

**FOOD PRODUCTION PRACTICES AND PERCEIVED FOOD SAFETY IN  
RESTAURANTS IN NAIROBI CITY, KENYA**

**BY**

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**DECLARATION**

**Declaration by the Candidate**

This thesis is my original work and has not been submitted in the same form to this or to any other university or institution for any award.

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## **DEDICATION**

I dedicate this thesis to my dear loving Mum Lucy Waithera, my loving husband Dr. Ezekiah Kimani, my daughter Adrienne Waithera, my brother John, my sisters Rose, Ceciliah and Jude. More sincerely to my dear late Dad Mr. Peter Murigi who immensely inspired me to scale to higher education.

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## ABSTRACT

Food safety protects foods from biological, chemical, physical, and allergenic hazards that may occur during all stages of production, distribution and consumption. A report by Kenya National Bureau of Statistics in the year 2019 ranked Nairobi County at the top in terms of cost burden incurred by county governments on fighting food borne illness. The purpose of this study was to investigate the effects of food production practices on perceived food safety at the restaurants in Nairobi city. The specific objectives were to establish the effect of food cooking practices, food storage practices and sanitation practices on perceived food safety in restaurants in Nairobi City. In addition, the study was to assess the food production practices through observation. The study was guided by theory of reasoned action, planned behaviour and health belief model. The study was a mixed method approach with descriptive and explanatory research designs adopted. The target population was 100 kitchen staff from sixteen restaurants within Nairobi city. Purposive sampling was used to select the restaurants while census sampling selected all the 100 kitchen staff that formed the sample size. Questionnaires collected quantitative data while an observation schedule collected qualitative data in line with the study objectives. Multiple linear regression was used to analyze data. Test of hypotheses results at 0.05 significance level revealed that cooking practices ( $\beta=1.474$ ,  $p=0.002$ ), food storage practices ( $\beta=0.739$ ,  $p=0.001$ ) and sanitation practices ( $\beta= 1.060$ ,  $p=0.001$ ) had significant effect on perceived food safety. The study concludes that food production practices, specifically cooking, storage and sanitation all affected perceived food safety. Observation revealed that handling of equipment and using the right procedures during the cooking process were not properly followed by the kitchen staff. The food handlers' in charge of storage violated rules and procedures of storage. The sanitation measures were violated as well yet the staff had adequate knowledge and skill on the same. The study recommends supervision and monitoring of food handlers during production process, separate storage for different food items and in case of a recorded food safety error, evaluation and corrective action taken. The study also recommends regular cleaning of food areas and surfaces, training of staff on areas of weaknesses, periodic inspection by public health and relevant agencies as well as sensitization of staff on the right food production process.

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**ABBREVIATIONS AND ACRONYMS**

ANOVA	:	Analysis of Variance
BC CAC	:	British Columbia Cook Articulation Committee
EFIC	:	European Food Information Council
FAO	:	Food and Agriculture Organization
HACCP	:	Hazard Analysis and Critical Control Point
IFPRI	:	International Food Policy Research Institute
iSALT	:	Institute for the Scholarship of Assessment, Learning, and Teaching
KNBS	:	Kenya National Bureau of Statistics
MSS	:	Mean Sum of Squares
NACOSTI	:	National Commission for Science, Technology and Innovation
RSS	:	Root Sum of Squares
UNICEF	:	United Nations International Children's Emergency Fund
WHO	:	World Health Organization
UNDP	:	United Nations Development Programme
UNFPA	:	United Nations Population Fund
UNESCO	:	United Nations Educational, Scientific & Cultural Organization

## OPERATIONAL DEFINITION OF TERMS

- Food borne illness** : Illness related to consumption of food, leading to symptoms with gastrointestinal features, including vomiting, diarrhea and abdominal cramps (Shapiro, et al., 2017).
- Food cooking practices** : These are practices defining food cooking preparation procedures, actual cooking procedures (Mbuthia, Muthoni & Muchina, 2015).
- Food production practices** : They are any activity where processing food is involved, ranging from food preparation, gifting, sharing meals, and cleaning up (Taylor, 2014).
- Food safety** : Includes a number of routines and practices the food handlers must observe to ensure food is safe during handling (FAO, 2012).
- Food sanitary practices** : These are practices defining sanitary processes which may lead to contamination both raw food stuff and ready food (Richardson, 2016).
- Food storage practices** : These are practices defining the way both raw foods are stored before cooking and storage procedure after cooking is duly completed (Baines & Seaman, 2015).
- Kitchen staff** : Group of restaurants personnel directly handling food; preparation of meals, gifting food, sharing meals, or cleaning up at the restaurant ( Kabuitu & Ngige, 2016).

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Introduction**

This chapter highlights include background to the study, statement of the problem, purpose of the study, study objectives, research questions, research hypotheses, and justification, limitation and scope of the study.

#### **1.2 Background to the Study**

Food safety has been a global critical issue of concern facing the food service industry. Researchers and experts in the food sector have continuously been in pursuit to understanding of the possible causes of food contaminations and importantly advised on restraints to food safety. Food is considered to be safe when food producers have no doubts that the product cannot harm any consumer thereafter (WHO, 2011; Nyamari, 2013; Achieng', 2016). Food safety are actions to ensure that all food stuffs are as safe as possible. As pointed by FAO (2011) the sole responsibility of the food handlers is to ensure food safety, from production to consumption. This process starts from the farm, at purchase of raw food through many separate phases in its handling, storage, preparation of food and serving, related cleanup and the use of leftover food. In this regard the joint European Food Information Council and World Bank report (2014) emphasized that it is important that broad precautions be taken thoroughly during food processing to ensure the safety of food and the consumers. Adequate evidence to violation of food safety measures are frequent outbreaks of food borne illnesses across the global. On a broad perspective, the risks leading to food contaminations are categorized into four classes; microbes through improper handling of both raw and cooked food, parasites through improper cooking, chemicals occurring naturally in food and environmental risks.

There exists slim literature on food safety in developed countries in the 21<sup>st</sup> century unlike developing countries. Dunton, Smith and Arioeh (2013) studied factors influencing food safety from a food preparation behavior in southern California. The study involved a sample of 107 households. The study reported that level of knowledge on food preparations as one of the foodborne illness risk factors. In United Kingdom, Clayton and Griffith (2014) reviewed a previous study on observation of food safety practices in catering as a national analysis and reported that worker characteristics, education and training among the workers, establishment procedures and sanitary measures shouldered the heavier risk of sources of food contamination. Reviewed by Raats and Adams (2014) was how food safety and food hygiene training studies in Europe were in the commercial sector. The study concluded that less than 40% of food handlers in the food service industry had adequately trained in the supervisory role of food safety during the period of the training which led to many studies considering lack of training as a restricting ability to measure food safety risks.

A comparative study on American and Chinese's restaurants, conducted by Green and Selman (2016) investigated safe food preparation as practiced by workers and managers. This study analyzed periodic data extracts from two main cities Florida in USA and Wuhan in China. Cross-contaminations factors were identified across the sets as the major contributing risks to unsafe food in the restaurants with knowledge on food practices being highlighted has an emerging cause of unsafe food in the restaurants. A study on a French prospective cohort by Aurelie, Caroline, Gojard and Katia (2018) investigated factors influencing food safety behaviors on consumer's health and revealed that that cleanliness of kitchen equipment had significant influence on food safety. In Egypt, Omar and El Hussein (2016) studied how food safety knowledge, attitude and practices in hotels affected hotel competitive advantage. Staffs' knowledge

and staffs' attitudes coupled with individual self-control created a competitive advantage quality differentiator for consumers, hotels, tour operators, and travel agencies. In Turkey Taner and Aylin (2020) studied food safety knowledge of food handlers within kitchens and found that food safety knowledge had a low remarkable score than expected, thus there was inadequate training on food safety in Turkey.

In African context World Health Organization (2015) reported that 29% of all food borne cases reported in Sub-Sahara Africa were due to poor food handling. Undercooking food and poor food handling practices within the food chain were quoted as the key sources of contamination. UNICEF has reported severally that most children in rural-urban regions in Africa died as a result of food borne illnesses (UNICEF, 2015). A study on the same slant studies conducted by Ababio and Lovatt (2020) revealed that about half of outbreaks in Sub-Sahara were due to poor food storage and related unhygienic environment. By the same study is that lack of commitment to enforce policies controlling health status of workers within the food chain also cause food contamination in most urban food establishments in Sub-Sahara Africa. This study supplemented a finding by Clayton and Griffith (2012) who had reported that the inconsistent routine medical examination of food handlers and pre-employment at food establishments often has been unreliable and a preventive measure of food safety.

In Rwanda, Mukhola (2012) studied how food handlers' health and food safety related. The study indicated high correlation between food handlers' health and food safety and revealed that maintaining standard medical controls over food handlers in the establishments was not easy due to rapid turnover. A study by Moser (2013) on food preparation patterns in African family households, a case of 300 households in Kwazulu province in South Africa concluded that educating and training food handlers was key to preventing food borne illness at any food point.



In Kenyan context, Kitagwa et al. (2012) in Eldoret Town studied how knowledge, attitudes and practices of food handlers within food kiosks related with food safety and hygiene. The study found that behavioral practices were inadequate. In match Nyamari (2013) study that evaluated the compliance to food safety standards among food handlers in selected hospitals in Kenya. A survey conducted regionally by KNBS (2015) indicated that on average 15% of food illness cases reported were caused by poor food handling at food points. The survey projected a high likely hood of an increase in food illness across the regions, more specifically in rural-urban regions due to the emerging socioeconomic trends and lifestyles (KNBS, 2015).

A study by Achieng' (2016) on determinants of food safety management in selected restaurants in Eldoret Town, Kenya identified that poor food storage, low basic knowledge on food handling and low sanitary measures as the key factors affecting food safety in the area of study. In a generalized point of view these studies conducted at different setting and period revealed that there were several barriers that affected compliance to the food safety standards in Kenya.

Sufficient data reveal that there are weaknesses on how food safety is managed in both small and large food businesses points, therefore food safety remains a key public health challenge in developing countries in the 21<sup>st</sup> century. Wallace (2014) stated that improvement on general food safety measures would account to reduction of food borne illnesses, which means better safe food. In regard to this, understanding of the determinants of food safety in the public food establishments is vital.

According to World Bank the broad sources of food safety hazards include, improper handling causing microbes, improper cooking, physical methods of storage causing unintended chemicals to the food stuffs and physical handling of the food stuffs during

processing which intentionally or accidentally added food safety hazards into the food (The World Bank report, 2000). From this, the researchers' forward-facing is to establish how kitchen staff execute their knowledge on food production practices would contribute to food safety at the restaurants in Nairobi City.

### **1.3 Statement of the Problem**

In a report by WHO (2018) control of control of foodborne disease outbreaks require skillful multi-disciplinary tasks. Researchers in epidemiology, laboratory medicine, food catering management, food microbiology and chemistry need to frequently conduct investigations on food safety hazards and the related control at different food establishments. Logic shows that poor food safety measures or management leads to food borne illnesses. Recent reports on food borne illness in Kenya especially in rural and urban areas were indicators of poor food safety practices at food establishments or at homes. In the year 2019 KNBS reported that county government shouldered burden on food borne illnesses. Nairobi County was ranked top followed by Kisumu then Nakuru. The three are the large urbanized counties in Kenya (KNBS reported, 2019).

This reflected a great challenge on food safety despite the factor that many studies on epidemiological discipline have been done here in Kenya and on food safety practices and hygiene in different sectors (Achieng', 2016, Gachuki, 2012; Kamau, Penina and Laban, 2012; Marwa and Ahmed, 2012; Githiri and Okemo, 2013; Nyamari, 2013). Few studies investigating food safety and practices from catering dimension and food management exist in Kenya and no study has been done investigating how food production practices affect food safety in Nairobi City. A study by Wainaina, Otieno, Kamau, Nyachieo and Lowther (2017) to investigated how knowledge, attitudes and practices-controlled food safety hazard in small food establishments within informal urban settlement in Kisumu, Kenya identified that most of the raw food was delivered

to the establishment via motorcycle aka “boda boda” and push cart aka “mkokoteni”. These food stuffs were highly exposed to food safety hazard cross-contamination. The researcher conceptualized to investigate how significantly perceived food safety by kitchen staff was affected by the food production practices.

#### **1.4 Purpose of the Study**

The study investigated the effects of food production practices on perceived food safety in restaurants in Nairobi city, Kenya.

#### **1.5 Study Objectives**

The general objective of the study was to establish the effect of food production practices on perceived food safety at the restaurants in Nairobi City, Kenya.

The specific objectives of the study were to:

- i. Establish the effect of food cooking practices on perceived food safety in restaurants in Nairobi City.
- ii. Establish the effect of food storage practices on perceived food safety in restaurants in Nairobi City.
- iii. Establish the effect of sanitary practices on perceived food safety in restaurants in Nairobi City.

#### **1.6 Research Hypotheses**

**Ho1:** Food cooking practices have no effect on food safety in restaurants within Nairobi city.

**Ho2:** Food storage practices have no effect on food safety in restaurants within Nairobi city.

**Ho3:** Food sanitation practices have no effect on food safety in restaurants within Nairobi city.

### **1.7 Significance of the Study**

The study is important in many domains; to the food establishment points, food handlers, researchers and scholars as well as other interested parties. Food establishment points need to draw food safety plans. Findings from this study can be adopted as standing points during the planning of food production safety schedules at the restaurants and any other food establishment points.

Food handlers during the food production process are direct beneficiaries of this study as it directly deals with the perceived behavior on food safety during the production process. The findings by this study enlightened food handlers develop a positive perception on safe food production at any food production point or any other food production chain.

Food safety and related food production illness have been a global critical issue where researchers and scholars in the food industry discipline have continuously pursued understanding issues restraint to food safety and control of food production related illnesses. This study provides sufficient literature on the area related to how food handlers perceive the production practices towards food safety. The study further triggered some thoughts for further investigation in the discipline.

