



**AN ASSESSMENT OF FOOD HYGIENE PRACTICES AMONG FOOD
HANDLERS IN RESTAURANTS IN KABWE URBAN DISTRICT**

BY

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**A dissertation submitted to the Department of Public Health, School of
Medicine, University of Zambia, in partial fulfillments of the requirements for
the Degree of Masters of Public Health (Environmental Health)**

The University of Zambia

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I **Ennie Chipabika** declare that this dissertation herein presented for the Degree of Masters of Public Health (Environmental Health) has not been previously submitted either wholly or in part for other Degree at this or any other University nor is it being currently submitted for any other Degree.

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ABSTRACT

Kabwe district is one of the six (6) Districts of Central Province and a provincial headquarter. It is 139km from the capital city Lusaka with an area of 1,577km² surrounded by Kapiri-Mposhi and Chibombo. It is a transit town with a huge traffic of people moving through the Great North Road to the Copperbelt from Lusaka and vice versa. The district in 2008 had a projected population of 183,954 inhabitants with a growth rate of 1.8% (KDMT, 2008). Recently the general population has increased and this has lead to increase in the demand of wide variety of food stuffs which include those that are often eaten away from homes. This demand has lead to an increase in the establishment of many eating places such as hotel, lodges, restaurants and guest houses.

The general objective of the study was to assess food hygiene practices among food handlers in restaurants in Kabwe urban district. Specifically the study was conducted to establish characteristics of food handlers working selected restaurants, to assess the level of knowledge regarding food hygiene practices among food handlerst and to assess food hygiene practices among food handlers in restaurants in Kabwe district. The study site was Kabwe Urban district with a sample size was 251.

The majority (76%) were female. 58% of respondents attained secondary level of education. In general, regardless of the education level, there were more female food handlers working in restaurants than male in all age groups. The study revealed that 74.1% were not trained in any food hygiene programme while 25.9% were trained. 100% of food handlers washed hands before handling food. 96% washed with soap while 6% just washed with plain water. 86% of food handlers confirmed that they covered their hair when working in the restaurants while 14 % did not cover their hair.

The study revealed that there was an association between education and level of knowledge in food hygiene. Furthermore, the study revealed that food handlers that were very knowledgeable fell among those whose level of education was secondary school. And within this category, those without any form of education were the least knowledgeable. The association between level of knowledge and food hygiene practices was significant at 5% level of confidence with P-value=0.001. In conclusion, this study revealed that there was an association between level of knowledge and hygiene practices among food handlers. It was

further, concluded that the level of knowledge is high among food handlers in Kabwe Urban district and that the majority of these handlers had good hygiene practices

DEDICATION

This work is dedicated to my parents who trained me to be honest and resilient even in situations that are challenging and to my family for their encouragement throughout my studies.

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Many thanks also go to Kabwe Municipal Council for granting me permission to carry out a study in the district and Health Inspectors for their time and support during the process of data collection.

ABBREVIATIONS/ACRONYMS

E. coli	:	Escherichia coli
CDC	:	Centre for Disease Control
FAO	:	Food Agriculture Organisation
GMP	:	Good Manufacturing Practices
HACCP	:	Hazard Analysis Critical Control Point
KDHMT	:	Kabwe District Management Team
SSOP	:	Standard Sanitation Operation Procedures
WHO	:	World Health Organization
ZEMA	:	Zambia Environmental Management Agency

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CHAPTER ONE: INTRODUCTION

1.1 Background Information

Kabwe district is one of the six (6) Districts of Central Province and a provincial headquarter. It is 139km from the capital city Lusaka with an area of 1,577km² surrounded by Kapiri-Mposhi and Chibombo. It is a transit town with a huge traffic of people moving through the Great North Road to the Copperbelt from Lusaka and vice versa. The district in 2008 had a projected population of 183,954 inhabitants with a growth rate of 1.8% (KDMT, 2008).

The district being centrally located, the trading outlets and markets are well articulated and facilitate the necessary internal and external exchange of goods and services and provide the much needed employment for the local people. It has 89 restaurants, 158 bars, bottle stores and 183 taverns which play an important role for international conferences, workshops and seminars (KDHMT, 2012).

Recently the general population has increased and this has lead to increases in the demand of wide variety of food stuffs which include those that are often eaten away from homes. This demand has lead to an increase in the establishment of many eating places such as hotel, lodges, restaurants and guest houses. The demand for a wide variety and convenient foods is also increasing the risk of foodborne diseases and infections on the consumers who mainly depend on these establishments. Thus, it is important that people handling food observe certain strict hygienic measures when it comes to cleaning, preserving, cooking or storing food for human consumption. This is because good health is dependent on the manner food is handled. This is because if one eats meat that was cooked a while ago, but was not refrigerated or stored properly, it could lead to an upset stomach resulting into food poisoning or other digestive problems. Therefore, it is absolutely essential for people of all ages to be aware of food safety measures and proper food handling practices (Tonder, 2007).

The term food safety is increasingly being used in place of food hygiene and this encompasses a whole range of issues that must be addressed for ensuring the safety of ready to eat foods. Food hygiene therefore put too much emphasis on cleanliness while food safety requires much more than a clean premises (Sprenger, 2007). The World Health Organization

(WHO) defines food safety as the “conditions and measures that are necessary during production, processing, storage, distribution and preparation of food to ensure that it is safe, sound, wholesome and fit for human consumption” (WHO, 1984). Food safety remains a critical issue among professionals in the food service sector as well as consumers (Griffith, 2000). This is basically due to outbreaks of foodborne diseases resulting in substantial costs to individuals and the economy of the country.

The high incidence of food-borne illnesses especially in developed countries where statistics are compiled has led to an increase in global concern about food safety and has been associated with poor personal hygiene of food handlers. An estimated 76 million foodborne illnesses occur annually in the United States. These foodborne illnesses result in an estimated 325,000 hospitalizations and 5,000 deaths every year in the United States (Tonder, 2007).

According to (FAO/WHO, 2005), food safety systems in developing countries and Africa in particular are weak and unable to protect human health. In Ethiopia, 2004, the ten leading causes of outpatient visits to their health institutions were due to all forms of diarrheal diseases and intestinal parasites which may be directly or indirectly related to food, (MOH, 2004). However, health institutions that compile monthly morbidity statistics do not identify if the cause for such illnesses is due to food or other. In addition, no systematic surveillance system is in place due to weak structural organization and insufficient resources allocated to food-borne surveillance. Occurrence of such diseases is rarely reported and exchange of information between regulatory bodies is virtually absent. As a result, the prevalence and magnitude of the problem inflicted by food-borne illnesses is not known (FAO/WHO, 2005).

Food safety is directly related to the harmful substances present in it. Thus any substance that is reasonably and likely to cause harm, injury or illness, when present above an established acceptable level is a food safety hazard and these hazards arise from different sources. They can be natural components of the food itself, they can arise from contamination of the food during any stage of the production, processing, storage and distribution or can be a result of decomposition and deterioration of the food items. In most countries regulatory bodies have established acceptable limits for all types of hazards (Ali, 2000). Food hazards are grouped into three main categories: microbiological hazards chemical and physical hazards.

1.2.2 Biological hazards

Biological hazards are the most important as they result in large amount of spoilt and unacceptable numbers of food poisoning cases. Food poisoning bacteria may be brought into the food premises by either food handlers, raw foods, insects, rodents, animals and environmental pollution including soil and dust (Ali, 2000).

People commonly harbor food poisoning organisms in the nose, mouth, intestine and also on the skin. The hands are never free of bacteria and the soiled hands of food handlers are likely to harbor large numbers of moulds, yeast and bacterial, some of which may be pathogenic like staphylococci aureus. The presence of boils and septic cuts usually guarantees the presence of staphylococci and food handlers suffering from these conditions should be excluded from working in food premises. Carelessness, ignorance of, or disregard for hygienic food handling may result in contamination and possibly food poisoning. All food handlers must practice high standard of personal hygiene by wearing suitable protective clothing. (Sprenger, 2007).

1.1.3 Chemical hazards

Chemical hazards refer to the contamination of food by chemicals. Chemicals like veterinary drugs, fertilizers, pesticides can enter food stuffs during growth and environmental contaminants such as lead and dioxins enter food stuffs during processing (WHO, 2000).

1.1.4 Physical Hazards

Physical hazards include objects which are not a part of food, never was meant to be food, but somehow got into the food. Examples are pieces of glass or metal, toothpicks, cigarette butts, hair, staples, jewelry. Eating these can cause injury. A physical hazard can enter a food product at any stage of production. Hard or sharp objects are potential physical hazards and can cause, cuts to the mouth or throat, damage to the intestine, damage to teeth or gums (Sprenger, 2007).

1.1.5 The Food Control System

1.1.5.1 Prerequisite programs

According to the Canadian Food Inspection Agency (1998), prerequisite programs are universal steps or procedures that control the operational conditions within a food establishment allowing for environmental conditions that are favorable for the production of safe food. The Codex International Code of Practice and General Principles of Food Hygiene is believed to be the basis for these programs. The wide range of activities and events included in prerequisite programs may have an impact on Hazard Analysis and critical Control Point (HACCP) system for a specific food product even though they are not parts of the HACCP system. Prerequisite programs include concerns and aspects of the entire food environment before the HACCP system is initiated. They include the suitability of facilities, control of suppliers, safety and maintenance of production equipment, cleaning and sanitation of equipment and facilities, personal hygiene of employees, controls of chemicals, pest control and the like. These programs include good manufacturing practices and should be brought up to acceptable standards before the HACCP system is initiated (Ali, 2000).