### **1.8 Scope of the Study**

This study was conducted in sixteen restaurants within the city of Nairobi. The restaurants involved were the casual dining restaurants within Nairobi City. Data was collected using structured questionnaires and observation. Food production practices were conceptualized as predictors of perceived food safety at the restaurants. The study commenced in January 2021 and data collection was undertaken between the months of October and November the year 2022.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

The chapter presented widespread review of past related studies that focuses on food safety. The sequence of sub-heading is theoretical framework, empirical literature review and conceptual framework.

#### **2.2 Concept of Food Safety**

Documented evidence shows that there exist a wide range of factors contributing to food contamination in foodservice. These factors are highly associated with the technological, biological, physical and chemical hazards. Biological hazards are characterized by the contamination of food by microorganisms. Found in the air, food, water, animals, and in the human body, these incredibly tiny organisms are not inherently unsafe – many provide benefits to our anatomy. Despite this, foodborne illness can occur if harmful microorganisms make their way into the food we eat. There are several types of microorganisms, each of which can negatively impact health: bacteria, viruses, and parasites.

Chemical hazards are identified by the presence of harmful substances that can be found in food naturally, or unintentionally added during processing. Some chemical hazards include naturally occurring chemicals, such as mycotoxins, intentionally added chemicals, including the preservative sodium nitrate, and unintentionally added chemicals, like pesticides. Physical hazards are foreign objects that are found in food products. They are either naturally found in the specific item, such as stems in fruit, or not normally part of the food item, such as hair or plastic. Unnatural physical hazards are generally more dangerous to health, whereas natural physical hazards can be harmless. Past studies have viewed food safety as a continuous process or a system that

consist of principles, practices and, implementations that incorporates all aspects of procuring, transporting, preparing and serving to ensure food is safe for consumption. (Perlik, 2014). Backing the 2008 World Health Organization report on food safety Saleh and Murali (2017) defined food contamination as occurrence of an activity or process or practice in a food environment which causes development of food safety hazard agents.

Outlined by WHO (2008) was that policy makers and direct food handlers are responsible for controlling development of food safety hazard agents. Studies conducted on epidemiology a different discipline identified that inadequate heating inappropriate storage, infected food handlers, food safety knowledge, poor personal hygiene and cross-contamination as the major source of agents of food safety hazards across the world. Sufficient documentation on food safety show that majority of the food safety risks skew toward patronizing and food handlers' food production practices and assertion by Saleh and Murali (2017) is that minimized source of agents of food safety hazards would on improvement on food safety. A study conducted by Achieng' (2016) on factors affecting food safety in selected restaurants in Eldoret Town, Kenya, supported findings by Ball et al. (2013) that insufficient cooking or reheating of food improper storage of cooked food before consumption, use of dirty utensils/equipment carry large proportion food safety hazard episodes anywhere where the food safety policies are not observed.

Proclaimed by Shu-Yin (2015) is that inconsistent monitoring of food safety policies during patronizing and food production at food establishment contributes to high risks of food safety hazards. Based on this assertion this study linked poor management strategies and implementation to unsafe food. A linkup led the study to evaluate the proposed hazards using standards set up by food safety management systems among

them the HACCP system. The HACCP system emphasizes that inspection and improvement on food production process to be a better way of controlling food safety risks rather than inspection on finished product. HACCP uses a logical scientific approach to identify specific hazards and specifies the measures that can manage and guarantee food safety.

The major categories of food safety hazards addressed by HACCP are microbiological hazard, physical hazard, and chemical hazard. (Bolton, 1997). This study did not measure directly the depth of influence of these food safety hazards as stated by HACCP system but was guided by the HACCP system emphasis to understand and highlight the possible effect of food production practices on food safety and suitability.

### **2.3 Food Cooking Practices**

Management workforce at any food establishment is responsible of ensuring that the duties dispensed by different operators minimize all possible food safety hazard occurrences during food production process (BC CAC report, 2015). The BC CAC 2015 report identified that a chef's cooking skill and knowledge coupled adherence to actual cooking procedures as the ways of controlling food safety hazards during cooking practice. A study by Aurelie et al. (2018) identified that about 67% of the chefs involved in the study do not fully observe the right procedures as required in preparation of different meals.

The study concluded that preparation cooking skills and earlier preparation markedly determined level of food safety hazards. Sixty-seven percent of the chefs involved counted on food readiness based on the appearance of the food, and the taste of the food than backing on use procedures like use of thermometer to check the temperatures and required period of heating during cooking process. Inexperienced workers and interns

working were found to more likely adhere to the procedures of cooking and use of instruments like thermometers to control the temperatures, proper cooking equipment than experienced ones.

Study by Ko (2016) on food safety at marine food points in Wuhan in China found that inadequate food cooking knowledge and practices among chefs raised the probability of increased food safety hazards. The study identified that failure to monitor the level of temperature subjected raw foods during cooking process led to presence of pathogens such as Norovirus, Salmonella spp, Campylobacter spp and Clostridium perfringens at 46%, 15%, 12% and 10% respectively in already cooked meals. This study finding by Ko (2016) echoed finding by Shu-Yin (2015) in a study done at fast food joints in Bangkok Thailand that existence of food safety hazard like pathogens directly related to inadequate knowledge on food cooking practices and failure to observe proper cooking procedures. The study by Shu-Yin (2015) suggested that monitoring how cooking was done at the establishments would reduce risks of food safety hazards and agents.

Documented literature has shown that uneven cooking result due to inadequate knowledge on cooking and insufficient practical use of some cooking equipment, ignorance by the operators thus leading to presence of food safety hazard in the processed food. In Minnesota Nicole, David and Karen (2012) studied how chefs were knowledgeable on use of cooking equipment as well as standard of the equipment themselves. The study reported that many cooking equipment in majority of the food service establishment did not meet the standards required by US food and drug administration guidelines. This induced ignorance to adhere to the rules at some stages hence comprising the safety of the food produced.



Nicole et al. (2012) carried a similar study and proved that variation of temperature control during cooking and reheating or hot-holding practices as key sources of destructive pathogen, associating this to ignorance of the food handler once more. Doyle and Beuachat (2018) explained that some toxin developing microorganism may survive destruction during cooking and there-forth remain food safety hazard hence advised that proper cooking practices should be observed.

## **2.4 Food Storage Practices**

Raw food stuffs and ingredients in any food establishment are acquired from different sources usually away from the establishment. Fawzi and Shama (2014) urged that cleanliness level at the source and its environment a times comprise levels of food safety hazards to these stuffs. A report to IFPRI by Mutua and Karugia (2018) categorized food safety hazards into categorizes and indicated the stage of concern in which the hazards are acquired the food production process. Raw foodstuffs were classified into fluid and solid forms. Mutua and Karugia (2018) urged that these raw food stuffs may acquire food safety hazard depending on how they are stored and transported to the destined establishment and indicated that development of food safety hazard agents start at the early stages of food processing, acquisition of raw food inclusive.

In the report toxins such as heavy metal, chemicals harmful to human and pesticides and parasitic organisms were listed in the category of hazards associated with initial stage and storage stages in the production process. From this dimension the study made an initiative to investigate whether food safety was compromised by how food stuffs were stored at different stages of food production process.

Motorcycles and low-capacity trucks as mode of transport have been cited as drivers of economic growth by several school of thought and scholars across the globe. Tama

(2016) pinpointed that China, Singapore, Malaysia and the nearby Islands have embraced use of motorcycles and low-capacity trucks as mode of transport. In the same era Mazijn and Achten (2016) conducted a study in Philippines in upcoming restaurants on relationship between mode of transport and food safety hazards. The study indicated that fluid and non-dry raw food stuffs had high chances of acquiring food safety hazards or agents before reaching destination than solid and dry raw foods. Dust, fumes, temperature and humidity were named as the possible agents of food safety hazards during transportation.

In a study by Wainaina, et al. (2017) on knowledge and attitudes towards control of food safety hazards in small food establishments within informal rural/urban Nyeri found that motorcycle aka “*boda boda*” and push cart aka “*mkokoteni*” to be the economical means transport for raw food stuff acquired. Pegging this to Mazijn and Achten (2016) assertion that most raw food stuffs acquire food safety hazards and agents during transportation this study directly translated the raw food stuff delivered to the destinations through use of motorcycles, low commercial truck and push carts have high chances of acquiring food safety hazards or agents.

Food safety hazard under the category of biological hazards like mold, toxins produce by yeast and afro toxins were identified by Loessner and Golden (2015) to be developed during storage of both raw food stuffs and cooked food. The study noted that proper use of storage equipment at the store and after cooking was a great challenge as it was derived ignorance of the concerned food handler. Loessner and Golden (2015) there are high chances of food safety hazards developing when different kind of food are stored in the place since the spoil levels vary. The duos recommended that storage conditions for foods should often vary; with the variations differing for the same foods depending on the freshness or dryness of the particular food.

An earlier study by Wangalachi and Oiyee (2010) on food quality and safety in 303 household Suba sub-county, Kenya noted that storage areas for raw food stuffs from harvested were not dry and well ventilated with 67% of the household storing non-food chemical products such as lubricating products and fuel in the same room with farm harvests. Nyamari (2013) studied compliancy of food safety standards in selected level 4 hospitals in Kenya and found lack of proper cleaning of food storage equipment like hot flasks and dishes increased growth rate of microbes and organoleptic change on stored food. A similar sentiment by Achieng' (2016) was that some of the equipment used for food storage in the restaurants investigated had designs with limited effective means of controlling and monitoring temperatures, humidity, air-flow; characteristic likely to have a detrimental effect on food safety hazard development.

## **2.5 Food Sanitation Practices**

Insanitary food production practices have been reported to significantly relate to development of food safety hazards during food processing cycle (WHO 2011; FAO 2011; World Bank report 2014 and BC CAC report 2015). Use of clean water has been reported to be the main agent of a wide spectrum of food safety hazards globally (McLauchlin & Little, 2010). Poor drainage and sewer system have been noted to be persistent origin of unclean water in most rural urban centers across as Sub-Saharan Africa (WHO report, 2017). Reported by Wandolo (2016) was that water from sources like deep boreholes, harvested rain and seasonal springs to be mostly contaminated. Wandolo further reported that water piping systems in urban areas get tapered thus creating loophole for contamination. In connection to this study consider any contaminated water used as an agent of food safety hazard. In suburbs of Addis Abba Ethiopia Rizzo and Bianco (2014) noted that food handlers themselves modelled food production practices that promoted food safety hazard. The couple cited water recycling

due to shortage as a routine practice at several food establishments and stated dirty water was an agent of food safety hazard.

A study by Wainaina, et al. (2017) noted that dirty sinks, containers and equipment at any food establishment were a major source of food safety hazards. On the note, Wainaina, et al. (2017) reported that such practices during food preparation, cooking and serving resulted from food handlers' ignorance and perceived food safety. The study strongly emphasized that food handlers whether at home, or at food establishment need to be sensitized on importance of washing hands and recommended a six-step hand washing procedure by Griffith, Farber and Tedd (2016). Recommendation by Rizzo and Bianco (2014) enlighten that cleaning of the hands, utensils and premises at food establishments and at home using standard detergent and sanitizer be considered with weight for they control food safety hazards effectively. Achieng' (2016) observed a noxious practice by food handlers where cold water was used to clean utensils, improper rinsing and use of untidy tea wiper at rush hours. On a different tone Achieng' (2016) also observed that the large group of the restaurants investigated used food equipment and containers that could not be easily disassembled to allow maintenance and disinfection to facilitate inspection for pests. The study recorded noted these practices as major agents of food safety hazards at the restaurants.

## **2.6 Theoretical Framework**

This study considered the theories of behavior change to explain perceived behavior on food safety during food production was affected by the selected food practices exercised by kitchen staff at the restaurants. Behavior-change theories have been noted to be inconsistency in their predictive ability and their specific constructs are easy to adapt in local context of application (Young & Waddell, 2018). The theory of reasoned

action, health belief model and theory of planned behavior were identified as the most suitable theories based on their consistent and predictive proponents.

### **2.6.1 Theory of Reasoned Action**

An assertion by Nancy (2013) is that researchers have difficulty to provide valuable insight to understand why individuals behave unethically in different specific situations. Fishbein and Ajzen (2010) stated that the best approach to understand people's behavior and intentions is found in the theory of reasoned action, which is directly concerned with consciously-intended behavior and links behavioral intentions to the person's actual behavior. Perceived behavioral control was noted by Cooke and French (2008) to be the constructs of Theory of Reasoned Action that as a strong predictor of behavioral intentions but not necessarily of behavior itself. This aligns to (Rhodes & Courneya, 2008) who asserts that an individual's actual behavior determines the intention to act. This study relied on a hypothetical scenario that focused on behavioral intention and did not explicitly measure behavior. The study also backed on perceived behavioral control another the strong construct of the theory although the construct assumes that actions are totally controlled volitionally. Perceived behavioral control supported the study in predicting whether the food handlers are more likely to perform actions controlled by perception thus leading to affected food safety procedures despite them having knowledge and skill of safe food preparation.

### **2.6.2 Theory of Planned Behavior**

The Theory of Planned Behavior was developed by Ajzen 1985, and since then has been tool used in diverse disciplines to predict an individual's intention to engage in a behavior at specific time and place (Ajzen, 1991). According to iSALT Team (2016) the Theory of Planned Behavior posits that behavior intentions determine, an individual's attitude toward subjective norms and perceived behavioral control. This

theory assisted the study in measuring the components; behavior subjective norms and perceived behavioral control of kitchen staff in the involved restaurants in Nairobi city.

### **2.6.3 Health Belief Model**

The health belief model was first developed in 1958 and there exist a number of revised editions (Hochbaum, 1958; Rosenstock 1974; Abraham & Sheeran, 2015). The health belief model is a cognitive model which hypothesizes that behavior of an individual is determined by several beliefs about threats on one's well-being, the effectiveness and the probable end results. According to DiClemente, Abraham and Smith (2013) health belief model focus on individual's attitudes and beliefs than seeking to explain and predict behavior. The main constructs of health belief model adapted by this study were self-efficacy and perceived susceptibility.