Food establishments working with ready-to-eat (RTE) food products should understand the importance of developing and implementing procedures to reduce the potential for contamination with microorganisms. Therefore, it is extremely important that anyone involved with ready-to-eat food products develop and implement effective Good Manufacturing Practices (GMPs) and Standard Operating Procedures (SOPs) as the foundations of a successful HACCP program (North American Meat Processors, 1995). As the matter of fact, prior to application of HACCP to any sector of the food chain, that sector should have in place prerequisite programs such as good hygienic practices according to the Codex General Principles of Food Hygiene, the appropriate Codex Codes of Practice and appropriate food safety requirements. All prerequisite programs must be initially verified and validated and appropriate preventive measures and a monitoring system should be in place. Whereas a deviation from the limits set for the monitoring of prerequisites occurs, a proper corrective action should be applied and addressed under the HACCP plan (Codex Alimentarius Commission, 1997).

1.1.5.2 The Hazard Analysis and Critical Control Point (HACCP) System

HACCP is an internationally recognized food safety assurance system that concentrates prevention strategies on known hazards; it focuses on process control, and the steps within that, rather than structure and layout of premises. HACCP is defined as “an effective system based on Good Manufacturing Practices (GMP) and Standard Sanitation Operation Procedures (SSOP), for providing safe and healthy foods” (Isara, *et al.*, 2009). HACCP is an effective system because the food safety system is designed to provide the information flow for preventive and corrective actions and can easily be established on the production lines of all kinds of foods (Sprenger, 2007). In addition, it establishes procedures whereby these hazards can be reduced or eliminated and requires documentation and verification of these control procedures (Tibebu, 2008). HACCP system should be suitably placed in the total management system of a food manufacturing company because it emphasizes on the hazard analysis step as the weak analysis of the HA (hazard analysis) step makes the HACCP system ineffective (Sprenger, 2007)

1.1.6 Foodborne infections

Foodborne infections follow the ingestion of bacteria, their toxins or viruses, which may be present in already contaminated food, or derived during processing from other foods by cross contamination (from surfaces, equipment or catering staff hands), or, less likely, from carriers. On top of that, poisonous chemicals and/or other harmful substances may also be causes for foodborne diseases if they are present in food. People can become ill if a pesticide is inadvertently added to a food, or if naturally poisonous substances are used to prepare a meal (Walker et al., 2003).

More than 250 different foodborne diseases have been identified and most of these diseases are bacterial, viral and parasites infections. Other diseases include poisonings that are caused by harmful toxins or chemicals that have contaminated the food. In many countries, people become ill after mistaking poisonous mushrooms for safe species, or after eating poisonous reef fishes (CDC, 2005). These different diseases have many different symptoms, so there is no one syndrome that is foodborne illness. However, the microbe or toxin enters the body

through the gastrointestinal tract, and often causes the first symptoms such as nausea, vomiting, abdominal cramps and diarrhea (CDC, 2005).

Most of the foodborne diseases are preventable but there is no simple one-step prevention measure. Prevention measures need to prevent or limit contamination all the way from farm to table. A variety of good agricultural manufacturing and kitchen practices can reduce the spread of microorganisms and prevent the contamination of foods. Careful review of the whole food production process can identify the principal hazards, and the control points where contamination can be prevented, limited, or eliminated. A formal method can be used to evaluate and control the risk in foods and it is called the Hazard Analysis Critical Control Point, (HACCP) system (CDC, 2005).

Effective hygiene control is vital to avoid the adverse effects to human health and economic consequences of foodborne illness, foodborne injury, and food spoilage. Everyone, including farmers and growers, manufacturers and processors, food handlers and consumers have a responsibility to assure that food is safe and suitable for consumption (FAO/WHO, 2005).

The availability of safe food improves the health of people and is a basic human right (WHO, 2002). Safe food contributes to health and productivity and provides an effective platform for development and poverty alleviation. People are becoming increasingly concerned about the health risks posed by microbial pathogens and potentially hazardous chemicals in food. It is against this background that, a study will be conducted in Kabwe Urban District to establish hygienic practices among food handlers in restaurants in Kabwe urban.

1.2 *Statement of the Problem*

Food safety is an essential public health problem that affects all countries. The problem of Food-borne diseases is widespread and represents a serious threat to good health in both developing and developed countries. Approximately two million children die annually from diarrheal diseases, while hundreds of millions suffer from frequent episodes of diarrhea and its debilitating consequences, mostly caused by food or water-borne pathogens (WHO, 2002).

According to World Health Organisation (WHO, 2005), contaminated food contributes to 1.5 billion cases of diarrhoea in children each year, resulting in more than three million premature deaths. However, these deaths and illnesses are shared by both developed and developing nations. For example, in the United States, according to Centre for Disease Control and Prevention (CDC) it estimates that foodborne diseases cause approximately 76 million illnesses annually among the country's 290 million residents, as well as 325,000 hospitalizations, and 5,000 deaths of known pathogens account for about 18% of the illnesses and 36% of the deaths, while unknown agents account for the rest. However the three most common pathogens include Salmonella, Listeria, and Toxoplasma, which are estimated to cause 1,500 deaths each year.

In Africa regular surveillance of food borne diseases is weak, although there is awareness on the importance of diarrheal diseases and a limited number of studies have been undertaken. According to Molbak (1989) indicates that 40 to 80% of stored water samples and 19 to 32% of food samples contained significant number of enterobacteria. The levels of contamination were even greater in infant foods that were stored at room temperature. Similarly, in Ethiopia, the Ministry of Health (MOH, 2004) stated that among the ten leading causes of outpatient visits to health institutions were due to all forms of diarrheal diseases and intestinal parasites which may directly or indirectly be related to food (Todd, 1997)

Reports from Kabwe District Health Management Team (2008), showed that the incidence rate of diarrheal diseases in Kabwe District were declining at a slow rate such as 91/1000 in 2008, 100/1000 in 2007 and 101/1000 in 2006. The Annual Reports for the District also indicate that diarrhoea is number three (3) major cause of morbidity for all age groups and this might be attributed to foodborne diseases and waterborne diseases.

A similar study conducted by Lusaka City Council (2010) revealed that poor hygiene practices in food establishments, improper cleaning and bad habits such as smoking and poking of the nose, wearing jewellery and lack of protective gear were potential health hazard (Shinando, et al., 2010). Taking in to consideration of Kabwe town as a busy town with a number of food and drink establishments, it was desirable to select it as a study area. In addition, there was no research done in this area which assesses the food handling practices among food handlers in the restaurants.

1.3 Study Justification

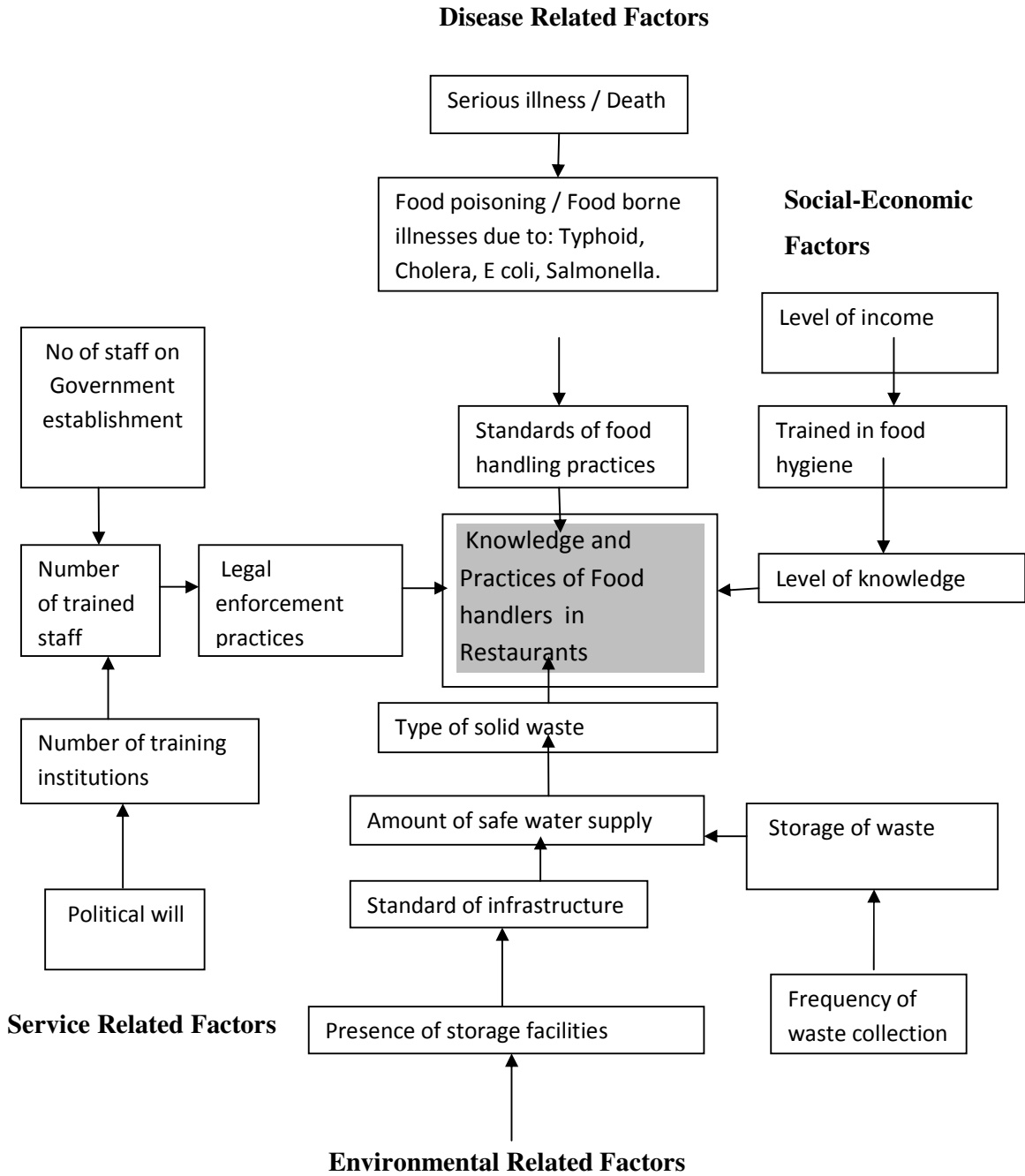
Zambia like any other developing countries with many competing priorities on their health agenda has not recognized food safety as a vital public health issue. It is becoming clear that food-borne diseases have a significant negative impact on health, which in turn has a significant effect on the national economy. A quick survey showed that most restaurants in Kabwe district operate under insanitary conditions. They have inadequate sanitary facilities, hand washing facilities, latrines, water supply and poor waste disposal system. Food contamination and personal hygiene practices might have contributed to outbreaks of foodborne diseases and water borne diseases such as cholera, typhoid and dysentery in the district.