Self-efficacy is an individual belief to capably execute a task while susceptibility explains individuals' ability to determining the level of risk during the act of execution the task Bandura (1977). As highlighted by Heimlich and Ardoin (2008) these constructs are supplemented by stimuli referred to as cues of action, which trigger actual adoption of behavior. Hayden (2014) stated that people tend to adopt safety measures when they believe the new behavior will decrease their chances of getting affected themselves. This safety measure is directly influenced by the individuals' perceptions such as culture, past experiences, and skills.

In this dimension study considered that food safety at the establishment depends on the food handlers' attitudes and beliefs at the restaurants which are directly determined by susceptibility and self-efficacy. To this study susceptibility enabled determination of the level of risk that a food handler is at in contracting food borne illness by not performing proper food safety practices. Self-efficacy determined the individuals'

confidence to carry out an activity by applying already learnt skills and how the kitchen staff perceived their way of carrying out daily food production duties at the restaurants to be affecting food safety.

## **2.7 Summary of the Gaps**

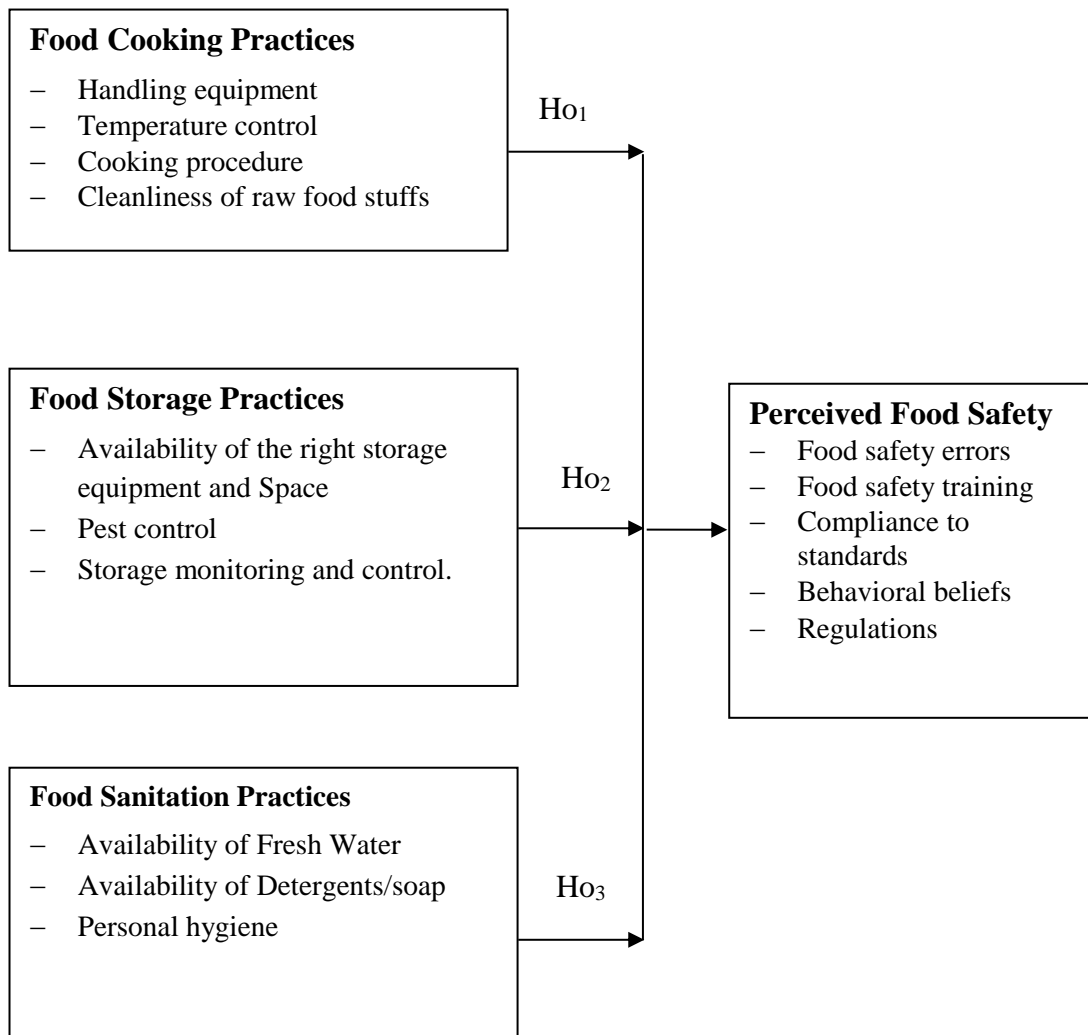
Mixed reaction from past studies on food catering and epidemiology disciplines have strongly pointed out that both external and internal factors lead to food safety hazards. Past studies conducted in different scopes; hospitals, university cafeteria, conventional restaurants have cited food heating, inappropriate storage of foods, handlers' knowledge on safety, handlers' personal hygiene plus health and how the handlers operated as the major sources of food safety hazards (Ball et al., 2013; Rizzo & Bianco, 2014; Shu-Yin, 2015; Achieng', 2016; Wandolo , 2016; Wainaina, et al., 2017). The studies developed diversified concepts where many focused on identifying the sources and agents of food safety hazards without pointing on behavior of food handlers and their perceived effect on food safety. This study filled this gap by investigating restaurants within Nairobi city on the effect of food production practices on perceived food safety.

## 2.8 Conceptual Framework

The independent variables are, food cooking practices, food storage practices and food sanitation practices while the dependent variable is perceived food safety.

### Independent Variables

### Dependent Variable



**Figure 2.1 Conceptual Framework**

**Source:** Modified and adapted from Thomas, (2012)



## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter highlights the research design, the target population, the sample size and sampling procedures, data collection instrument, the validity and reliability of the data collection tools, data processing and analysis procedures, legal and ethical considerations of the study.

#### **3.2 Study Area**

This study was conducted in restaurants in Nairobi city. The Nairobi city is the Commercial and administrative hub with a high concentration of casual dining restaurants. According to the KNBS report of 2019, Nairobi County had incurred large bills towards solving foodborne-related illnesses.

#### **3.3 Research Design**

According to Saunders, et al. (2012), research design is a plan aimed at answering a specific research question. It concerns proper research data management and brings together several components, strategies, and methods to collect data and analyze it

The study used descriptive research designs. Descriptive research design is a powerful tool used by scientists and researchers to gather information about a particular group or phenomenon. This type of research provides a detailed and accurate picture of the characteristics and behaviors of a particular population or subject.

The design was considered suitable for studies as it aimed at analyzing food production practices investigated at the restaurants and reporting the characteristics of the group involved (Cohen, Manion & Morrison, 2017). This design also supports integration of both quantitative and qualitative types of data in the analysis (Mertens, 2018).

### **3.4 Target Population**

The target population is “the entire aggregation of respondents that meet the designated set of criteria” (Burns & Grove 1997:236).

According to Nairobi County business register 2021 there are 158 registered restaurants that the study focused to involve in the investigation. The 158 restaurants were divided into nine strata based on different characteristics. Purposive sampling was used to identify one of the strata which had a total of 16 restaurants which were of the same size. There were a total of 100 employees in the 16 restaurants under the category of the direct food handlers considered as kitchen staff by the research. From this dimension the study small scale target population was 100 respondents.

### **3.5 Sampling Procedure and Sample Size**

The study target population was 100. Shukla (2018) advice that census sampling is suitable if the data subjects rather the target population of a study are less than 100 in number. Census sampling technique lead the study to consider all the 100 kitchen staff in the 16 restaurants as the study sample size.

### **3.6 Data Collection Instruments**

Data-collection instruments are tests, questionnaires, inventories, interview schedules or guides, rating scales, and survey plans or any other forms which are used to collect information on substantially identical items from 10 or more respondents.

A structured questionnaire for kitchen staff was the main data collection tool and an observation schedule was used to supplement the relevant data need in the study. The questionnaire was suitable and gave kitchen staff chance to give their opinions as pertains to the research problem. The questionnaire had both open-ended and close-ended questions, with closed ended presenting descriptive statements constructed in a

5-point Likert scale. As demonstrated by Zikmund and Griffin (2015), data gathered from a questionnaire is free of researchers' influence. The questionnaire and the observation schedule captured quantitative data with a free observation made based on the observation schedule. The data was collected in the month of October and November 2022.

### **3.7 Data Collection Procedures**

An introductory letter from Moi University and a permit from NACOSTI enabled the researcher capture data with legality. The management of the 16 restaurants picked accepted the restaurant be involved in the study and researcher interaction with the kitchen staff and making observations relevant to the study during the period of data collection. The researcher made arrangement with the managements to clearly know the dates and the appropriate time to collect the data. On the accrual data of data collection, the researcher sensitizing the staff on the importance of the study and then administered the questionnaires to the kitchen staff willing to participant. The respondents were given a two days' period to dully complete the questionnaire. After administering the researcher made the observations in the key areas as guided by the observations schedule.

### **3.8 Pretesting of Research Instruments**

An instrument pretesting was done to assess the effectiveness of the research instruments towards collecting the required and relevant data for the study. According to Ranjit (2018) pretesting of data collection instruments ensures that the instrument possess the right question for information required by the study and are consistent which then motivates the respondents to share the required information. The study sample size was 100 subjects. Based on assertion by Kim and Stukel (2017) that pretesting sample should be within the range of 1% to 10% of the actual study sample

size the study involved only 8 kitchen staff chosen from 8 restaurants within the city that were not involved in the final study to pretest the reliability of questionnaire and eight subject experts who were lecturers in the field of hospitality for validity of the questionnaire.

Pretesting test was conducted with the aim to ensure that the research instruments were valid and reliable and helped the identification of design flaws as well as refining data collection and analysis plans. The researcher keenly explored ways of further improving the consistency of the kitchen staff questionnaire by clarifying the statements and ensuring the number of items was high. The pretesting was done in the month of September 2022.

### 3.8.1 Reliability of Instruments

Cronbach's Alpha test was used to determine the reliability of the instruments. The study computed Cronbach's Alpha Coefficient for each instrument question items and then computed the total reliability factor. According to Shukla (2018), the scale of reliability varies from 0 to 1 in accordance to Cronbach Alpha test. The acceptable level of significance was 0.7 as recommend by (Zohrabi, 2018; Wilson, 2019). The Cronbach Alpha coefficients for the variables and overall Cronbach Alpha coefficients for the questionnaire were as presented in in table 3.1.

**Table 3.1 Reliability Test Results**

	<b>Cronbach's Alpha if Item Deleted</b>
Food cooking practices	0.798
Food storage practices	0.785
Food sanitation practices	0.779
Food safety	0.789

As suggested by Robinson (2019) reliability of an instrument is indicated by a Cronbach Alpha coefficient equal to or above 0.60. Cronbach Alpha coefficients within 0.90 and

above show excellent reliability, within 0.70 - 0.90 show high reliability, within 0.50-0.70 show moderate reliability and Cronbach Alpha coefficients below 0.5 showing low reliability. The results in table 3.1 show that all the variables in the study had Cronbach's alphas greater than 0.7 thus the reliability was high. To this end, standardization of items gave an overall Cronbach alpha index of 0.845 and a value of 0.7 or greater Cronbach alpha is sufficient to consider the set of questions for each variable as strongly related and reliable (Zohrabi, 2018; Wilson, 2019).

### **3.8.2 Validity of the Instruments**

Validity of a research instrument assesses the extent to which the instrument measures what it is designed to measure (Robson, 2011). Face and content validity were tested by subject experts who in this case were lecturers in the field of hospitality. In this study content and construct validity were checked to ensure the items in the questionnaire explained what was intended and appropriately measured the constructs concepts.

### **3.8.3 Validity Test Results**

In a study, instrument reliability is important but is not sufficient unless when combined with validity (Wilson, (2019). This study pretested the degree to which items in the questionnaire reflected the universal content in other words the content validity. To facilitate validation, judgmental approach was used and it involved eight experts. The experts reviewed the question items in the questionnaire and established the content validity. Content validity ratios were computed using Lawshe method and those questions with content validity index less than the critical level of eight panelists were eliminated (Lawshe, 1975). {See appendix V}. This generated a new questionnaire with few question items in each variable. The result adapted from the panel of 8 experts were as shown in table 3.2.

**Table 3.2 Validity Test Results**

	Initial number of questions	Number Eliminated <sup>a</sup>	Number significant
Variable 1 <sup>i</sup> .	15	5	10
Variable 2 <sup>i</sup> .	15	2	13
Variable 3 <sup>i</sup> .	14	3	11
Variable 4 <sup>d</sup> .	12	4	8

*a. Listwise deletion based on the procedure.*

*i. Independent Variable.*

*d. Dependent Variable.*

### **3.9 Data Processing and Analysis**

Data collected was inspected, transformed and modeled with aim to discover useful information, signifying conclusions and supporting decision making. Qualitative data from observations was analyzed using content analysis and supplemented discussions. Quantitative data captured by the questionnaire was coded using a five scale Likert scale where SD–strongly disagree was coded as 1, D–disagree was coded as 2, NS–not sure was coded as 3, A–agree was coded as 4 and SA–strongly agree coded as 5. Using Statistical Package for Social Sciences version 24 the simultaneous steps in analyses were done. This enhanced accuracy and precision in the result generation.

The analyses generated both descriptive and inferential statistics. Descriptive statistics described the characteristics of the study sample, which were presented as frequencies, percentages, mean and standard deviation. The mean and the standard deviation were the key descriptive parameters that bridged the analysis to multiple regression analysis. Multiple regression analysis involved simultaneous tests that gave important inferential parameters to the study. These simultaneous tests were tests of assumptions, test for association, ANOVA test and lastly study null hypothesis testing.

### 3.9.1 Tests of Assumptions

Test of assumption were normality test and multicollinearity test. Normality test which adapted Shapiro-Wilk test, tested whether the data captured was got from a sample that came from a normally distributed population. Shapiro-Wilk test was suitable for normality test since the study sample size was less than 1000 subjects (Zaiontz, 2020). The Shapiro-Wilk test null hypothesis was that the data values got from the respondents were identical, independent and came from a sample that was normally distributed, and was tested at 5% significance level, as shown in equation (i)

$$H_0: x_i \sim N(\mu, \sigma) \quad \left\{ \begin{array}{l} \text{For real values of } \mu \text{ and } \sigma \neq 0 \\ i = 1 - 95 \end{array} \right. \dots\dots\dots (i)$$

Where  $\mu$  is the mean and  $\sigma$  is the standard deviation parameters. The

Where  $\mu$  is the mean and  $\sigma$  is the standard deviation samples parameters. The W statistics calculated from Monte Carlo stimulation was the statistics that stipulated ruling of the test. With W-statistic being less than the test significance level the null hypothesis is rejected Van den Berg (2020).

Variance inflation factor test was most suitable for multicollinearity test among the three independent variables since the sample size was less than 500 subjects (Zach, 2019). Variance inflation factor measured the inflation of the parameter estimated for the three food practices. Declared by Rashwan (2019) is that variance inflation factor range starts from one and as no upper limit. A value of one indicates would show there is no linearity between the corresponding food production practice with any other practices investigated in the study. Any value between 1 and 5 would indicate moderate linearity but would be considered not to require attention. An attention would be required if a VIF would be greater than 5 as it would indicate severe linearity.

### 3.9.2 Test of Association

The test of association between the practices and perceived food safety was done using Pearson product moment test. Pearson product-moment correlation coefficients were obtained that shown the magnitude and direction of association between the food practices and perceived food safety at the restaurant. As suggested by Warren (2019) the strength of the relationship between predictor and response variables can be interpreted from either direction and based on the scale constructed from the magnitude.

A magnitude within a range less than 0.3 indicate very weak relationship, within the range 0.31 to 0.5, weak relationship, within the range 0.51 to 0.7 moderate relationship and greater than 0.7 very strong relationship. If magnitude computed is zero, it is an indicator of lack of relationship. A negative value indicates that the effect due to influence is in reverse as set during analyses. McCabe and Moore (2019) assert that the bigger the coefficient, the stronger the association.

### 3.9.3 Model Specification and Fitness

ANOVA test was done. This was for purposed of describing the predictive accuracy of the study statistical model and explanatory power of the food production practices on perceived food safety. Model specification tested whether the combination of the practices investigated by the study exhibited characteristics of F-distribution (Shaffer, 2019). The null hypothesis for the test, was the food practices investigated do not belong to a family of F-distribution and was tested at 5% significance level as shown in equation ii.

$$H_0: x_i \sim F(\alpha, \nu_1, \nu_2) \begin{cases} \text{For real values of } p, \nu_1 \text{ and } \nu_2 & x, \nu_1, \nu_2 \dots\dots\dots (ii) \\ 0 & x \leq 0 \end{cases}$$



Where  $\alpha$  is the significance level,  $\nu_1$  and  $\nu_2$  are degrees of freedom with  $\nu_1 = k-1$  being degrees of freedom for the repressors; the practices and  $n-k-1$  where  $k$  = number of predictors as the degrees of freedom for the residual and  $n$  is the sample size.

Bryman (2017) explained that the null hypotheses should be rejected if the p-value computed is greater than the test significance or if the computed F statistics is greater than the F critical value at  $F(\alpha, \nu_1, \nu_2)$ . ANOVA test further yields result for model fitness. The magnitude of coefficient of determination,  $R^2$  was used to explain the degree of variation of the observed values from the fitted regression to the portion of variance and its' associated standard error (Zikmund & Griffin, 2015).

#### 3.9.4 Test of Hypotheses

According to Van den Berg (2020) asserts that predictors in a hypothesized investigation exhibit characteristics of student-t distribution. The practices food cooking, storage and sanitation were the predictors of perceived food safety in the investigation. on testing whether the three predictors in the study exhibited the t-distribution characteristics the study was able to explain if the practices had statistically significant effect on perceived food safety at the restaurants. The study statistical model was as presented in equation (iii).

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon \dots \dots \dots (iii)$$

Whereby;  $Y$  = perceived food safety,  $X_1$  = food cooking practices,  $X_2$  = food storage practices,  $X_3$  = food sanitation practices,  $\beta_0$  = intercept constant,  $\beta_1$   $\beta_2$  and  $\beta_3$  are coefficients of regression and  $\epsilon$  is the summative error term.

#### 3.10 Ethical Considerations

During the study the researcher observed the research ethics; right to anonymity and confidentiality of data collected, right to privacy, justice, beneficence and respect for

staff at the restaurant as advised by (Shukla, 2018). The researcher made sure through pilot tests that the study data collection tools were valid and reliable for use. With an introductory letter from the Moi University, a data collection permits from NACOSTI, consent from the managements of the 16 restaurants involved data collection was done the researcher sensitized the respondents on the importance of the study and was obligated to the respondents who participated. Data captured from the tools was treated with utmost confidentiality and avoiding researchers' interests was analyzed in accordance to the rules of research.

## **CHAPTER FOUR**

### **RESULTS AND PRESENTATION**

#### **4.1 Introduction**

This chapter present the research findings got from the analysis in the order of; response rate, demographic findings, descriptive and inferential findings for the study variable as aligned to study objectives.

#### **4.2 Response Rate**

The study targeted 100 kitchen staff who were given the questionnaires. Out of 100 questionnaires administered, 100 questionnaires were returned. Data screening and cleaning was done. 95 were complete and were considered valid for analysis. They represented 95% return rate. The return was considered adequate as per the recommendations by Cohen, et al. (2017) who suggested that return rate greater than 60% as adequate in social research.

#### **4.3 Demographic Data Analysis of the Respondents**

The study captured respondents' demographic information; gender, age, educational background and years having worked in food industry for all the respondents involved in the study. This was vital to the study as it helped the researcher to understand cross-cutting issues on food safety across gender, age, education and number of years worked. The findings were presented in the successive sections.

##### **4.3.1 Distribution of the Respondents by Gender**

This part presents gender characteristics of kitchen staff in the restaurants involved. Results indicated that 42.1% of the respondents were male while 57.9% of the respondents were female. The results were as indicated in table 4.1.

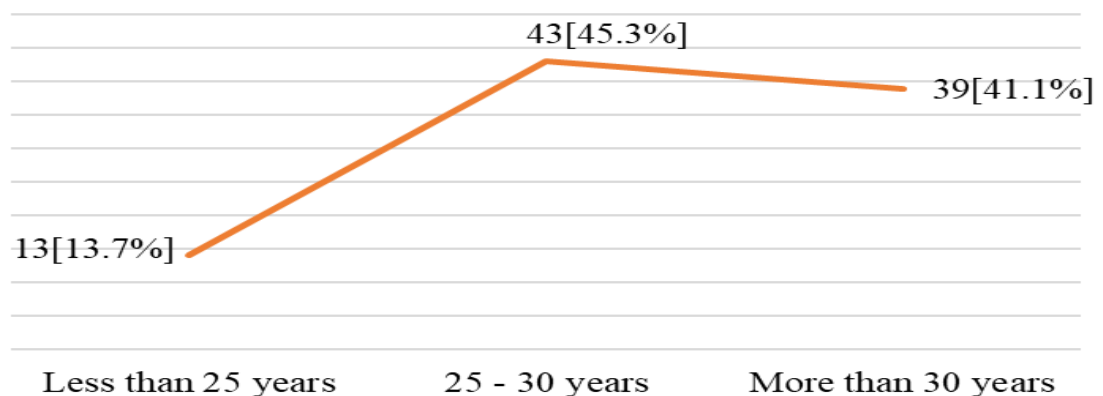
**Table 4.1 Respondent's Gender Results**

Category	Frequency	Percent
Male	40	42.0
Female	55	58.0
<b>Total</b>	<b>95</b>	<b>100.0</b>

The results present are evident enough that there were more female employees in the restaurants as shown by the percentages 42.1% for males and 57.9 for females. This indicated moderate distribution of gender and that would eliminate gender biasness in opinion given by the group. It also shown that the sector was not dominated by a particular gender.

#### 4.3.2 Distribution of the Respondents by Age

Study respondents gave their age bracket. Responses from the two categories were as portrayed in figure 4.1.

**Figure 4.1: Age bracket results for respondent's**

Results shown that 45.3% of respondents were aged between 25 years and 30 years, 41.1% of them having age above 30 years. A smaller percentage of 13.7 of the 95 respondents had age less than 25 years. This demonstrated that the respondents had a spectrum of ideas and their opinions were sufficient for analysis.

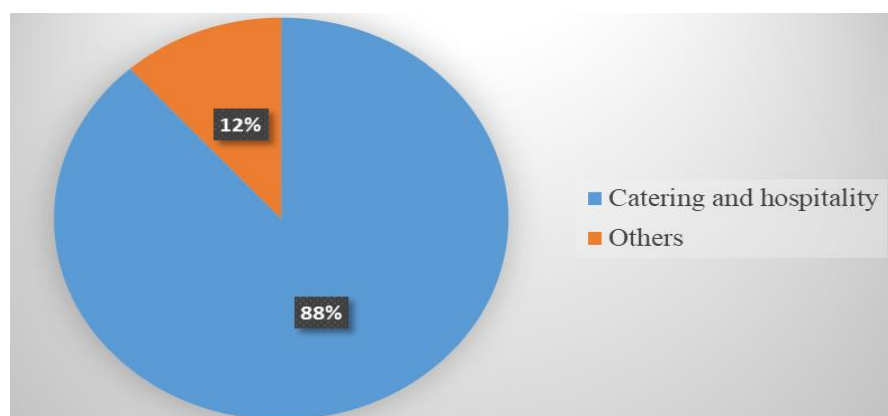
### 4.3.3 Academic level and Area of Specialization Results

The respondents were requested to state their highest level of education and area of specialization. This was important in order to establish whether chefs had adequate skills which would enable them to understand food safety dynamics. The feedbacks for the chefs were as depicted in table 4.2 and figure 4.2.

**Table 4.2 Respondent's level of education results**

Category	Frequency	Percent
Certificate	35	36.8
Diploma	38	40.0
Undergraduate	22	23.2
<b>Total</b>	<b>95</b>	<b>100.0</b>

The findings in table 4.2 indicated that the staff had a blended levels of education level attained. The large group of the respondents had diploma level at 40.0%. Respondents with certificate level of education were 36.8% while 23.2% were the smaller in the group with undergraduate degree level. These implicated that all the respondents were knowledgeable and capable of interpreting questions directed to them in the questionnaire.

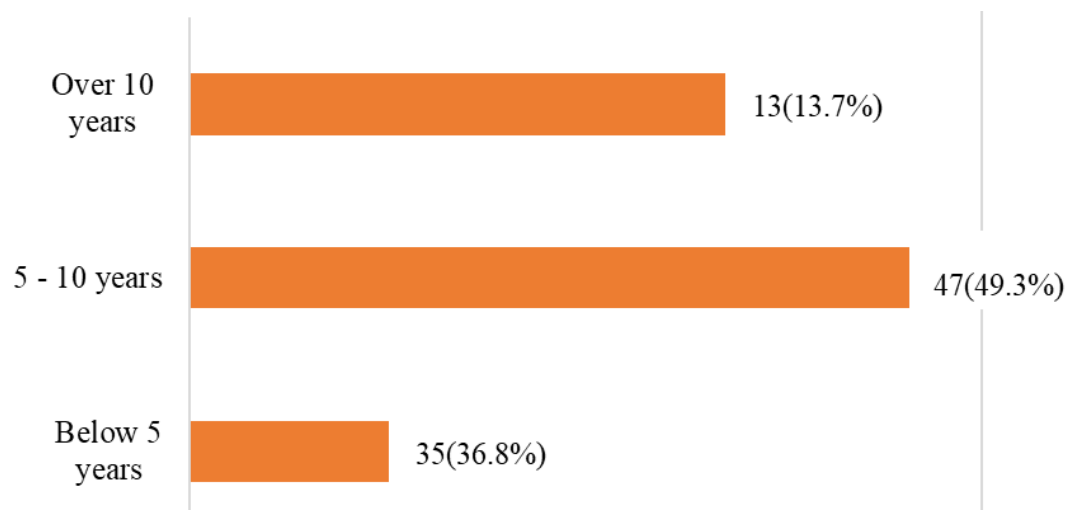


**Figure 4.2 Respondent's education specialization results**

Out of 95 respondents involved 84(88%) had education background aligned to catering and hospitality. This indicated that the large group of the respondent were a skilled workforce in the field of catering and hospitality. A cross tabulation shown that the 11(12%) who did not have background oriented to catering and hospitality had certificate education level of education.

#### 4.3.4 Working Experiences of the Respondents' Results

The study investigated respondents' work experience in the food industry and service. This was intended to know the whereabouts of experiences and operations homogeneity of the group. Their responses were as presented in figure 4.3.



**Figure 4.3 Respondents' Working Experience Results**

Results presented in figure 4.3 show that the 13.7% which is the smaller group of the respondents had worked in the food industry and service for more than ten years this indicated that the large group of respondents were well acquitted with operation and challenges related to food production process as they had worked in the industry for over 5 years.

#### **4.4 Data Analysis**

Data captured from the objective based question was analyzed in order of objective and the question items using SPSS Version 29 released on September 12, 2022 by Kennia Garcia. The first step was to obtain the key descriptive statistics the mean and standard deviation for each question item and then the weighted mean of the transformed variable for each objective. The mean and the standard deviation are parameters that provide meaningful descriptions of the study findings of the objective.

From the transformed variables for each objective results from the simultaneous tests in multiple regression analyze are presented.

##### **4.4.1 Results for Food Cooking Practices**

The first objective of the study was to establish the effect of food cooking practices on perceived food safety in restaurants in Nairobi City. Findings for this objective were presented in ten question items as in Table 4.3.