Statistically, Kabwe District has continued to record high incidences of diarrhoea and dysentery cases and currently the incidences of these diseases stand at 91/1000 in 2008, 100/1000 in 2007 and 101/1000 in 2006. Although this shows a slight decrease it is obvious that some of the cases are not reported and there is a high possibility of under reporting (KDHMT Action Plan, 2010)

In April 2012, it was reported that cases of typhoid had risen from 100 to 127 and this was mostly attributed to drinking contaminated water and eating contaminated food. It was further stressed that typhoid is caused by the bacterium salmonella typhi and lives in the intestines of humans and can be shed by carriers who are food handlers (MoH, 2012). It is against this background that food establishments are required to give special attention to food hygiene in order to prevent food from being contaminated and lead to foodborne illnesses. It

is also for this reason that the study was undertaken to establish hygienic practices in food establishment in order to inform stakeholders about the the current hygiene standards of food handlers in restaurants in Kabwe district.

1.4 Problem Analysis Diagramme



1.4.1 Disease Related Factors

It is important to evaluate actual microbiological performance of end products in order to check the effectiveness of a food safety management system and to appraise performance of critical control points, good hygienic practices and standard operating procedures (Walker, et al., 2002).

The microbial quality of food has been identified as a useful indicator for control of the critical points related to the procedures of cleaning and disinfection. Hands are also considered as a critical source of cross contamination according to other studies that have found contamination with *Campylobacter* and *Staphylococcus aureus* microorganisms coming from hands (Fisseha et al., 1999).

Food handlers with poor personal hygiene can inoculate food item with infected excreta, respiratory drippings' or other infectious discharges. Sometimes food handlers may be a major source of contamination and ultimate sources of health risks either as carriers of pathogens or through poor hygienic practices (Kaferstein, 2003). Workers can carry microbial pathogens on their skin, hair, hands, digestive systems or respiratory tracts and unless they have a thorough understanding and follow basic food hygiene principles, they may unintentionally contaminate foods, water supplies and equipment thereby creating favorable conditions for an outbreak of foodborne illnesses (Dugassa, 2007).

1.4.2 Environmental Related Factors

The environmental factors are also important in the prevention of food from being contaminated and should equally be given a priority in food establishment. Similarly, water is a critical raw material in food establishments which may equally be contaminated with biological, chemical or physical hazards. As such, contaminated water will create a public health risk if it is used for drinking purpose, washing of food, incorporated into food as an ingredient and used in food processing, washing of equipment, utensils and containers (Sprenger, 2006).

Waste disposal if not properly handled and disposed off may lead to food contamination. In particular, access to food waste by pests (insects and rodents) as well as by animals (dogs and cats) should be avoided.

1.4 Objectives

1.4.1 General objectives

To assess hygiene practices among food handlers on food hygiene in restaurants in Kabwe Urban District.

1.4.2 Specific Objectives

- a) To establish the characteristics of food handlers working in randomly selected restaurants in Kabwe Urban District
- b) To assess the level of knowledge regarding food hygiene practices among food handlers in Kabwe urban district
- c) To assess food hygiene practices among food handlers in restaurants in Kabwe district

1.4.3 Hypotheses

H₀: There's is no relationship between the level of knowledge and food hygiene practices among food handlers in restaurants in Kabwe Urban District.

H₁: There's is a relationship between the level of knowledge and food hygiene practices among food handlers in restaurants in Kabwe Urban District.

1.5 Operational definitions

The following operational definitions apply to this study.

- Food Hygiene:** Means all conditions and measures necessary to ensure the safety of the food chain.
- Food Safety:** Means the scientific discipline describing handling, preparation and Storage of food in ways that prevent foodborne illnesses.
- Restaurant:** Means an establishment which prepares and serves food and drink to customers in exchange of money either paid before a meal or after a meal.
- Food Handler:** Means any person employed in a food premise who at any time may be involved in the manufacturing, preparation or packing food for sale.
- Contamination:** Means the presence in the food of harmful chemicals and microorganisms which can cause consumer illness.
- HACCP:** Means a systematic preventive approach to food safety that identifies physical, chemical and biological hazards in production and processing of food.
- Biological Hazards:** Biological hazards come mainly from microorganisms including bacteria, viruses and parasites
- Chemical Hazards:** Means of food by chemicals
- Physical Hazards:** Means objects which are not a part of food, never were meant to be food but somehow got into the food. Examples are pieces of glass or metal, toothpicks, cigarette butts, hair, staples, Jewelry. Ingesting these can cause injury.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter discusses the literature reviewed for this study. This literature has been reviewed from the journals, books, dissertation both published and unpublished. The literature is in three categories and these include; global, regional and local perspective.

2.2 Global Perspective

WHO defines food safety as the conditions and measures that are necessary during production, processing, storage, distribution and preparation of food to ensure that it is safe, sound, wholesome and fit for human consumption (WHO, 1984). Food safety remains a critical issue among professionals in the food service sector as well as consumers (Griffith, 2000).

Food safety is becoming a key public health priority because a large number of people take their meals outside their homes. As a result, they are exposed to food borne illnesses that originate from food stalls, restaurants and other food outlets. In line with this, food service employees are a crucial link between food and consumers. World Health Organization (WHO) has developed five main keys to safer food, which include keeping clean, separating raw and cooked food, cooking thoroughly, keeping food at safe temperatures, and using safe water and raw materials (WHO, 2007). These five keys to safer food are of immense importance in developing countries, and equipping food handlers with such information could impact significantly on food safety.

Between 1998 and 2002, an average of 1329 food borne disease outbreaks were reported to the Center for Disease Control and Prevention (CDC) each year. Approximately 52% of these were attributed to food service establishments (Jones TF, 2006; Lynch M, 2006). During the same period, the Oregon Public Health Division reported 62 food borne outbreaks or approximately 5% of the national total (Emilio E. DeBess, 2009). Another study conducted in Malaysia also showed that approximately 10-20% of food-borne disease outbreaks are due to contamination by the food handlers (Zain MM, 2002).

Food contamination may occur at any point during its journey through production, processing, distribution, and preparation (Green L, 2005; Hennessy TW, 2004). The risk of food getting contaminated depends largely on the health status of the food handlers, their personal hygiene, knowledge and practice of food hygiene (Mead PS, 1999). Infections can also be acquired through contaminated unwashed fingers, insects, and circulation of bank notes and by wind during dry conditions (Isara AR, 2009). Contamination of food with eggs and cysts especially those sold by hawkers may also serve as a source of infection to consumers of such items (Umeche N, 1991). Therefore, food handlers i.e. any person who handles food, regardless whether he actually prepares or serves it, play an important role in the transmission and, ultimately, prevention of food borne disease (Isara AR, 2009). Information regarding food handlers' practices is key to addressing the trend of increasing food borne illnesses.

2.8 Regional Perspective

In Africa poverty is the underlying cause of consumption of unsafe food. Lack of access to potable water, poor government structural arrangement, communicable diseases, trade pressure, and inconvenient environmental conditions are notable reasons. High incidence of diarrheal diseases among children are an indications of the food hygiene situation in the African region (Dewaale et al., 2006). There are many factors associated with food handling practices. A study done in Ankara, Turkey, Mekelle town, and Bahir Dar town, Ethiopia indicated that knowledge of food handling is significantly related with food handling practices (Nigussie et al., 2012), whereas, a study done on central India, Bangladesh, and Nigeria indicated that food handling practices was related with educational status of food handlers (Kibret et al, 2012). Moreover, a study done in Nigeria and Kenya in 2009 showed that type of premise, unclean equipment and work responsibility were factors affecting food handling practices (Havelaar et al, 2013). Gender was also found to be associated with food handling practices of vendors of street foods in Nairobi, Kenya (Muinde et al, 2005). In addition to socio demographic factors, environmental factors such as temperature, solid waste storage, solid waste disposal, latrine condition and hand washing facilities of the food and drink establishment were associated with food handling practices (Bas et al, 2006).

Food borne diseases are common in developing countries including Ethiopia because of the prevailing poor food handling and sanitation Practices, inadequate food safety laws, weak regulatory systems, lack of financial resources to invest in safer equipments and lack of education for food handlers.

2.9 Local Perspective

In Zambia, a study was done by Lusaka City Council to assess the effectiveness of mini-intervention on food hygiene in restaurants and bakeries in Lusaka. It was also commissioned to determine risk factors associated with existing sanitation practices and facilities in restaurants and bakeries in Lusaka (Shindano et al. 2012).

An assessment of microbial loads based on APC using PHL standards in water showed that the proportion of food outlets with a combination of satisfactory and improved performance was 65% while the performance of all the restaurants in salads was satisfactory (100%). On the overall, assessment of hygiene in water based on coliforms and *E. coli* has shown that all the food outlets performed well. On the contrary, hygiene in salads based on coliforms and *E. coli* revealed that performance was below expectations as the proportion of food outlets with a combined satisfactory and improved performance was only 33% (Shindano et al. 2010)

The high levels of hygienic indicator microorganisms such as coliforms and *E. coli* from hand swabs of food handlers entails that most restaurant workers or food handlers were not observing good personal hygiene. In a similar vein, high levels of coliforms and *E. coli* in salads mean that either the raw materials of these salads were initially contaminated or there was cross contamination during or after preparation.