**Table 4.3 Results for Food Cooking Practices**

	Item		(5)	(4)	(3)	(2)	(1)	$\mu$	$\sigma$
1	Every kitchen staff in this restaurant use the right knives to chop meat/ poultry and vegetables/fruits.	<i>f</i> %	11 11.6	47 49.5	0 0.00	25 26.3	12 12.6	<b>3.2</b>	<b>5.2</b>
2	Every kitchen staff in this restaurant use the right cutting boards for different food items.	<i>f</i> %	10 10.5	36 37.9	14 14.7	21 22.1	14 14.7	<b>3.1</b>	<b>4.243</b>
3	Every kitchen staff in this restaurant use the right cooking utensil for different food items.	<i>f</i> %	15 15.8	38 40.0	17 17.9	17 17.9	8 8.42	<b>3.4</b>	<b>4.287</b>
4	In this restaurant all chefs have knowledge on controlling cooking temperature for different foods items.	<i>f</i> %	26 27.4	31 32.6	15 15.8	16 16.8	7 7.4	<b>3.6</b>	<b>4.066</b>
5	The restaurant provides the standard cooking and heating facilities for different types of food.	<i>f</i> %	17 17.9	26 27.4	16 16.8	21 22.1	15 15.8	<b>3.1</b>	<b>3.785</b>
6	In this restaurant all chefs have knowledge on cooking procedures of different foods items and intended food product.	<i>f</i> %	11 11.6	25 26.3	24 25.3	19 20.0	16 16.9	<b>3.0</b>	<b>3.888</b>
7	Before cooking process, thorough check on freshness of raw food stuff is done by chef on duty and management.	<i>f</i> %	8 8.4	24 25.3	19 20.0	23 24.2	21 22.1	<b>2.7</b>	<b>3.979</b>
8	In this restaurant re-use of marinades; {eg re-use of cooking oil} and others does not happen.	<i>f</i> %	16 16.8	17 17.9	0 0.0	36 37.9	26 27.4	<b>3.0</b>	<b>4.680</b>
9	The standard cooking procedure are shown in the kitchen and observed	<i>f</i> %	9 9.5	14 14.7	0 0.0	41 43.2	31 32.6	<b>2.3</b>	<b>5.174</b>
10	I concur that the cooking equipment and utensils in this restaurant meet the standards of food safety.	<i>f</i> %	23 24.2	25 26.3	11 11.6	19 20.0	17 17.9	<b>3.2</b>	<b>3.817</b>
<b>Overall mean and standard deviation</b>								<b>3.1</b>	<b>4.312</b>



These question items needed to establish whether food cooking practices indicators were practiced in the typical operations in the restaurants' food safety process and how individual food handler perceived the practice to affect food safety in the production process. Understanding incorporated knowledge on food cooking process was considered as a foundation to food safety. Findings in the table 4.3 indicate that 11.6% strongly agreed that use of the right chopping knives for different raw food items were used by all kitchen staff, with 49.5% agreeing and 26.3 disagreeing when 12.6% strongly disagreed. The findings from this revealed that the half of the staff involved had the knowledge that different chopping tools were required for different raw food during the cooking process. On the contrary 26.3% and 12.6% disagreed and strongly disagreed use of the right chopping tools did not occur as expected during the food cooking process. The researcher observed that all the 16(100% } restaurants had enough standard non-corrosive knives meant for use at different times and for chopping different food stuffs. The researcher observed that 6 (37.5%) restaurants had knives that were not sharp while 10 (62.5%) had sharp knives. Another observation made was that 2(12.5%) restaurants had the filing machine put in place at restaurant outside the restaurant with the large number 14(87.5%) did not have knife filing system at the restaurant.

From the respondent's usage issue emerged that regarding use of the right cutting boards for different food items, 10.5% strongly agreed, 37.9 agreed and 22.1% disagreed when 14.7% strongly disagreed. Only 14.7% were not sure whether this happened at the restaurant. The researcher observed that all the restaurants had smooth aluminum working surfaces. The researcher observed a staff chopping vegetable using the wrong chopping board in several restaurants {R3, R5, R7, R11}. Another emerging issue was that on use of the right cooking utensil for different food items, 15.8%

strongly agreed, 40.0% agreed and 17.9% disagreed at the tone of 8.42% strongly disagreeing. A proportion of 17.9% indicated that they were uncertain on whether this was practiced at the restaurants. These first three question items tested on whether the kitchen staff used the right tools at all stages in general during the cooking process. The responses shown that a proportion of the respondents, small did not use the right cooking wares as required to ensure elimination of food safety hazard.

The fourth and fifth question items tested on knowledge on temperature control during the cooking process. Only 27.4 % strongly agreed that all chefs had knowledge on controlling cooking temperature for different foods items, 32.6% agreed, when 16.8% disagreed and 7.4% strongly disagreed. Only 15.8% of the respondents were uncertain about the fact that all chefs were knowledgeable on controlling the temperature required for different food items. On whether standard cooking and heating facilities for different types of food were provided by management 17.9% of the respondents strongly agreed, 27.4 % agreed and 22.1% disagreed when 15.8% strongly disagreed. 16.8% were not sure whether the cooking and heating facilities at the restaurant were standard or not. The researcher observed that 9(56.2%) had temperature control systems for use during cooking process and on the same time noted that 8(50.0%) had heating and cooling guide charts pinned at the kitchen point. On whether all chefs at the restaurant had knowledge on cooking procedures of different foods items and intended food product, 11.6% strongly agreed, 26.3% agreed, 20.0% disagreed and 16.9% strongly disagreed with 25.3% being not sure.

On whether freshness of raw food stuff was done and thoroughly 22.1% and 24.2% responded with intent of disagreement, while only 25.3% and 8.4% agreed and strongly agreed respectively. The reuse of marinades was common at the restaurants. This was indicated by a high number of respondents giving response that skewed to disagreement

of the question that inquired whether reuse did not happen. 27.4% and 37.9% strongly disagreed and disagreed respectively. To the tune of truth only 16.8% strongly agreed and 17.9% agreed. In restaurant R7 the researcher observed a chef re-use cooking oil.

On whether the standard cooking procedure are shown in the kitchen and observed 9.5% strongly disagreed, 14.7% disagreed, 43.2% agreed and 32.6 strongly disagreed. Supplemented by the observation made by the researcher was that 9(56.2%) had cooking procedure charts only pinned at the kitchen point and 2(12.5) restaurants had both cooking procedure charts and cooking guide booklets and the 5(31.3%) restaurants had no such materials.

#### **4.4.2 Results for Food Storage Practices**

The second objective of the study was to establish the effect of food storage practices on perceived food safety in restaurants in Nairobi city. Findings from question items for this objective were as in Table 4.4.

**Table 4.4 Results for Food Storage Practices**

Item		(5)	(4)	(3)	(2)	(1)	$\mu$	$\sigma$	
1	Standard capacity for refrigerators is observed in this restaurant.	<i>f</i>	12	19	15	29	20	<b>2.7</b>	<b>3.982</b>
		%	12.7	20.0	15.8	30.5	21.1		
2	Raw food items are stored separately and as required in this restaurant	<i>f</i>	17	29	5	25	19	<b>3</b>	<b>4.146</b>
		%	17.9	30.5	5.3	26.3	20.0		
3	Non-food items and not chemical are separately stored in this restaurant	<i>f</i>	0	0	2	48	45	<b>1.5</b>	<b>6.565</b>
		%	0.0	0.0	2.1	50.5	47.4		
4	Vermin and rodent control measures are properly observed in this restaurant.	<i>f</i>	16	32	7	26	14	<b>3.1</b>	<b>4.201</b>
		%	16.8	33.7	7.4	27.4	14.7		
5	All the utensils and equipment used for food storage are always in good shape and state as required by the standards	<i>f</i>	10	16	17	29	23	<b>2.6</b>	<b>4.069</b>
		%	10.5	16.8	17.9	30.5	24.2		
6	All persons in charge of food storage are aware that cold food is stored at a low temperature of 40° C and below and hot foods at a high temperature of 140 ° C.	<i>f</i>	18	26	25	16	10	<b>3.3</b>	<b>3.877</b>
		%	19.0	27.4	26.3	16.8	10.5		
7	Use of different storage equipment for different food stuff is highly observed in this restaurant	<i>f</i>	19	21	23	18	14	<b>3.1</b>	<b>3.725</b>
		%	20.0	22.1	24.2	19.0	14.7		
8	No re-freezing or refrigerating of thawed foods is done in this restaurant	<i>f</i>	23	28	18	15	11	<b>3.4</b>	<b>3.854</b>
		%	24.2	29.5	19.0	15.8	11.6		
9	The storage personnel in the restaurant have been facilitated with material to store and label preparation date and expected expiry date for non-fast-moving food.	<i>f</i>	15	45	2	10	23	<b>3.2</b>	<b>4.975</b>
		%	15.8	47.4	2.1	10.5	24.2		
10	By any chance, all the expired raw food stuff, marinades and consumable food are immediately separated out of storage facilities.	<i>f</i>	17	18	16	25	19	<b>2.9</b>	<b>3.788</b>
		%	17.9	19.0	16.8	26.3	20.0		
11	Uninterrupted power supply system exists in this restaurant	<i>f</i>	22	26	11	20	16	<b>3.2</b>	<b>3.834</b>
		%	23.2	27.4	11.6	21.1	16.8		
12	Proper pest and rodent control systems have been installed in this restaurant	<i>f</i>	15	24	19	23	14	<b>3.0</b>	<b>3.799</b>
		%	15.8	25.3	20.0	24.2	14.7		
<b>Overall mean and standard deviation</b>							<b>3.0</b>	<b>4.207</b>	

Question items under this study objective sought to establish whether food storage practices by the operators contributed to growth or development of food safety hazards.

The researcher observed that all the 16(100%) restaurants had refrigerators with storage compartments; freezer section which were air tight used for different raw food stuffs as well as processed foods. The researcher observed that in 8(50.0%) restaurants the kitchen refrigerators were congested and others with mixed food stuffs.

This study attributed this to space available at the restaurant premise and this explicitly indicated possibly of development and suitability of area of growth of food safety hazards. Response capture and presented in table 4.4 regarding observing if refrigerators' storage capacity was observed the large response where in favour of disagreement with 21.1% strongly disagreeing and 30.5% disagreeing. Only 20.0% agreed with support of 12.7% strongly agreeing. On whether raw food stuffs were stored separately and in different types shown that 20.0% and 26.3% disagreed and strongly disagreed with 17.9% and 30.5% strongly agreeing and agreeing respectively. Only 5.3% shown opinion of uncertainty. On the same dimension of whether non-food stuff items being stored separately the findings show that the {50.5%, 47.4% } were in favour of disagreement.

An assertion by Achieng' (2016) is that vermin and rodent control is easily depending on how food stuff were stored at the establishment. Finding on whether vermin and rodent control was properly done at the restaurants show that 14.7 % strongly disagreed with 27.4% disagreeing. Only 33.7% and 16.8% of the respondents involved were in tune of agreement. The researcher made observation that there were flies and cockroach in 7(43.8%) restaurants. Failure to notice any rodent did not mean the restaurants had air tight systems to control the pest and rodents like rats.

On whether right utensils and equipment as required by standards were used for storing ready food at the restaurants the smaller votes skewed to negative, with 10.5% and 16.8% of the responses indicating strongly agree and agree respectively while the

24.2% and 30.5% showed sense of strongly disagreeing and disagreeing. The show of disagreement by over 50% indicated that most of the storage utensils and equipment were not in good shape but perceived fit for storage. On whether storage of different ready food items was done at standard temperatures, 10.5% voted for strongly disagree, 16.9% disagree, 26.3% were uncertain, 27.4% agreed and 19.0% strongly agreed. Based on the study objective these findings show that there was higher probability that the large group did not have the right knowledge on this or due to limitation of the equipment.

There was high response showing signs of agreement on the question on whether food re-freezing or refrigerating of thawed food was not done in this restaurant where 11.6% strongly disagreed and 15.8% disagreed while 29.5% and 24.2% agreed and strongly agreed respectively. The smaller percentage that indicated in favor of disagreement enlightens the study that there were chances of refrigerating thawed food stuff. Concerning using marinades and re-use of cooking oil with good food or during cooking responses show that the large group of the kitchen staff voted in favor of disagreement with 20.0% indicating strongly disagree, 26.4% disagreed. This was supported by the observation made by the researcher on presence of used cooking oil in 6(37.5%) restaurants storage compartment. The study findings were sufficient to decide that continuous re-use of cooking oil would lead to food safety hazard.

An observation made in 11(68.8%) restaurants was that not all food stuff stored in the refrigerators had labels showing designated period of storage. From the questionnaire responses on whether adequate storage materials like labelling stickers and storage bags were supplied to the personnel in the food chain 47.4% indicated agree with 15.8% showing strongly agree. On the counter 24.2 % strongly disagreed with 10.5% disagreeing. The study did not scrutinize whether the opinion came from various

restaurants as guided by the objective. With the high show of agreement, it opened the eye of the study that labeling was not done due to lack of insight. On whether all chefs had awareness that cooked food should be refrigerated within two hours and the perceived effect on food safety findings indicated that the large group were aware and practiced that. The researcher made an observation that all the restaurants had standby power backup systems to supply power in case of mains power failure and that lighting systems in the whole premises were all standard in all the restaurants.

#### **4.4.3 Results for Food Sanitation Practices**

The third objective of the study was to establish the effect of sanitary practices on perceived food safety in restaurants in Nairobi City. Findings captured from question items for this objective were as in Table 4.5.