This study revealed that there were a number of deficiencies in the food control management systems of food outlets in Lusaka. These deficiencies pose a great risk to food safety of the food that consumers are subjected to in these food outlets although data is not there to quantify how many people had food borne illnesses.

Another study conducted by Schmitt et al. 2019 following identification of some cases of diarrhoea from persons who sought treatment at a health clinic that served two townships

near a large city in Zambia or got water from a deep protected well in one of the townships, hazard analysis was done on food preparations and storage practices in 17 homes which revealed that the food had salmonella especially the left over foods. Thermotolerant conliforms and Escherichia coli was also found in drinking water. It was therefore concluded that these organisms were responsible for diarrheal diseases which was as a result of poor hygiene practices among food handlers in various homes where these patients came from.

Another survey conducted in Lusaka, Zambia in 2003 on street food revealed that most street food venders operate in unsanitary conditions without proper shelters, unadequate water and insanitary conditions which can facilitate the outbreak of diarrhea diseases (FAO/WHO, 1999)

2.10 Legal Framework in Zambia

2.10.1 Food and Drugs Act Cap 303

This is the law that governs the “sale of food in the Zambia. It states that “No person shall use any premises for sale or manufacture for the sale of any food unless she/he first obtain a licence from the local authority authorising them to do so”. The licence is issued on grounds that the person meets the requirements in terms of hygiene practices, waste disposal, water supply and all the relevant requirements. The license is valid for one year and renewable if the requirements are maintained.

Regulation 490 of the Food and Drugs Act Cap **303** requires that food handlers maintain a high degree of personal cleanliness and wear appropriate protective clothing. Nobody may work with food if they are known to be suffering from a disease likely to be transmitted to the consumer through food.

2.10.2 Public Health Act Cap 295

The Public Health Act states that the infrastructure of the warehouse or building used for storage or food established should be constructed of the material in the manner to render it rat proof and also section 77 prohibits any person from sleeping where food is prepared

It is for this reason that similar studies should be undertaken more often in order to monitor the quality of food being offered to the public and also protect the health of the people and also the economy of the country because food-borne illnesses have negative effects on the economy of the country.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methods used in the research study and this includes variables, study type, data collection technique, sampling procedures, plan for data analysis, ethical considerations and how the data collection tools were tested.

3.2 Dependent and independent Variables

In this study, the dependent variable was food hygienic practices among food handlers in restaurants while the independent variables were, characteristics of food handlers, levels of knowledge on food hygiene and hygiene practices among food handlers in randomly selected restaurants in Kabwe Urban district..

3.3 Study Type

This was a descriptive cross-sectional conducted in Kabwe urban district.

3.4 Research Setting

The research was conducted in Kabwe urban District in Central province. It is 138Km from the capital city Lusaka with an area of 1,577km² surrounded by Kapiri-Mposhi and Chibombo. It is a transit town with a huge traffic of people, goods and services moving through the Great North Road to the Copperbelt from Lusaka and vice versa.

The district is mainly urban with four health facilities in peri-urban areas. Some facilities provide first level services but other cases are being referred to Kabwe General Hospital for first level hospital services. The District has also expanded one of its Health Centres namely Ngungu Health Centre to a 24 bed capacity mini-Hospital.

Being strategically located, district, the trading outlets and markets are well articulated and facilitate the necessary internal and external exchange of goods and services and provide the

much needed employment for the local people. It has 89 restaurants, 158 Bars, Bottle stores and 183 taverns which play an important role for international conferences, workshops and seminars.

3.4.1 Study Population

The study population was 89 restaurants registered with Kabwe Municipal Council and 320 food handlers. The food handlers consist of female and male adults who work in identified restaurants.

3.5 Inclusion and Exclusion Criteria

3.5.1 Inclusion Criteria

Only people who worked in restaurants were included in the study

3.5.2 Exclusion Criteria

All those people who do not work in the restaurants and were not willing to participate in the study were excluded.

3.6 Determination of Sample Size

Taking 89 as the total number of restaurants and 320 as the sampling frame for food handlers, the sample size is calculated as follows;

$$n = \frac{Z^2 p (1-p)}{d^2}$$

n = is the sample size

Z = confidence interval

\hat{p} = Proportion

d = Confidence error

Therefore:

Z = 1.96

\hat{p} = 0.21

$$n = \frac{1.96^2 * 0.21(1-0.21)}{0.05^2}$$
$$= 255$$

The study therefore set to recruit 255 participants.

* Only 251 respondents were interviewed because 4 food handlers refused to participate in the study.

3.7 Sampling Technique

A simple random probability technique was used to select the sample units. In this respect a register of 320 food handlers constituted the sampling frame. In order to have a representative sample all the 89 restaurants were sampled and then random sampling techniques was used to sample study units of food handlers.

3.7.1 Simple Random Probability Sampling

In order to present a representative sample, the study drew respondents or study units using simple random sampling method from the sampling frame. This was done by assigning numbers to food handlers in each restaurant and all the numbers were put in the box. Then each unit was picked randomly from the box. Three (3) food handlers were randomly picked from each restaurant. The purpose of using a simple random method was to obtain a representative sample and get the representative information which will be the reality on the ground

3.8 Data Collection, management and quality control

Data in this study was collected using a structured questionnaire which was administered to food handlers and a check list was used to observe behaviours of food handlers.

3.8.1 Validity

Validity is the degree to which an instrument measures what it is intended to measure. There was an extensive literature review to measure validity of the tool before designing the tools and some questions in the tool were adapted from similar studies. Pre-test of the instruments was conducted to determine whether they were bringing out the required responses from respondents.

3.8.2 Reliability

Reliability refers to the degree of consistency or accuracy with which an instrument measures designed attributes intended to measure. In this study to ensure reliability, the research used quantitative data reliability process using Delphi approach where the researcher got various views and incorporated in the instrument.

3.8.3 Questionnaire

This involved the administering of structured designed questionnaires to food handlers. The questionnaires were addressed to the food service staff focusing on their demographic characteristics, knowledge and practice of food hygiene, knowledge on common occurring food-borne diseases, practices regarding the use of preventive measures against food cross-contamination and knowledge of Hazard Analysis and Critical Control Points (HACCP). Questionnaires were translated in Bemba for easy understanding to food handlers.

3.8.4 Checklist

This was designed to assess some practices of food handlers in terms of hand washing, washing utensils in hot water, licking fingers and covering hair. It was also used to assess the availability of running water, sanitary facilities and waste management in the restaurants. The full content of the checklist is included in the annex

3.9 Plan for Data Processing and Analysis

After data collection, the questionnaires were thoroughly checked for completeness and for consistency. Then, They were coded manually and entered in a statistical package called SPSS and stata. Data was summarized and presented in table form, pie charts, and tables in order to facilitate understanding.

3.10 Pre-Testing of Data Collection Tools

The data collection tools were pre-tested on food handlers in found in the restaurants in Mungwi district. This was done in order to determine the quality of the information which was collected using the described tools.

3.11 Ethical Consideration

Ethical clearance was sought from Eres Coverage IRB. Institutional clearance was sought from Kabwe Municipal council. Permission was obtained from the owners of the restaurants. Consent was also obtained from the respondents. The researcher adhered to Anonymity and Confidentiality of the respondents throughout the research process.

CHAPTER FOUR- PRESENTATION OF FINDINGS

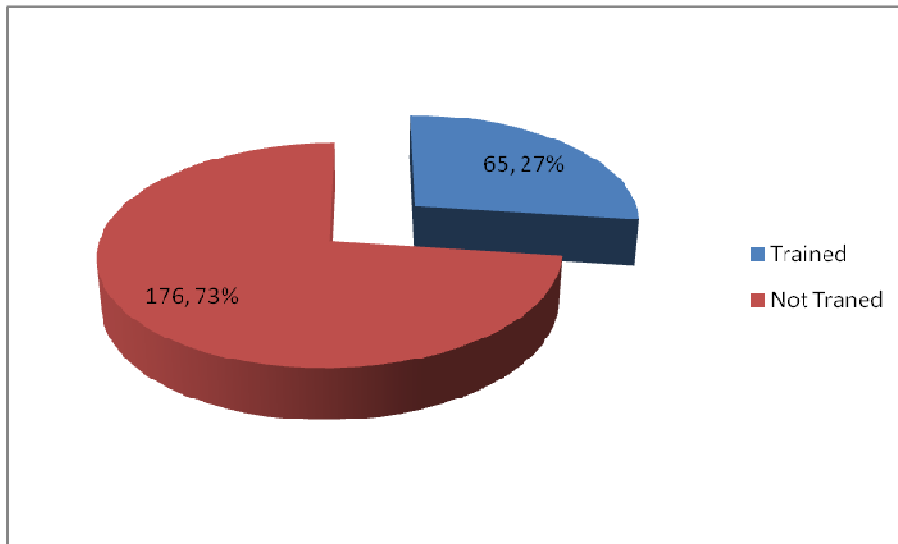
A total of 251 food handlers were interviewed to assess the level of knowledge and practices on food hygiene. The variables have been grouped in order to give the overall picture. Similarly, findings have been presented in different forms that comprise frequency tables, charts, cross tabulations and logistic regression model.

Table 1: Background Characteristics of Food Handlers (*n*=251)

Demographic profile	Frequency/Percentage
Gender	
• Male	60 (24%)
• Female	191 (76%)
Age in Yrs	
• 15-20	51(20.4%)
• 21-26	96(38.2%)
• Above 26 yrs	104(41.4%)
Education Level	
• Primary and Below	91 (36.1%)
• Secondary	145(58%)
• Tertiary	15(5.9%)

The majority (76%) were females and (24%) were males. 58% of respondents attained secondary level of education. In general, regardless of the education level, there were more female food handlers working in restaurants than male in all the age groups.

Figure 1: Training of Food handlers in food hygiene practices



Out of 251 food handlers that were interviewed, results in figure 1 show that 26% were trained in food hygiene while 74% were not trained..

Figure 2 Definition of food hygiene

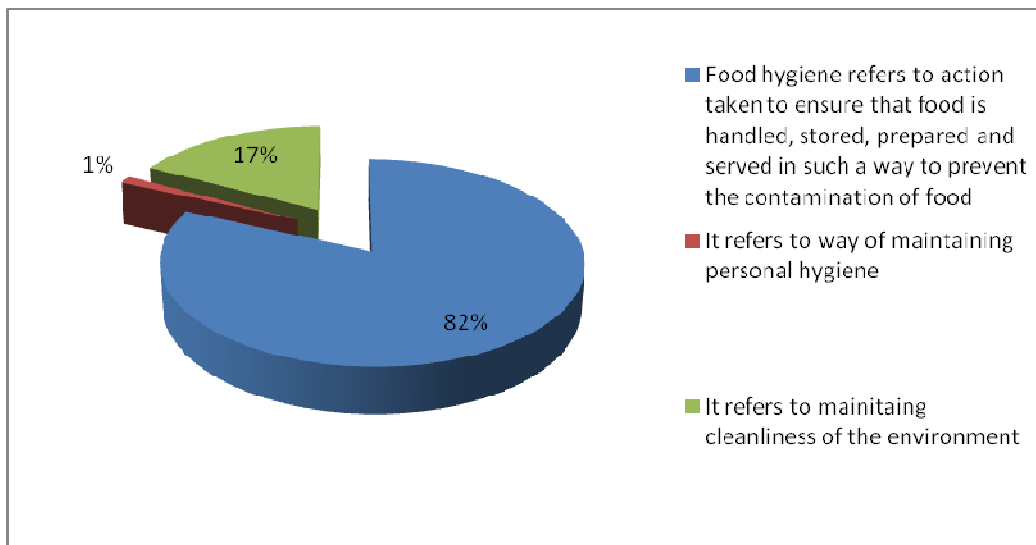


Figure 2 above shows the knowledge of food handlers on the definition of food hygiene, 206 (82%) of food handlers indicated that food hygiene refers to actions taken to ensure that food is handled, stored, prepared and served in such a way to prevent contamination of food, 43 (17 %) indicated that it is a way of maintaining personal hygiene and 2(1%) referred it as a way of maintained cleanliness of the environment.

Figure 3 Prevention of food borne diseases

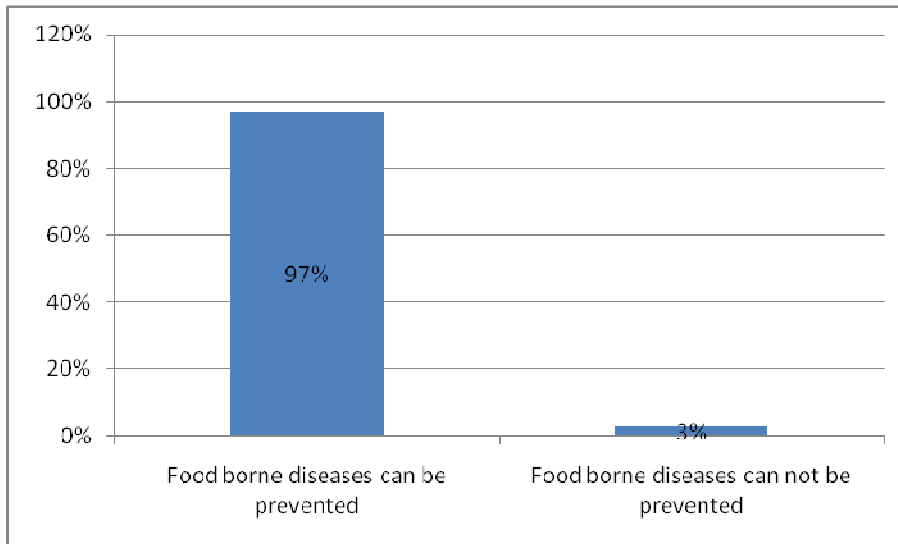


Figure 3 above shows knowledge of food handlers on prevention of foodborne diseases. 243 (97%) indicated that food borne diseases can be prevented through good hygiene practices while 8(3%) indicated that it does not prevent food borne diseases.

Figure 4 No of times when hands are washed in the restaurants

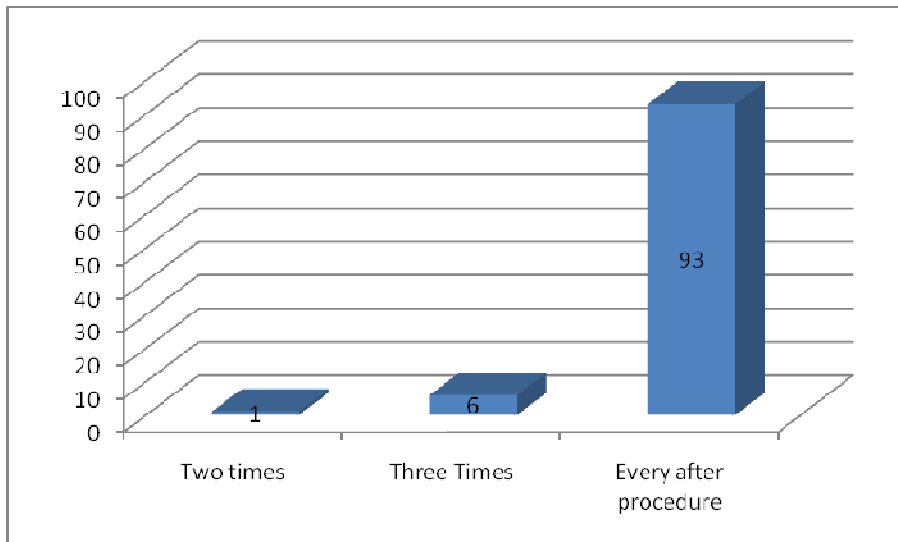


Figure 4 above shows the number of times food handlers washed their hands in restaurants, 233 (93%) respondents indicated that hands are suppose to be washed before every after procedure.

Table 2 Knowledge of food handlers on Food Hygiene Practices

	Frequency	Percentage
Posting of food hygiene information sheet	148	58.96
No Posting of food hygiene information sheet	103	41.04
Importance of food Hygiene Training		
Important	232	92.4
Not Important	19	7.6
Cross Contamination		
Poor hygiene can cause cross contamination	231	92
Poor hygiene can not cause cross contamination	20	8
Prevention of foodborne diseases		
Aware	239	95.22
Not aware	12	4.78
Good hygiene practices Prevent diarrhea		
Prevent	227	90.4
Does not prevent	24	9.6

Table 2 above shows knowledge levels of food handlers on food hygiene practices. 59% of food handlers had information sheets on the wall especially on hand washing while 41% did not have information sheets on walls in their restaurants. On the importance of food hygiene training, 92% of respondents indicated that food hygiene training was important while 8% indicated that it was not important. 92% of respondents knew that poor hygiene can cause cross contamination while 8% did not know. 95.2 % knew that foodborne diseases are preventable while 4.78 % of respondents were not aware on the prevention of foodborne diseases.

Table 3: Hygiene Practices of Food handlers(n=251)

	Frequency	Percentage
Wash hands before handling food		
Wash hands before handling the food	251	100
Do not wash hands before handling food	0	0
No of times when hands are washed		
Once a day	4	1.59
Three times a day	14	5.58
After every procedure	233	92.83
Wash hands with soap		
Wash with soap	242	96.41
Does not wash with soap	9	3.59
Covering hair		
Covered	217	86.45
Not covered	34	13.55
Protective clothing		
Wear protective clothing	208	82.87
Do not wear protective clothing	43	17.13
Do not wash cooking utensils in hot water	37	14.74
Wash cooking utensils in hot water	214	85.5
No of times when nails are cut		
Once a week	214	85.26
Twice a month	30	11.95
Once a month	7	2.79
No of times when working area is cleaned		
one time	2	0.8
two times	10	3.98
Every after a procedure	239	95.22

Table 3 shows hygiene practices of food handlers in restaurants. 100% of food handlers confirmed that they washed hands before handling food. Of the 100% who washed hands, 96% washed with soap while 4% just washed with plain water. Further, 2% of food handlers indicated that they washed hands once a day, 5.6% washed hands three times a day and the rest 94% washed every after specific procedure.

86% of food handlers confirmed that they covered their hair when working in the restaurants while 14 % indicated that they did not cover their hair. The food handlers who did not cover

their hair indicated that they were not provided with protective clothings. 85% indicated that they cut nails once in a week, 12% cut their nails twice a month and 3% cut nails once a month.

Table 4. Association between the education level and Practices of Food Handlers (n=251)

Education	Practices of Food Handlers				Total
	Very good	Good	Fair	Poor	
	----- N (%) -----				
None	7(5.3)	0(0)	2(4.55)	0(0)	9(3.59)
Primary	36 (27.27)	19(28.79)	20(45.45)	7(77.78)	82(32.67)
Secondary	80 (60.61)	43(65.15)	22(50)	2(22.22)	147(58.57)
College	9(6.82)	4(6.06)	0(0)	0(0)	13(5.18)
Total	132(100)	66(100)	44(100)	9(100)	251(100)

Notes: Pearson $\chi^2(9) = 19.8684$ P-Value = 0.019, Fisher's exact P-Value=0.019

Table 4 presents the results of the association between the education level and the practices of food handlers. Overall, the association between the two variables was significant at 5% with a p-value=0.019. The results also showed that food handlers that had attained secondary school level of education had very good food practices representing about 61% of 132 food handlers with very good practices. Those with poor practices fell in primary level of education.