**Table 4.5 Results for Food Sanitation Practices**

	Item		(5)	(4)	(3)	(2)	(1)	$\mu$	$\sigma$
1	The restaurant frequently experiences clean water shortage	f	11	5	0	41	38	<b>2.1</b>	<b>5.556</b>
		%	11.6	5.3	0.0	43.2	40.0		
2	The cleaning of hands, utensils and equipment is done using clean water at all time in this restaurant	f	5	8	2	42	38	<b>1.9</b>	<b>5.602</b>
		%	5.3	8.4	2.1	44.2	40.0		
3	All restaurant personnel do clean and dry hands before handing either raw food stuff or done food products, and food utensils.	f	19	22	19	19	16	<b>3.1</b>	<b>3.694</b>
		%	20.0	23.2	20.0	20.0	16.8		
4	All personnel dealing with food observe the rule of using clean utensils and equipment as required by standards.	f	10	16	17	29	20	<b>2.6</b>	<b>3.925</b>
		%	10.5	16.8	17.9	30.5	24.2		
5	There is a cleaning plan for areas like kitchen, storage rooms in this restaurant. {periodic cleaning}	f	20	26	20	16	13	<b>3.3</b>	<b>3.770</b>
		%	21.1	27.4	21.1	16.8	13.7		
6	Different washing areas are designated for use at the kitchen for different food stuffs {eg as washing sink for vegetables only}	f	19	21	23	18	14	<b>3.1</b>	<b>3.725</b>
		%	20.0	21.1	24.2	18.9	14.7		
6	Wash rooms and sanitation areas are kept well placed in this restaurant and properly cleaned.	f	23	28	18	15	11	<b>3.4</b>	<b>3.854</b>
		%	24.2	29.5	18.9	15.8	11.6		
7	The management of the restaurant provide adequate cleaning material for use. {detergents, brooms, wipes etc.	f	18	19	19	25	14	<b>3.0</b>	<b>3.774</b>
		%	18.9	20.0	20.0	26.3	14.7		
8	The way food waste bins and litter bins are handled here reflect high standard of cleanliness. {at the kitchen and other points}	f	18	22	21	18	16	<b>3.1</b>	<b>3.705</b>
		%	18.9	23.2	22.1	18.9	16.8		
9	Personnel directly handling food observe the rule not wearing of jewelry and related material in this restaurant.	f	14	19	24	21	17	<b>2.9</b>	<b>3.792</b>
		%	14.7	20.0	25.3	22.1	17.9		
10	My opinion regarding how the personnel behave and conduct themselves in regard to person hygiene ensures high standard of food safety	f	14	21	19	23	18	<b>2.9</b>	<b>3.780</b>
		%	14.7	22.1	20.0	24.2	18.9		
<b>Overall mean and standard deviation</b>								<b>2.9</b>	<b>4.107</b>



From the study findings indicated that restaurant did not experience frequent water shortage, as shown by votes of 40.0% and 43.2% of strongly disagree and disagree on the issues of frequent water shortage. The researcher observed that in all the restaurants there was adequate provision for clean water from piped systems and backup reservoir tanks and that there were different washing points for different types of food stuff at the kitchen in all the restaurants. The researcher noted that taps at kitchen point wash area were controlled using a step-on pedal and at some other points the taps were controlled using a knob pressed using an ankle. This was noted as a regulatory measure due to the Covid-19 pandemics. A bone of contention was whether the water supplied to the restaurants was really clean water.

Despite that the supply of clean water was continuous 40.0% of the respondents strongly disagreed that cleaning of utensils and equipment is done always using clean water at all time at this restaurant, with 44.2% also disagreeing. This opinion directly reflected sense of observing the sanitary practice at the restaurants by the food handlers. An emerging issue could possibility be that water usage at the restaurant is restricted. The study also found that there were different washing areas for different food stuff and properly utilized. This was shown by 20.0% of the respondents strongly agreeing, 22.1% agreeing, 18.9% disagreeing and 14.7% strongly disagreeing. The researcher observed that adequate liquid soap dispenser and paper towel dispenser were placed together at every wash point apart from wash area for raw food stuff at the kitchen. From the responses, 23.2% of respondents agreed, 20.0% strongly agreed that all the operators in the restaurants cleaned and dried hands before handling raw food stuff and utensils.

Despite having sufficient hand washing point and cleaning facilities 16.8% strongly disagreed with 20.0% disagreeing too that all the operators in the restaurants handled

raw food stuff and utensils after cleaning the hands. The researcher noted also that there was a security camera mounted at every wash area in at the kitchen point. The researcher associated this with an enforcement measure to ensure that the operators did wash their hands before engaging in a task. The researcher observed the floors around the restaurant's rooms were neither waste encrusted or muddy or dusty. Noted too was that the floors were smooth covered with tiles which enabled ease in cleaning and not slippery. From the responses it was captured that 27.4% and 21.1% of the respondents indicating agree and strongly agree on the issue regarding periodic cleaning of the restaurant and key areas like kitchen, storage rooms and storage facilities while 13.7% and 16.8% of the respondents strongly disagreed and disagreed on the respectively.

The researcher noted that in kitchen operators did not wear ornamental material when on duty. This was supported by the finding that 14.7% and 20.0% of the respondents strongly agreed and agreed while 25.3% were not certain with 22.1% disagreeing and 17.9 strongly disagreeing that all kitchen staff worn jewelry or ornamental material while at workplace. Regarding how the personnel behaved and conducted themselves hygienically to ensure high standard of food safety, the large percent of 18.9% and 24.2% strongly disagreed and disagreed respectively was captured. 20% was not sure while 14.7% strongly agreed and 22.1 % agreed There were high probabilities that the practices by the staff at the restaurants was controlled by surveillance systems and code of conduct set at the restaurant together with penalty if rule is/are violated. The researcher observed in restaurant R3 and R10 staff working without full gear.

#### **4.4.4 Perceived Food Safety at the Restaurants**

The dependent Variable of the study was to establish the relationship with the independent variables. Findings for this variable were as in Table 4.6.

**Table 4.6 Results for Perceived Food Safety at the Restaurants**

Item		(5)	(4)	(3)	(2)	(1)	$\mu$	$\sigma$
1 All the restaurant personnel highly ensure that food prepared and served is free from any contamination	<i>f</i>	25	26	21	15	8	<b>3.5</b>	<b>3.902</b>
	%	26.3	27.4	22.1	15.8	8.4		
2 The cases of food error leading to development of food safety hazards rare in this restaurant	<i>f</i>	24	26	0	26	19	<b>3.1</b>	<b>4.311</b>
	%	25.3	27.4	0.0	27.4	20.0		
3 Management strictly monitors and control processing stages areas that can lead to development of food safety hazards	<i>f</i>	13	19	25	22	16	<b>2.9</b>	<b>3.839</b>
	%	13.7	20.0	26.3	23.2	16.8		
4 Cases of turnover due to mis- conduct during food handling are high in this restaurant.	<i>f</i>	22	26	5	23	19	<b>3.1</b>	<b>4.041</b>
	%	23.2	27.4	5.3	24.2	20.0		
5 Food safety sensitization is frequently done to ensure that safety of food is kept high in this restaurant	<i>f</i>	30	36	0	20	9	<b>3.6</b>	<b>4.677</b>
	%	31.6	37.9	0.0	21.1	9.5		
6 Programs on behavior and attitude towards work are frequently done to build the employees capacity	<i>f</i>	23	28	0	25	19	<b>3.1</b>	<b>4.322</b>
	%	24.2	29.5	0.0	26.3	20.2		
7 Medical screening organized by the management frequently take place to ensure good health is maintained	<i>f</i>	21	27	0	26	21	<b>3.0</b>	<b>4.327</b>
	%	22.1	28.4	0.0	27.4	22.1		
8 The management comply with public health regulations to reduce negative outcomes on food	<i>f</i>	23	26	5	23	18	<b>3.1</b>	<b>4.043</b>
	%	24.5	27.4	5.3	24.2	18.9		
<b>Overall mean and standard deviation</b>							<b>3.2</b>	<b>4.182</b>

The researcher observed that all business and operational compliancy documents required by government organs were well placed on the walls of the restaurants. All the restaurants had standard lighting systems put in place. An important observation made was that there were a few pictograms and well written code of conducts to motivate the operators keeps food safety and suitability pinned on the wall of the restaurants and

those supervisors made impromptu checks on how the processing or activities were carried out at the restaurants.

The study captured that 26.3% of the respondents strongly agreed that as a team, the restaurant personnel highly ensured that food prepared and served was free from any contamination while 27.4% agreed. A flimsy percentage strongly disagreed at 8.4%, with 15.8% also disagreeing with the resultant total indicating that there were open chances of food contamination or violation of food safety measures within the restaurants. A support for the first question finding was that on average respondents agreed that cases of food error leading to food contamination were rare as shown by 27.4% agree vote and 25.3% strongly agree vote and occurred too as indicated by 20.0% strongly disagreement and 27.4.0% disagree well as occurred at the restaurants. This also was an open indicator that food safety measures were not adhered wholly. The study found that control of potential areas that can lead to food contamination by the management was not effective since 16.8 % of the responses show strongly disagree and 23.2% show disagree. These carry the large percentage which indicates monitoring and control was a challenge in the investigated restaurants.

Mixed response on occurrence of turnover due to mis-conduct during food handling being high at the restaurant were captured, with the greater percentage in favor of true as shown by 23.2% strongly agreeing, 27.4% agreeing and in the contrary 20% strongly disagreeing and 24.2% disagreeing. This again showed that food safety was compromised at the restaurants by staff to a high degree.

Concerning staff sensitization on ensuring food safety, a high percent indicated that this was done as shown by 31.6% of responses indicating strongly agree and 37.9% agreeing. This indicated that the restaurant management continuously fought for food

safety and maximized ways of ensuring that the standards of food safety remained high. A supportive finding was that 24.2% of the respondents were strongly agreeing that seminars on behavior and attitude toward work were frequently done to capacity for purpose of effectiveness and efficiency at the restaurant. 29.5% agreed such seminars were conducted at the restaurant. These two findings strongly indicated that the restaurant management had challenges towards ensuring minimal food production practices done by the handlers did not lead to development or growth of food safety hazards at the restaurant. On matters of compliancy to public health regulations and frequency of medical screening to ensure good health of food handlers at the restaurant means of 3.0 and 3.1 respectively showed that the management of restaurants had put in place proper moves to ensure food safety at the restaurants was maintained.

#### **4.5 Model Diagnosis**

Tests of assumptions involved testing for normality of the study population and linearity between the production food practices. Since the study sample size {95} was less than 1000 subjects, Shapiro-Wilk test was done for normality test as counseled by (Zaiontz, 2020). Since the sample size was less than 500 subjects, variance inflation factor test was considered suitable to determine whether there existed linear relationship between the food cooking practices as advised by (Zach, 2019).

##### **4.5.1 Normality Test**

Shapiro-Wilk test was done at 5% significance and one tailed test with 95 degrees of freedom. The normality test's null hypothesis was that data items analyzed were identical, independent and came from a sample that was normally distributed. The results were as shown in table 4.7.

**Table 4.7 Shapiro-Wilk test Results**

items	W Statistic	df	Sig.
Food cooking practices	0.563	95	0.0567 <sup>a</sup>
Food storage practices	0.524	95	0.0543 <sup>a</sup>
Food sanitation practices	0.533	95	0.0639 <sup>a</sup>
Perceived food safety	0.539	95	0.0578

a: dependent variable perceived food safety

The results presented in table 4.7 indicated that all p values/sig. were greater than the 0.05. From the arm of the W statistics all the W statistics had magnitudes greater than 0.5. The study retained the null hypothesis that data analyzed was identical, independent and came from a sample that was normally distributed hence concluded that the source population was normally distributed too.

#### 4.5.2 Multicollinearity Test

Variance inflation factor (VIF) test was done at 5% significance determined the existence of multicollinearity between each food practice and the others. The results were as shown in table 4.8.

**Table 4.8 Variance Inflation Factor Test Results**

Model	Collinearity Statistics	
	Tolerance	VIF
Food cooking practices	0.796	1.256 <sup>a</sup>
Food storage practices	0.745	1.342 <sup>a</sup>
Food sanitation practices	0.849	1.177 <sup>a</sup>

a: *Dependent variable: Perceived food safety*

The test returned variance inflation factors of 1.256, 1.342 and 1.177 for the food cooking, food storage and food sanitation practices respectively. As guided by Rashwan (2019) all the values were within the range of indicate moderate linearity considered to

be not severe. The study concluded that linearity between the food production practices investigated by the study required no attention and as advised by Zach (2019); Rashwan (2019) the finding implied that the model was well fitted with the three predictors.

#### 4.6 Correlation Analysis

Strengths of the association between food production practices and perceived food safety were established and explained using the Pearson correlation coefficients. The two tailed test done at 5% significance level to get the Pearson's correlation coefficients (r) yield findings presented in table 4.9.

**Table 4.9 Strength of the Association between Food Production Practices and Perceived Food Safety**

		Perceived food safety	Food cooking practices	Food storage practices	Food sanitation practices
Perceived food safety	(r) Sig. (2- tailed)	1			
Food cooking practices	(r) Sig. (2- tailed)	0.547**	1		
Food storage practices	(r) Sig. (2- tailed)	0.503**	0.321	1	
Food sanitation practices	(r) Sig. (2- tailed)	0.511**	0.209	0.333	1
	Sig. (2- tailed)	0.008	0.036	0.047	

\*\**: Predictors: (Constant), Food cooking practice, food storage practice and food sanitation practices*

The correlation coefficient (r) informed the study about the magnitude and direction of the relationship between each practice and perceived food safety. The results found that the correlation coefficient for food cooking practices as .0547 with 0.001 significance, correlation coefficient for food storage practice as 0.503 with 0.013 and correlation coefficient for food storage practice as 0.0511 with 0.008. The findings shown that all the practices had positive moderate linear relationship with perceived food safety (McCabe & Moore, 2019; Warren, 2019). This was adequate probe that the food

production practices had significant effect on perceived food safety at the restaurants.

The study further probed for model fitness.

#### 4.7 ANOVA Test

ANOVA tested whether the study hypothesized statistical model was adequate and fitted well. The results yield by test are presented in two stages, models specification and model fitness. The partial results for model fitness were as presented in table 4.10.

**Table 4.10 Model Summary**

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate
1	0.69843 <sup>a</sup>	0.48781	0.48754	0.21093

*a: Predictor; (Constant), Food cooking practice, food storage practice and food sanitation practices*

The results present the coefficient of determination R<sup>2</sup>. The value 0.48781 demonstrated that the three food production practices investigated explained 48.871% of perceived food safety while non-investigated factors explained 51.25% at a standard error of 0.21093. A power parameter adjusted R<sup>2</sup> {0.48754} indicated that any change made on the model in terms of addition or removal of a variable the proportional explained would be 48.754% thus reducing the weight. The next set of presented in table 4.11 show results on model fitness.