Table 5. Association between education level and level of knowledge on food hygiene (n=251)

Education	level of knowledge on food hygiene				Total
	Very knowledgeable	Knowledgeable	Moderate	Poor	
	----- N (%) -----				
None	7(4.14)	1(2)	0(0)	1(5)	9(3.59)
Primary	39(23.08)	25(50)	8(66.67)	10(50)	82(32.67)
Secondary	110(65.09)	24(48)	4(33.33)	9(45)	147(58.57)
College	13(7.69)	0(0)	0(0)	0(0)	13(5.18)
Total	169(100)	50(100)	12(100)	20(100)	251(100)

Notes: Pearson $\chi^2(9) = 26.9010$ P-Value =0.001, Fisher's exact P-Value=0.001

Similarly, an analysis of the association between education and level of knowledge on food hygiene revealed that food handlers that were very knowledgeable, fall in the secondary school of education (65%) of the 169 who are very knowledgeable. And within this category, those without any form of education were the least knowledgeable. The association was also significance at 5% with a p-value=0.001(Table 5).

Table 6: Association between the level of knowledge on food hygiene and food hygiene practices (n=251)

Level of knowledge	Food Hygiene Practices				Total
	Very good	Good	Fair	Poor	
	----- N (%) -----				
Very knowledgeable	121 (71.6)	32 (18.93)	12 (7.1)	4 (2.37)	169
Knowledgeable	8(16)	22(44)	19(38)	1(2)	50
Moderate	1(8.33)	4(33.33)	5(41.67)	2(16.67)	12
Poor	2(10)	8(40)	8(40)	2(10)	20
Total, N (%)	132 (52.59)	66 (26.29)	44(17.53)	9(3.59)	251

Notes: Pearson chi2(9) = 88.0626 P-Value = 0.00, Fisher's exact P-Value=0.000

The majority of the food handlers (67.33%) were very knowledgeable. Among these, 121 out 132 representing 71.6% have very good food hygiene practices. In order to determine whether there was an association between the level of knowledge and food hygiene practices, a chi square test was performed. Fisher's test, however, had to be performed since the expected frequency in some cells was less than 5, and this would make the results of the Pearson chi-square test to be invalid. The results of the Fisher's test indicated that there was a significant relationship between the levels of knowledge and the food hygiene practices at 5% level of significance (P-value=0.001).

Table 7. Logistic regression model factors contribute to hygiene practices of food in restaurants (N=251)

Hand washing with soap	Odds Ratio	P>z	95% Confidence Interval	
Demographics				
sex (1=male,0=female)	0.22	0.26	0.02	3.10
Age Group				
18 to 20 years	0.14	0.11	0.01	1.59
21 to 26 years	0.73	0.73	0.13	4.25
Education Level				
Primary	4.21	0.32	0.25	71.84
Secondary	44.45	0.02	2.00	990.06
Knowledge On Food Hygiene				
Trained in food hygiene	0.08	0.05	0.01	0.98
Presence of a Food hygiene statement policy	152.54	0.01	3.54	6576.35
Food hygiene training important	74.92	0.03	1.61	3479.52
Knowledge of good hygiene practices	7.13	0.37	0.10	505.39
Heard of Hazard analysis critical Control points (HACCP)	0.76	0.83	0.06	9.18
Food hygiene prevent diarrhoea diseases	0.03	0.03	0.00	0.75
Does poor personal hygiene contribute to food contamination	1.14	0.97	0.00	894.40
Definition of food hygiene	0.97	0.98	0.13	7.34
Definition of food-borne diseases	0.03	0.07	0.00	1.30
Constant	2.10	0.67	0.07	63.21

Table 7 presents the results of the logistic regression model which show that the level of education has a significant effect on the washing hands with soap which is good hygiene practice. Specifically, those that have attained some high level of education in this case, secondary school are 44.55 times more likely to wash their hands with soap than those with lower levels of education. Furthermore, training in food hygiene has significant effect on washing hands with soap as the results show that, food handlers trained in this effect, are 0.08 times more likely to wash their hands with soap.

The presence of a food hygiene statement policy is also significant with an odds ratio of 152.54 implying that the probability of food handlers washing their hands with soap is this much. Other variables that came out to significantly affect the washing of hands with soap include, acknowledgment of the importance of food hygiene training (odds ratio= 74.92; p-value=0.03) and that good food hygiene practices can prevent diarrhea (odds ratio=0.03; p-

value=0.03). Finally, understanding of what foodborne diseases are, increases the chances of food handlers washing their hands with soap(odds ratio=0.03; p-value=0.07) at 10% significance level.

CHAPTER FIVE- DISCUSSION OF RESULTS

INTRODCTION

This chapter discusses the findings of the study and compares with published literature. The findings of the study provide information on the knowledge and practices of food handlers in Kabwe Urban District.

5.1 Demographic Characteristics of Respondents

This study revealed that the majority (80%) of food handlers were above 21 years. Among the food handlers interviewed 184 (73%) were female and males were 67 representing 27%. This is similar to the study done by Getachew (2010) on the assessment of hygienic practices in selected hospitals in Ethiopia where 100% were female and another study done by Zain and Isara (2009) on knowledge and practices of food hygiene and safety among food handlers in fast foods in Benine found that the majority were females (69.5%). From these studies it is clear that the majority of food handlers in food establishments are female and this could be attributed to the number of factors which include the nature of the job and mostly female employees are known to maintain proper personal and food hygiene. These two studies were different from the study done by Kasturwar and Mohd on knowledge and practices among food handlers found that the majority of food handlers 52(62.7%) were males and 31 (37.3%) were females.

The study also revealed that 167 (67%) attained secondary and tertiary level of education while 71 (28%) attained primary and below. Similarly, in a Chinese study, the level of education for food handlers was 75% up to secondary level and the hygiene levels were also high among the food handlers. From this study it is clear that there is a relationship between the level of education and knowledge levels of food hygiene as it was confirmed with the Pearson's Chi Square test with the P-Value of 0.001 at 5% significance.

5.2 Knowledge on food Hygiene

Generally, the food handler's knowledge levels were high. They demonstrated good knowledge in the areas of hand washing, general cleaning, causes of food contamination and definition of foodborne diseases. All respondents indicated that hands should be washed before food preparation and serving to customers. Despite exhibiting good knowledge in

these areas, it was found that only 26% of the food handlers were trained in food hygiene and the rest indicated that they came to know about food hygiene practices through inspectors who go round to inspect the food premises. A similar study was done in small and micro enterprises, to assess food handlers' knowledge on food hygiene in South Africa and found that the average correct answers were at 46% low compared to this study that found an average of 67% to be knowledgeable in food hygiene practices. The results of the Fisher's test, however, indicate that there was a significant relationship between the levels of knowledge and food hygiene practices in this study at 5% level of significance (P-value=0.000). Knowledge on food hygiene is crucial because poor practices have been shown to be significant contributory factors to food borne illnesses in various food retailers (Taylor et al, 2000)

5.3 Hygiene Practices of Foodhandlers

With regards to practices, Hand hygiene and food hygiene practices are the two most critical factors in ensuring food safety. This study revealed that 100% of food handlers wash their hands before handling food but only 96.4% wash with soap. The 3.6% indicated that they wash with plain water because they were not provided with soap. 86% of food handlers covered their hair when handling food while 14% did not cover their hair. This is contrary to the recommendation in the Food and Drugs Act Cap 303 where it is a requirement for all food handlers to be covering their hair. The reason for not covering their hair was that these food handlers were not provided with protective clothing.

With regards to washing utensils in hot water, 85% of respondents indicated that they washed their utensils in hot water while 14.7% indicated that they did not wash their utensils in hot water. The Food and Drugs Act Cap 303, however, states that utensils are supposed to be washed in hot water. On the issue of changing rooms, it was revealed that 85% of respondents were not provided with change rooms and they do not change clothes when they report for work. This is contrary to the study done by Safee in 2010 where all respondents were taking baths daily and changing clothes before starting to work.

CHAPTER SIX- CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

This study revealed that the majority of food handlers in restaurants in Kabwe urban district are female and this could be attributed to the number of factors which include the nature of the job and mostly female employees are known to maintain proper personal and food hygiene. Further, the majority of the food handlers (67.33%) in Kabwe Urban District are very knowledgeable about food hygiene. Among these, 121 out of 132 representing 71.6% have very good practices with regards to food hygiene. In order to determine whether there was an association between the level of knowledge and food hygiene practices, a chi square test was performed. Fisher's test, however, had to be performed since the expected frequency in some cells was less than 5, and this would make the results of the Pearson chi-square test to be invalid. In conclusion, there is a significant relationship between the levels of knowledge and the food hygiene practices at 5% level of significance (P-value=0.000).

This study revealed that there was an relationship between level of knowledge and hygiene practices among food handlers. In addition, the level of education also has an impact on the level of knowledge on food hygiene. Therefore, It can also be concluded that the level of knowledge is high among food handlers in Kabwe Urban and that the majority of these handlers had good hygiene practices. It was concluded that the level of knowledge is high among food handlers in Kabwe Urban District and that the majority of these handlers have good hygiene practices

6.2 RECOMMENDATIONS

In order to improve the hygiene practices among the food handlers in restaurants in Kabwe urban district, the following recommendations were directed to Kabwe Municipal Council, Kabwe District Medical Office and the owners of the restaurants.

a) Kabwe Municipal Council-Ministry of Local Government and Housing

- Employ more Health Inspectors to carry out inspections
- Carry out sensitisation programmes on food hygiene
- Design short courses for food handlers

b) Kabwe Medical Council-Ministry of Health

- Carry regular inspections of restaurants
- Improve funding on Environmental Health activities

c) Restaurant Owners

- Provide protective clothings to food handlers
- Employ food handlers who are trained in food hygiene
- Ensure you hold meetings with food hanldres on food hygiene

6.3 Limitations of the Study

- Some food handlers refused to participate in the study
- Only restaurants registered with Kabwe municipal Council were included in the study
- Very few studies have been done on food safety in Zambia therefore there is little informationon food safety in Zambia.