**Table 4.11 Model Specification**

	RSS	df	MSS	F	Sig.
Regression	1906.021	3	635.34	28.89	0.0043 <sup>a</sup>
Residual	2001.3	91	21.992		
Total	3907.321	94			

*a: Dependent variable: Perceived food safety*

*b: Predictors: (Constant), Food cooking practice, food storage practice and food sanitation practices*



The results present parameters used to rule whether the set of predictors; the food production practices was suitable and adequate for the study. In table 4.11. Using the F statistics, the computed value 28.89 its value is comparatively greater than F critical value 2.7 at (0.05,3, 91) supportively the power of the test pvalue of 0.0043 which is less than the test significance of 0.05 lead to rejection of the null hypothesis that the food practices investigated do not belong to a family of F-distribution. The study then concluded that the combination of the three investigated food production practices as predictors of perceived food safety was stable. Therefore, the study had statistical support to continue drawing valid conclusions regarding perceived food safety in the restaurants within Nairobi City.

#### 4.8 Tests of Hypotheses

The study having passed all the test of assumption, tests showing moderate relationship between food production practices and perceived food safety. The test of hypothesis was done. This test was based on the fact that the food production practices show exhibit *t*-distribution characteristics. The simultaneous test results were as presented in table 4.12 as summary of regression coefficients.

**Table 4.12 Summary of the Regression Coefficients <sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error				
	(Constant)	1.947	0.9430			
1	Food cooking practice	1.173	0.0759	1.1520	23.427	0.001
	Food storage practices	1.107	0.1537	1.1136	7.201	0.001
	Food sanitation practices	1.058	0.2450	1.0390	4.318	0.000 <sup>b</sup>

*a: Dependent variable: Perceived food safety*

*b: Predictors: (Constant), Food sanitation practice*

The ruling on whether to reject the objectives null hypothesis the computed t values (23.427, 7.201 and 4.318) were used. All the t computed values were greater than the t-critical value at  $\{0.05, 95\} = 2.632$ . Supported by the fact that all the p-values (0.001, 0.001, 0.000<sup>b</sup>) were all less than the 0.05, all the three null hypotheses were rejected (Van den Berg, 2020). The study then concluded that food cooking practices, food storage practices and food sanitation practices all had statistically significant effect on perceived food safety at restaurants within Nairobi city.

A values of standard error of regression (0.9430, 0.0759, 0.1537 and 0.2450) shown that the approximated prediction errors were small. The study concluded that the unreliable measurement of the variables or unsystematic difference between the values was minimal as advised by Reid (2021) who stated that the standard error of regression approximates the spread of the predictor errors when using the values X to predict the value of Y. Further assertion is that the smaller the standard error of estimate the higher the validity of the measure.

The test also shown the predictive factors presented as the unstandardized coefficients. Results shown that food cooking practices would contribute the highest effect as indicated by an unstandardized coefficient (1.173), which means one unit improvement on food cooking practices would lead to 1.173 units improvement on food safety at the restaurants. Food storage practices and food sanitation practices would contribute 1.107 and 1.058-unit improvements on food safety on every unit increased improvement respectively. In absence of the three investigated practices, unit improvement on all the other practices not investigated would yield an improvement factor of 1.947. This is supported by an earlier finding that 51.219% of perceived food safety is explained by this combination. The study's summarized hypothetical model was represented as in equation (iv).

$$Y = 1.947 + 1.173X_1 + 1.107X_2 + 1.058X_3 \dots\dots\dots (iv)$$

Whereby; Y= perceived food safety, 1.947 = intercept constant, 1.173, 1.107 and 1.058 are best estimators for the predictors; food cooking practices, food storage practices and food sanitation practices.

## **CHAPTER FIVE**

### **DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction**

The chapter present the results to the research problem, significant inferences, conclusions as well as essential study recommendations. The study examined the effect of food production practices on perceived food safety in restaurants in Nairobi city, in Kenya. After thorough statistical verification of several propositions based on the study parameters concise results were obtained. The conclusions and recommendations relating to specific study objectives as well as suggestions for further research were also highlighted.

#### **5.2 Discussions**

This section presents the discussion of the study. This section presents the discussion the study specific objective.

##### **5.2.1 Food Cooking Practices and Perceived Food Safety in Restaurants in Nairobi City**

The first specific objective of the study was to establish the effect of food cooking practices on perceived food safety in restaurants in Nairobi city. Based on the four indicators underlined in this objective the study found that some restaurants involved in the study did not use the right or standard tools required during the cooking process, which posed presence or growth of food safety hazards at the restaurants. Use of blunt knives to chop raw food stuff like meat, fish, poultry was found to be practiced in these restaurants and according to HACCP requirements blunt knives are agents of microbiological hazard agents (Bolton 1997). The study also found and observed that use of standard chopping boards as required by the HACCP food safety standard was a challenge at the restaurants even though it did not cut across all the restaurants. This

was noted to be another possible source of food safety hazard based on HACCP food safety standard guidance (HACCP report, 2015).

Presence of standard cooking ware with cooking temperature systems was noted at the majority of the restaurants with half of the restaurants involved having heating and cooling guide charts pinned at the kitchen point. On the contrary the study found that majority of the staff at the kitchen did not properly use this guide during cooking and also the management was not on the ground in monitoring and controlling the use of the charts and guides. This also posed high possibility of pathogens and growth of food safety hazards during the cooking practice. Ko (2016) reported that underheating of some food stuff like meat would lead to presence of pathogens in the resulting product and also overheating could also lead to growth of food health hazards.

The study found that chefs at the restaurants involved had sufficient knowledge on cooking procedures of different foods items and intended food product. But the findings revealed that thorough checking on whether raw food stuff were fresh or suitable for cooking was by passed by majority of the chefs. The study also found that reuse of marinades was common at the restaurants especially cooking oil. Despite the finding that cooking procedure guides and booklet being found in many of the restaurants involved and the chefs having adequate skills in cooking action it was found that the chefs did not follow the standard cooking procedures during the practice. This findings shown that presence of food safety hazard could be again be right at the restaurants in some food products, which is align to Aurelie, et al., (2018) who found that 67% of chefs investigated their study did not adhere to all the procedures of cooking of different meals.

In general, the study found that food cooking practices had positive and moderate relationship with perceived food safety with a correlation coefficient of 0.547 at 0.05 significance. Further findings shown that null hypotheses; food cooking practices have no effect on perceived food safety in restaurants within Nairobi city was rejected at 0.001 significance. This generally meant that food cooking practices in some manner lead to presence of food safety hazards hence affected food safety. The study found that one unit improvement on the collective food cooking practices would lead to 1.173-unit improvement in food safety. The general finding aligned to Aurelie, et al., (2018); BA CAC report (2015), assertion that with well monitored food cooking practices at any food establishment presence of food safety hazards are eliminated or minimized.

### **5.2.2 Food Storage Practices and Perceived Food Safety in Restaurants in Nairobi City**

The second study objective was to establish whether food storage practices have effect on perceived food safety in restaurants in Nairobi City. The study found that half (50.0%) of the restaurants had spacious storage rooms and equipment. A further finding was that the refrigerators used in all the restaurants had storage compartments; freezer section which were air tight and suitable for storing different raw food stuffs as well as processed foods. In line with the study objective that sought to establish the effect of food storage practices on perceived food safety in restaurants, the study revealed that in half of the restaurants kitchen storage points including refrigerators were congested and had mixed food stuffs. This finding was evident enough for the study to relate presence/existence of food safety hazard in this production stage at the restaurants. The study is supported by Mutua and Karugia (2018) who urged that one major source of food safety hazard during process is storage of mixed food stuff and congestion during

storage, which is still supported by Acheing' (2016); Mazijn and Achten (2016) and Loessner and Golden (2015).

A further finding was that the idea of storing mixed food stuff led to growth of food safety hazards as a result of minimal control of vermin and rodent at the storage points which was also noted by Acheing' (2016). Use of standard right utensils and equipment was not also observed at the restaurants yet there were enough of them. With use of non-standard storage equipment at the restaurant high chances of food safety hazard existed. This finding is supported by Nyamari (2013) who stated that using non-standard equipment for storage led to development of microbes and organoleptic change on stored food which was echoed by Acheing' (2016). High response showing that the large group did not have the right knowledge on temperatures required to reheat food indicated that there were again high chances of growth of food safety hazard at the restaurants. Loessner and Golden (2015) stated that it was important to stick labels showing the expected period of storage of food stuff depending on type. This study found that in the majority of the restaurants food stuff stored had no labels, which was a strong indicator of presence of spoiled food at the restaurants. Achieng'2016 urged that cooked food developed different types of food safety hazards if the temperatures required were not maintained. This study found that half of the restaurants had power backup systems for use in case of electricity failure. This means that there were chances of encountering spoiling food in half of the restaurants when there was power failure within the premises.

On a generalized approach the study found that food storage practice had remarkable positive and moderate relationship with perceived food safety, with a correlation coefficient of 0.503 at 0.013 significance. Further analysis shown that the null hypothesis stated as food storage practices have no effect on food safety in restaurants

within Nairobi city was rejected as guided by a significance of 0.05 at 5% significance level. The study revealed that one unit improvement on food storage practices would lead to 1.107 improvement of food safety at the restaurants. This finding is tandem to Mutua and Karugia (2018) who urged that food safety hazard which lead to compromised food safety was high in storage related stage during production process.

### **5.2.3 Food Sanitation Practices and Perceived Food Safety in Restaurants in Nairobi City**

The third study objective was to establish the effect of food sanitation practices on perceived food safety in restaurants in Nairobi City. This objective was guide by the indicators; availability/provision for fresh water, provision of detergents/soap, personal hygiene and monitoring and control.

It was found that all the restaurants involved had provision of clean water supplied using piped system and backup reservoir put in place. The study also found that this water was used for cleaning of the premise, utensils and for cleaning hands. But despite supply of clean water the study found that use of clean water during the production process was violated by food handlers at different times. With this finding it was easy for the study to state that there were high chances of development of food safety hazard due to use of unclean water a finding that support findings by McLauchlin & Little, (2010); Wandolo (2016) and WHO report, (2017) who reported that unclean water was one of the major sources of a wide spectrum of food safety hazards.

The study found that there were adequate hand washing area and enough detergents and soap at washing point. Further the study found that there were rule and regulations on how the staff were to conduct themselves toward observing personal hygiene at the restaurant. But despite all these measures put in place and made available, the study



found that most of the times the food handlers did not clean hands before handling utensils. This translated to the fact that using dirty hands opened chances of development of food safety hazard at the restaurants. This study aligned to the findings made and asserted by Wainaina, et al. (2017) who reported poor personal hygiene, dirty sinks, containers and equipment at any food establishment were a major source of food safety hazards. Rizzo and Bianco (2014) had earlier reported failure to observe hygiene practices such as cleaning hands purely depended on the attitude of the food handler.

A further analysis shown that food sanitation practices had moderate positive relationship with perceived food safety at correlation coefficient of 0.511 at 0.008 significance. The study also rejected the null hypotheses food sanitation practices have no effect on food safety in restaurants within Nairobi city at negligible (0.000) significance at 5% significance level. The study found that a unit improvement on food sanitation practices at the restaurants would lead to improvement of food safety by 1.058 units.

#### **5.2.4 Food Safety at Restaurants in Nairobi City**

The study found that all the restaurants complied with all the regulatory requirements by the government by ensuring lighting system was okay at the premises, having all business and operational compliancy documents. It was noted that some restaurants had diagrams and well written code of regulation put on the walls to ensure staff operated with ease and sensitized environment.

The study found that supervisors did not make impromptu checks on how the processing or activities were carried out at the restaurants. The study confirmed that higher number of respondents shown that there were open chances of compromising food safety at the restaurants due to personnel violating rules and regulations during the

production process. A large team of the respondent led to the finding that management was reluctant on monitoring how food safety was maintained during food production by the food handlers and also evaluating any occurrence that could have shown presence of food safety hazards.

### **5.3 Conclusion**

The justification of the research problem could not be challenged because food safety has remained a crucial issue across the countries in the world. The degree at which food production related illness is extending its roots in the households, business food points and the perceived effect of practices by the food handlers here in Kenya got an attention of the researcher which was key driver for conducting this study. The study heavily relied on quantitative data got from the questionnaire and qualitative data captured by the observations made during the data collection at the restaurants. The comprehensive analysis led to findings and interpretation and then the conclusion.

#### **5.3.1 Food Cooking Practices Findings**

Food cooking practices was found to be a source of food safety hazards and thus affects food safety during food production at the restaurants. From the study findings and as guided by the theories used in the study the following conclusions were made for the first study objective.

- Handling of equipment as well as observing the right procedures during the cooking process were not properly observed by the kitchen staff and contributed maximum effect towards chances of food safety hazards during the cooking process.
- From the study temperature control and cleanliness of the raw food stuff depended on the perception of the kitchen staff. This is as guided by the health

belief model and theory of planned action. The study then concluded that these two practices contribute a lot towards source of food safety hazard during cooking process and that ensuring the right process is completed successfully during the cooking process depends on the attitude of the staff concerned and not aspect of experience and acquitted skills.

### **5.3.2 Food Storage Practices Findings**

According to the second study objective; availability of the right storage equipment and space, pest control and storage monitoring and control were the key indicators in the objective. The study noted that storage space and use of the right storage equipment used during storage at the stage of concern was a determined development of diverse food safety hazards during the production process.

- According to the study finding on this objective the practice by the handlers at the restaurants was determined by how the handler perceived the action. In connection to this the study concluded that despite having adequate space and standard equipment did not guarantee minimization of food safety hazard during the production process but how the handler took the action would eliminate or minimize the growth or development of food safety hazard.
- The food handlers concerned with storage violated rules and procedures of storage directly since they had adequate knowledge and skill on the same. This is supported by the health belief model and the theory of planned behavior.
- Based on the findings made by the study it was clear there was element of failure to monitor and evaluate how food safety development and growth were done at the restaurants. This study concluded that management contributed indirectly in promoting growth of diverse food safety hazards at the restaurants.

### **5.3.3 Conclusions Derived From Food Sanitation Practices Findings**

The third study objective was indicated by; availability of fresh water, availability of detergents/soap, personal hygiene and monitoring and control by management. With continuous supply of clean water, quality detergents and soaps at the restaurants food handlers at different times violated the rules and regulation as required to use clean water for cleaning.

- This study as guided by theory of planned behavior that behavior intentions determine, an individual's attitude toward subjective norms and perceived behavioral control the study concluded that the action of violation of using clean water by the handlers led to development of food safety hazards indirectly.
- The study also concluded that the management was reluctant in monitoring how the personnel operated during the task's executions.

### **5.3.4 Conclusions Derived From Perceived Food Safety**

The perceived food safety was indicated by; food safety errors, food safety training, compliance to standards and monitoring and control, behavioral beliefs and regulations.

The study findings portrayed that the management at the restaurants did not practice consistent checks on how the activities were done and also shown that the same management did not evaluate and review any error reported related by the food safety hazard presence at the restaurant. Thus, the study concluded that;

- Laxity by the management was an unhidden factor that indirectly contribute to development and growth of food safety hazards in production process at the restaurants.

## **5.4 Recommendations**

With respect to the findings and conclusion made in this study and in different perspective other than epidemiology, this study made the following recommendations;

### **5.4.1 Food Cooking Practices and Perceived Food Safety**

- i. More campaign by management to sensitize kitchen staff at the restaurants on importance of observing and need to cook different raw foods at given temperatures and as required by standards should be done frequently. This would change their attitude and behavior of cooking hence minimizing chances of food safety hazards during cooking.
- ii. The management should set procedures of monitoring how the cooking process is done at different times by different chefs.
- iii. The restaurant management should ensure that at all times the equipment used at the restaurant meet the required standards for use and frequent evaluation should be done.
- iv. Use of standard wall chart on food safety at different stage of production should be enforced at the restaurants.
- v. The kitchen staff should be ready to provide relevant information to the management that may be helpful towards sustaining control of food safety hazards and they should remain firm on procedures that lead to continuous food safety.

### **5.4.2 Food Storage Practices and Perceived Food Safety**

- i. To minimize food safety hazards at the restaurant as a result of food storage practices, effective monitoring by management should be done frequently on how storage has been done, and seminars to sensitize the food handlers on

importance of storing different raw food stuffs and different ready foods.

- ii. The management should ensure that there are proper pest control measures in place to ensure minimal safety hazards at the restaurants.
- iii. The food handlers should ensure that the storage of both perishables and nonperishables are appropriately done to ensure food safety.

#### **5.4.3 Sanitary Practices and Perceived Food Safety**

- i. The restaurant management should encourage food handlers more on maintenance of personal hygiene like use of gloves and other protective clothing, hair and nails hygiene.
- ii. The food handlers should ensure use of clean water at all times during cleaning of the utensils to minimize food safety hazards.
- iii. The management should ensure regular inspection; availability of cleaning checklist have documented procedures to ensure consistent adherence to sanitation standards thus ensuring food safety.

#### **5.5 Areas for Further Research**

The present research was confined to food production practices and perceived food safety at the restaurants within Nairobi city. This study has been constructed from a managerial discipline. The study noted staff attitude towards work as a possible avenue that can lead to generation of food safety hazards at different stages during food production. This study recommends that research be done within the same study area on factors influencing kitchens staff attitudes towards work at the restaurants within Nairobi city.

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## APPENDICES

### Appendix I: Introductory Letter

Faith Wangui Murigi,  
School of Tourism, Hospitality and Events Management,  
Department of Hotel & Hospitality Management,  
Moi University - Nairobi Campus

Dear Respondent,

#### **RE: INTRODUCTORY LETTER FOR RESEARCH INSTRUMENT**

I am a student pursuing Master of Hospitality Management at Moi University – Nairobi Campus. As a partial fulfillment of the requirement for the award of the degree I am undertaking a study entitled

*“Food Production Practices and Perceived Food Safety in Restaurants in Nairobi City, Kenya”*

In regard to this I request for assistance and cooperation by responding to the attached questionnaire. Be assured that information provided will be treated with utmost confidentiality and will solely be used for academic purposes as well as enhancing knowledge in the area of study.

Yours Faithfully,

*Faith Wangui Murigi*

## Appendix II: Questionnaire for Staff Kitchen

### Section A: Demographic Data

Instruction: Kindly indicate with a tick the appropriate option.

1. **Your gender:** Male [  ] Female [  ]
2. **Age bracket:** Less than 25 Years [  ] 25–30 Years [  ] Above 30 Years [  ]
3. **Level of Education:** Degree [  ] Diploma [  ] Certificate [  ]
4. **Years of experience working in Restaurants** Less than 5 years [  ] 5-10 years [  ]  
More, than 10 years [  ]

### Section B: Food Cooking Practices

Please indicate your level of agreement on the following statements pertaining to cooking practices knowledge on a scale of 1-5 where Strongly Disagree (1), Disagree (2), Not Sure (3), Agree (4) and Strongly Agree (5).

No	Item	SD (1)	D (2)	NS (3)	A (4)	SA (5)
1	Every kitchen staff in this restaurant use the right knives to chop meat/ poultry and vegetables/fruits.					
2	Every kitchen staff in this restaurant use the right cutting boards for different food items.					
3	Every kitchen staff in this restaurant use the right cooking utensil for different food items.					
4	In this restaurant all chefs have knowledge on controlling cooking temperature for different foods items.					
5	The restaurant provides the standard cooking and heating facilities for different types of food.					
6	In this restaurant all chefs have knowledge on cooking procedures of different foods items and intended food product.					
7	Before cooking process, thorough check on freshness of raw food stuff is done by chef on duty and management.					
8	In this restaurant re-use of marinades; {eg re-use of cooking oil} and others does not happen.					
9	The procedure and standard cooking rules are shown in the kitchen for use by all chefs.					

10	I concur that the cooking equipment and utensils in this restaurant meet the standards of food safety.					
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List down any other possible food cooking practices that can affect food safety

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### Section C: Food Storage Practices

Please indicate your level of agreement with the following statements on food storage practices on a scale of 1-5 where Strongly Disagree (1), Disagree (2), Not Sure (3), Agree (4) and Strongly Agree (5)

	Item	SD (1)	D (2)	NS (3)	A (4)	SA (5)
1	Standard capacity for refrigerators is observed in this restaurant.					
2	Raw food items are stored separately and as required in this restaurant					
3	Necessary non-food ingredients are separately stored in this restaurant					
4	Vermin and rodent control measures are properly observed in this restaurant.					
5	All the utensils and equipment used for food storage are always in good shape and state as required by the standards					
6	All persons in charge of food storage are aware that cold food is stored at a high of 40° C and hot foods at a high of 140 ° C					
7	Use of different storage equipment for different food stuff is highly observed in this restaurant					
8	No re-freezing or refrigerating of thawed foods is done in this restaurant					
9	All chefs are aware that cooked/done food should be refrigerated within 2 hours.					
10	The storage personnel in the restaurant have been facilitated with material to store and label preparation date and expected expiry date for non-fast-moving food.					
11	By any chance, all the expired raw food stuff, marinades and consumable food are immediately separated out of storage facilities.					
12	Uninterrupted power supply system exists in this restaurant					
13	Proper pest and rodent control systems have been installed in this restaurant					

List down any other food storage practices that can affect food safety

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### Section D: Food Sanitation Practices

Please indicate your level of agreement with the following statements on food sanitation practices knowledge on a scale of 1-5 where: Strongly Disagree (1), Disagree (2), Not sure (3), Agree (4) and Strongly Agree (5) is used

No	Item	SD (1)	D (2)	NS (3)	A (4)	SA (5)
1	The restaurant frequently experiences water shortage					
2	The cleaning of hands, utensils and equipment is done using clean at all time in this restaurant					
3	All restaurant personnel do clean and dry hands before handing either raw food stuff or done food products, and food utensils.					
4	All personnel dealing with food observe the rule of using clean utensils and equipment as required by standards.					
5	There is a cleaning plan for areas like kitchen, storage rooms in this restaurant. {periodic cleaning}					
6	Different washing areas are designated for use at the kitchen for different food stuffs {eg as washing sink for vegetables only}					
7	Wash rooms and sanitation areas are kept well placed in this restaurant and properly cleaned.					
8	The management of the restaurant provide adequate cleaning material for use. {detergents, brooms, wipes etc}					
9	The way food waste bins and litter bins are handled here reflect high standard of cleanliness. {at the kitchen and other points}					
10	Personnel directly handling food observe the rule not wearing of jewelry and related material in this restaurant.					
11	My opinion regarding how the personnel behave and conduct themselves in regard to person hygiene ensures high standard of food safety.					

List down any other food sanitary practices that may affect food safety

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### Section E: Food Safety

Please indicate your level of agreement on the frequency of the following indicators on the scale of Strongly Disagree (1), Disagree (2), Not Sure (3), Agree (4) and Strongly Agree (5) is used

No	Item	SD (1)	D (2)	NS (3)	A (4)	SA (5)
1	All the restaurant personnel highly ensure that food prepared and served in free from any contamination					
2	The cases of food error leading to food contamination are rare in this restaurant					
3	Management strictly monitors and control potential areas of that can lead to food contamination					
4	Cases of turnover due to misconduct during food handling are high in this restaurant					
5	Food safety sensitization is frequently done to ensure the safety of food is kept high in this restaurant					
6	Programs to sensitize on behavior and attitude towards work are frequently done to build the employees capacity					
7	Medical screening organized by the management frequently take place to ensure good health is maintained					
8	The management comply with public health regulations to reduce negative outcomes of food					

Suggest any other food production practices that can enhance food safety

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Recommend ways in which food safety can be enhanced in restaurants

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*I appreciate your participation*

### Appendix III: Observation Schedule

Observation made in restaurant labelled _____			
1. Cooking practices	Y	N	Any other additional observation
a. Cooking equipment were in good shape and easy to clean and use			
b. Non corrosive workplace surfaces and smooth floor surfaces with ease to clean			
c. Non- wooden, smooth chopping boards for different food stuffs e.g. different types of meat and different vegetables and fruits			
d. There was ease use of the equipment by the staff			
e. Adequacy of non-corrosive cooking accessories and related tools e.g. and stainless steel knives.			
f. Practical use sharp knives and standard chopping board.			
g. Availability Temperature control equipment or system during actual cooking process.			
h. Availability of heating period and cooling charts for different food stuff and temperature guides on the same at the kitchen point.			
i. Use of fresh raw food stuff and fresh cooking ingredients			
2. Food storage practices	Y	N	Any other additional observation
a. There are storage rooms, compartments for different types of raw food stuff as well as category. Based on type. E.g. Room for cereals, room for fruits, room for fluid raw stuff and room for meats and chemicals all separated by type.			
b. Standard freezer rooms and compartments			
c. Air tight freezer rooms and fridges;			
d. Availability of storage cooling temperature charts for different			

food stuff and guides on the same at the storage point.			
e. Control of insects, pests and rodents at storage rooms and compartments.			
f. Stored food stuffs have labels showing designated period.			
g. Expired raw food stuff, marinades and consumable food found in the storage facilities.			
h. Well ventilated storage rooms or compartments			
i. Stand by power backup system			
<b>3. Food sanitation practices</b>	<b>Y</b>	<b>N</b>	<b>Any other additional observation</b>
a. Clean and running water from a tap or reservoir for hand washing purpose not controlled by hands.			
b. Different hand washing points for different operators depending with the stage of food processing stage e.g. kitchen area reserved for chefs only.			
c. Liquid soap dispenser and not bar soaps at every hand washing points			
d. Paper towel dispenser for drying hands at every hand washing points			
e. Clean smooth floors with no encrusted waste or dust/mad			
f. Adequate clean toilets and well ventilated and for different operators; for staff and clients			
g. Clean and well covered litterbins placed at different points			
h. Presence of pests like Flies, cockroaches within the premises			
i. Food handlers with jewelry while at workplace. Even rings			
j. Unpleasant odors of gases from unknown sources			
k. Slippery wet floors.			
<b>4. Food Safety</b>			
a. Documents of operational compliance as required by the government organs placed on the wall			
b. Adequate lighting system inside the restaurant			

c. Pictograms and written code of conducts to motivate the operators keep food safety and suitability			
d. Supervisors making impromptu monitoring check as the production of food goes on.			

### Appendix III: Target Population Structured Information (Shift Based)

These are 16 restaurants **labelled** and those only involved in the study. The names of these restaurants are only now to the researcher for purpose of confidentiality


<b>Restaurant</b>	<b>Restaurant label</b>	<b>Kitchen Staff</b>
Restaurant 1	R1	6
Restaurant 2	R2	7
Restaurant 3	R3	5
Restaurant 4	R4	6
Restaurant 5	R5	7
Restaurant 6	R6	6
Restaurant 7	R7	6
Restaurant 8	R8	6
Restaurant 9	R9	7
Restaurant 10	R10	6
Restaurant 11	R11	6
Restaurant 12	R12	7
Restaurant 13	R13	6
Restaurant 14	R14	7
Restaurant 15	R15	6
Restaurant 16	R16	6
<b>Total</b>		<b>100</b>

**Appendix IV: Guideline for the Valid Value of CVR by Lawshe (1975)**

<b>MINIMUM VALUE OF CVR, P = .05.</b>	
<b>No. of Panelists</b>	<b>Minimum Value</b>
5	0.99
6	0.99
7	0.99
8	0.75
9	0.78
10	0.62
11	0.59
12	0.56
13	0.54
14	0.51
15	0.49
20	0.42
25	0.37
30	0.33
35	0.31
40	0.29

Source: (LAWSHE, 1975)

**Appendix V: NACOSTI Permit**

 **REPUBLIC OF KENYA**

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

Ref No: 110842 Date of Issue: 25/July/2022

**RESEARCH LICENSE**



This is to Certify that Ms. FAITH WANGUI MURIGI of Moi University, has been licensed to conduct research in Nairobi on the topic: EFFECT OF FOOD PRODUCTION PRACTICES KNOWLEDGE ON PERCEIVED FOOD SAFETY IN RESTAURANTS IN NAIROBI CITY COUNTY, KENYA for the period ending : 25/July/2023.

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