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7.0 APPENDICES

7.1 Appendix 1- Information Sheet

University of Zambia

School of Medicine

Department of Public Health

Box 50110

LUSAKA

THE INTERVIEWEE INFORMATION SHEET.

Dear participant,

I am a student from the University of Zambia in the School of Medicine. In partial fulfillment to the qualification of Master of Public Health, I am required to undertake a research and the study am doing is to assess food hygiene practices among food handlers in restaurants in Kabwe Urban District which will help in the provision of safe food in restaurants

I therefore seek your permission to participate in this study and your duty as a respondent is to answer these questions designed in order to assess the hygienic practices among food handlers in restaurants among food handlers. Your decision to take part in this study is your choice and shall be respected.

Your responses given in this study shall be treated with confidentiality and anonymity to your participation is assured. Please know that there are neither risks nor direct benefits such as forms of money or materials directed to you as participant in this study. Should you have any questions, below is the address for the principal investigator.

Principal Investigator,

Ennie Chipabika.

7.2 Appendix II: Informed Consent Form

The purpose of this study has been explained to me and I understand the purpose, the benefits, risks and discomforts and confidentiality of the study. I further understand that:

If I agree to take part in this study, I can withdraw at any time without having to give an explanation and that taking part in this study is purely voluntary.

I (Names)

agree to take part in this study.

Signed Date..... (Participant)

Participant's signature or thumb print.

Signed..... Date..... (Witness)

Signed..... Date (Researcher)

b). Persons to contact for problems or questions

1. Ennie Chipabika, University of Zambia, Department of Public Health, P. O Box 50110, Lusaka. Cell: 0977456118
2. Mr. Allan Mbewe , University of Zambia, Department of Public Health, P. O Box 50110, Lusaka.
3. The Chairman , Eres Coverage IRB, 33 Joseph Mwila Road, Rhodes Park Lusaka.

7.3 DATA COLLECTION TOOLS

Appendix III: Questionnaire For Food Handlers Working In Restaurants

**THE UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE
DEPARTMENT OF PUBLIC HEALTH**

Topic: Assessment level of Knowledge and Practices Among Food Handlers on food hygiene In Restaurants In Kabwe Urban District.

Date Of Interview :

Place Of Interview :

Serial Number :

Instructions For The Interviewer:

- Introduce yourself to the respondent
- Explain the reason for the interview
- Assure the respondent of confidentiality and anonymity
- Do not write the name of the respondent on the interview schedule

Section A: Demographic Data

1. Sex of respondent

(a) Male ()

(b) Female ()

2. Age at last birthday

(a) 18 to 20 years ()

(b) 21 to 26 years ()

(c) Above 26 years ()

3. Education level

(a) None

(b) Primary

(c) Secondary

(d) College

Section B: Knowledge On Food Hygiene

4. Are you trained in food hygiene

(a) Yes ()

(b) No ()

5. Is there a food hygiene statement policy in this restaurant?

a. Yes ()

b. No ()

6. Is training in food hygiene important in the food industry?

(a) Yes ()

(b) No ()

7. Do you know any good food hygienic practices?

(a) Yes

(b) No

8. Mention some of the good hygienic practices you know

Ans.....

9. Are you aware of your responsibilities regarding food hygiene?

a. Yes ()

b. No ()

10. Can food hygiene prevent diarrhoea diseases?

(a) Yes ()

(b) No ()

11. Does poor personal hygiene contribute to food contamination?

(a) Yes ()

(b) No ()

12. What is food hygiene?

(a) is the action taken to ensure that food is handled, stored, prepared and served in such a way to prevent the contamination of food ()

(b) is the way of maintaining personal hygiene ()

(c) is maintaining cleanliness of the environment ()

13. What are food-borne diseases

(a) These are diseases transmitted through consumption of contaminated food ()

(b) Diseases caused by drinking contaminated water ()

(c) Diseases that are transmitted by mosquitoes ()

14. Do you know any food-borne diseases

(a) Yes ()

(b) No ()

15. Can food-borne diseases be prevented

(a) Yes ()

(b) No ()

16. Can licking hands contaminate food?

- (a) Yes ()
- (b) No ()

17. Can skin infections contaminate food?

- (a) Yes ()
- (b) No ()

18. When should the hands be washed in the restaurant?

- (a) Two times ()
- (b) Three Times ()
- (c) Every after procedure ()

19. Should floor, wall, roof be kept clean?

- (a) Yes ()
- (b) No ()

Section C: Practice

20. Do you wash hands before handling food?

- (a) Yes ()
- (b) No ()

21. How often do you wash your hands in the restaurant when handling food?

- (a) Once a day ()
- (b) Three times a day ()
- (c) After every procedure ()

22. Do you wash your hands with soap in the restaurant?

- (a). Yes ()

(b). No ()

23. Do you keep your hair covered in the restaurant?

(a) Yes ()

(b) No ()

24. Cooking utensils should be washed in hot water?

(a) Yes ()

(b) No ()

25. Are you provided with personal protective clothing by management when working in the restaurant?

(a). Yes ()

(b). No ()

27. What do you do with leftover food?

(a). Serve it the following day ()

(b). Throw it away ()

28 How often do you cut your nails

(a). Once a week ()

(b). Twice a month ()

(c). Once a month ()

(d). There's no need.

29. How many times do you clean your working area?

(a). one time ()

(b). two times ()

(d). Every after a procedure ()

30. What do you use to clean your working area?

(a). Water and soap ()

(b). Water only ()

31. What do you use to wash your kitchen utensils in the restaurant?

(a). Water and soap ()

(b). Water only ()

32. Do you have running water at your this restaurant?

(a) Yes ()

(b) No ()

33. Are you provided with change rooms in this restaurant?

(a) Yes ()

(b) No ()

34. Are you provided with shower rooms in this restaurant?

(a) Yes ()

(b) No ()

“Thank you for sparing this time to talk to us”

Appendix IV: Questionnaire For Food Handlers Working In Restaurants Translated In Bemba

THE UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE
DEPARTMENT OF PUBLIC HEALTH

Topic: Assessment Of Food Hygienic Practices Among Food Handlers In Resterants In Kabwe Urban District.

Ubushiku bwa mepusho :

Inchende yakwipushishako mepusho :

Serial Number :

SECTION A:

1. Kasuka nga:

- a) Mwaume ()
- b) Mwanakashi ()

2. Mulinemyaka inga?

- a) Ikumi limo and isano ukufika amakumi yabili ()
- b) Amakumi yabili and umo ukufika na makumi yabili namutanda ()
- c) Ukuchila amakumi yabili na mutanda ()

3. Amasambililo yenu mwafikile mushani?

- a) Nshasambililapo ()
- b) Mu masambililo yabana banono (Primary) ()
- c) Mu masambililo yabacikula bwangu (Secondary) ()
- d) Isukulu lyamasambililo yakalamba (College) ()

SECTION B: UBWISHIBISHI PAMISUNGILE YAFYAKULYA

4. Mwalisambilipo pamisungile yafyakulya?

a) Emukwai ()

b) Iyo mukwai ()

5. Bushe mwalikwata apomwalemba amafunde ayamisungile yafyakulya?

a) Emukwai ()

b) Iyo mukwai ()

6. Bushe ukusambilila pamisungile yafyakulya kusuma kulimwebabombela kufyakulya?

a) Emukwai ()

b) Iyo mukwai ()

7. Bushe mwalishibako imisungile isuma iyafyakulya?

a) Emukwai ()

b) Iyo mukwai ()

8. Londololeniko inshila shimo isho mwaishiba isho mwingasungilamo ifyakulya ubusaka.

9. Bushe mwalishiba ukuti nincito yenu ayakusunga ifyakulya ubusaka?

a) Emukwai ()

b) Iyo mukwai ()

10.

11. Bushe ubusaka bwafyakulya kuti bwacingila amalwele yakupolomya?

a) Emukwai ()

b) Iyo mukwai ()

12. Bushe ubusali bulalenga ifyakulya ukukowela?

a) Emukwai ()

b) Iyo mukwai ()

13. Bushe ubusaka bwafyakulya cinshi?

a) Ninshila iyabusaka iyo tubomfya mukwikata ifyakulya, imisungile, imipikile
ne mipekanishishe munshila iyakucingilila ifiko ukuya kufyakulya. ()

b) Ninshila iyakusunga ubusaka pamubili. ()

c) Ninshila ya busaka bwapa ncende. ()

14. Bushe malwelenshi ayafuma mufyakulya?

a) Aya malwele ayambula ukupitila mukulya ifilyo ifya lamba. ()

b) Amalwele ayafuma mukunwa amenshi ayalamba. ()

c) Amalwele ayafuma mukusumwa nabamugwigwi. ()

15. Bushe mwalishibako amalwelenshi yafyakulya?

a) Emukwai ()

b) Iyo mukwai ()

16. Bushe amalwele yafyakulya kuti mwayacingilila?

a) Emukwai ()

b) Iyo mukwai ()

17. Bushe ukumyanga kuminwe kuti kwakowesha ifyakulya?

a) Emukwai ()

b) Iyo mukwai ()

18. Bushe amalwele yapankanda kuti yakowesha ifyakulya?

a) Emukwai ()

b) Iyo mukwai ()

19. Bushe mikuinga mwingasamba kuminwe iyo mulepekanya ifyakulya?

a) Imiku ibili ()

b) Imiku itatu ()

c) Cilanshita ilyo ndepokanya ifyakulya. ()

20. Bushe panshi, icibumba namumutenge kuti mwasungika ubusaka?

a) Emukwai ()

b) Iyo mukwai ()

SECTION C: UKWESHA

21. Bushe mulasamba kuminwe ilyo tamulaikata ifyakulya?

a) Emukwai ()

b) Iyo mukwai ()

22. Bushe musamba imiku inga ilyo mulepekanya ifyakulya?

a) Umuku umo pabushiku bumo ()

b) Imiku itatu pabushiku bumo ()

c) Inshita yonse ilyo naikata ifyakulya ()

23. Bushe mulabonfya isopo pakusamba kuminwe muncende mupekanishishamo ifyakulya?

a) Emukwai ()

b) Iyo mukwai ()

24. Bushe mulafimba imishishi yenu ulyo muncende umo mupekanishisha ifyakulya?

a) Emukwai ()

b) Iyo mukwai ()

25. Bushe ifibombelo fyakwipikilamo mulafisanfya namenshi ayakaba?

a) Emukwai ()

b) Iyo mukwai ()

26. Bushe balimpela ifyakufwala ifyakubombelamo muncende mupekanishishamo ifyakulya?

a) Emukwai ()

b) Iyo mukwai ()

27. Bushe mucita shani ifyakulya ifyashalako?

a) Mulapekanya ubushiku bwakonkapo ()

b) Mulaposa ()

28. Miku inga musemba amala yenu?

a) Umuku umo pamulungu ()

b) Imiku ibili mumweshi ()

c) Umuku umo pamweshi ()

d) Tacili mulandu ()

29. Bushe muwanwa imiku inga muncende mubombelamo?

a) Umuku umo ()

b) Imiku ibili ()

c) Cilanshita ()

30. Bushe finshi mubonfya pakuwanwa muncende mubombelamo?

a) Amenshi nesopo ()

b) Amenshi fye ()

31. Fishi mubonfya pakusanfya ifibombelo fyenu muncende mwipikilamo?

a) Amenshi nesopo ()

b) Amenshi fye ()

32. Bushe mwalikwata amenshi pompi pancende mwipikila?

a) Emukwai ()

b) Iyo mukwai ()

33. Bushe mwalikwata umwakufwalila ifyakufwala muncende mwipikilamo?

a) Emukwai ()

b) Iyo mukwai ()

34. Bushe mwalikwata umwakusambila muncende mwipikilamo?

a) Emukwai ()

b) Iyo mukwai ()

NATOTELA SANA PANSHITA MWAMPELA IYAKULANDA NAINÉ.

***Checklist on Assessment of Food Hygiene Practices among Food Handlers In Restaurants
In Kabwe Urban District.***

Theme	Logistics	Yes	No	Remarks
1. Personnel	Is there evidence Medical examination for food handlers			
	Is there evidence of training in food safety			
	Do food handler wear Personal Protective clothing			
	Cutting of Finger nails			
2. Hand Washing Facilities	Running water (Hot and Cold)			
	Hand dryer			
	Sink/Basin			
	Soap			
3. Utensils	Are there appropriate Storage facilities			
	Presence of washing facilities			
	Presence of drying facilities			
4. Water supply	Running water			
	Water			
5. Waste management	Storage facilities			
	Record on amount of waste generated			
	Records on waste collection			
6. Sanitary facilities	Sanitary facilities (male and female)			
	Change rooms			
	Showers for males and females			
	Hand washing facilities			
7. Documentation	Is there a policy for maintaining food safety documents			
	Documentation on trainings			

7.4 Appendix IV: Variables, Scale Of Measurements and Indicators

Type Of Variable	Variable	Indicator	Scale Of Measurement
Dependant	Food hygiene practices	Acceptable standards- 1. Examination certificates for food handlers, 2. Appropriate dress code 3. Running water with soap 4. Receptacle for waste storage 5. Hand washing with soap 6. Paper towel	Ordinal; <ul style="list-style-type: none"> • Very good = 6 (81%- 100%) • Good = 4-5 (60-80%) • Fair = 2-3 (50%-59%) • Poor = below 2 (49% <)
Independent	Sex	Male Female	Nominal
	Age	Number of years at last birthday	Ratio
	Literacy Level	Number of years spent in school	Ratio/Ordinal
	Knowledge	Level of Knowledge	Ordinal; <ul style="list-style-type: none"> • Very knowledgeable = >80% • Knowledgeable = >60 - 79% • Moderate = >50 - 59% • Poor = < 50%
	Legal enforcement	Number of inspections done in last quarter	Ordinal <ul style="list-style-type: none"> • Very knowledgeable = >80% • Knowledgeable = >60 - 70%

			<ul style="list-style-type: none"> • Fair = >50 - 59% • Poor = <50 % 	
	Waste management	Amount of waste generated	Present Absent	

PERMISSION LETTERS



THE UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE

Telephone: 252641
Telegram: UNZA, Lusaka
Telex: UNZALU ZA 44370
Email: selestinenzala@yahoo.com

P.O. Box 50110
Lusaka, Zambia

=====

19th June, 2013

Ms Ennie Chipabika (511600161)
Department of Public Health
School of Medicine
LUSAKA

Dear Ms Chipabika,

RE: GRADUATES PROPOSAL PRESENTATION FORUM (GPPF)

Having assessed your dissertation entitled **"An Assessment of food Hygiene Practices Among Food Handlers in Restaurants in Kabwe Urban District"**. We are satisfied that all the corrections to your research proposal have been done. The proposal meets the standard as laid down by the Board of Graduate Studies.

You can proceed and present to the Research Ethics.

Yours faithfully,

Dr. S. H. Nzala
ASSISTANT DEAN, POSTGRADUATE

CC: HOD – Public Health





33 Joseph Mwilwa Road
Rhodes Park, Lusaka
Tel: +260 955 155 633
+260 955 155 634
Cell: +260 966 765 503
Email: eresconverge@yahoo.co.uk

I.R.B. No. 00005948
E.W.A. No. 00011697

8th October, 2013

Ref. No. 2013-Aug-004

The Principal Investigator
Ms. Ennie Chipabika
Health Professionals Council of Zambia
P.O. Box 32554,
LUSAKA.

Dear Ms. Chipabika,

RE: An assessment of food hygiene practices among food handlers in Restaurants in Kabwe Urban District.

Reference is made to your corrections dated 30th September, 2013. Noting that you addressed all concerns raised the IRB members resolved to approve this study and your participation as Principal Investigator for a period of one year.

Review Type	Ordinary	Approval No. 2013-Aug-004
Approval and Expiry Date	Approval Date: 8 th October, 2013	Expiry Date: 7 th October, 2014
Protocol Version and Date	Version-Nil	7 th October, 2014
Information Sheet, Consent Forms and Dates	• English.	7 th October, 2014
Consent form ID and Date	Version-Nil	7 th October, 2014
Recruitment Materials	Nil	7 th October, 2014
Other Study Documents	Questionnaire, Checklist.	7 th October, 2014
Number of participants approved for study	152	7 th October, 2014

Specific conditions will apply to this approval. As Principal Investigator it is your responsibility to ensure that the contents of this letter are adhered to. If these are not adhered to, the approval may be suspended. Should the study be suspended, study sponsors and other regulatory authorities will be informed.

Conditions of Approval

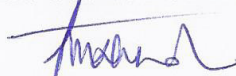
- No participant may be involved in any study procedure prior to the study approval or after the expiration date.
- All unanticipated or Serious Adverse Events (SAEs) must be reported to the IRB within 5 days.
- All protocol modifications must be IRB approved prior to implementation unless they are intended to reduce risk (but must still be reported for approval). Modifications will include any change of investigator/s or site address.
- All protocol deviations must be reported to the IRB within 5 working days.
- All recruitment materials must be approved by the IRB prior to being used.
- Principal investigators are responsible for initiating Continuing Review proceedings. Documents must be received by the IRB at least 30 days before the expiry date. This is for the purpose of facilitating the review process. Any documents received less than 30 days before expiry will be labelled "late submissions" and will incur a penalty.
- Every 6 (six) months a progress report form supplied by ERES IRB must be filled in and submitted to us.
- ERES Converge IRB does not "stamp" approval letters, consent forms or study documents unless requested for in writing. This is because the approval letter clearly indicates the documents approved by the IRB as well as other elements and conditions of approval.

Should you have any questions regarding anything indicated in this letter, please do not hesitate to get in touch with us at the above indicated address.

On behalf of ERES Converge IRB, we would like to wish you all the success as you carry out your study.

Yours faithfully,

ERES CONVERGE IRB



Dr. E. Munalula-Nkandu
BSc (Hons), MSc, MA Bioethics, PgD R/Ethics, PhD
CHAIRPERSON



Kabwe Municipal Council

OFFICE OF THE TOWN CLERK
Civic Centre, Freedom Way
P.O. Box 80424
Kabwe, Zambia

Telephone: +260 215 224238
Fax: +260 215 224239

OUR REF: KMC/101/1/30

9th July 2013

Mr. Annie Chipabika
Health professions Council of Zambia
Wamulwa Road
P.O. Box 32554
Thorn Park, 10101
LUSAKA

Dear Sir

PERMISSION TO CONDUCT A RESEARCH IN KABWE DISTRICT

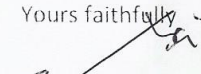
Reference is made to the above captioned subject.

I wish to acknowledge receipt of your letter dated 13th June, 2013.

I am pleased to inform you that your request to conduct a research in Kabwe has been accepted. You are therefore required to be attached to the department of Public Health and Social Services for your undertaking.

Report to the office of the Director of administration for deployment.

Yours faithfully,


E.M. Manda

**DIRECTOR OF ADMINISTRATION (AG)
FOR/TOWN CLERK**

c.c. Director of Public Health and Social Services