BELIEFS AND PRACTICES IN FOOD SAFETY AMONG FOOD HANDLERS IN RESTAURANTS OF CHIKANKATA DISTRICT, ZAMBIA

BY

DANNY MALAMBO

A dissertation submitted to the Department of Health Promotion and Education, School of Public Health, in partial fulfilment of the requirement of the degree in Masters of Public Health (Health Promotion and Education)

UNIVERSITY OF ZAMBIA

LUSAKA

2017

DECLARATION

I, DANNY MALAMBO, do hereby declare that this dissertation represents my work and that it has not previously been submitted for a degree at this or any other university.

Signature..... Date

COPYRIGHT

CERTIFICATE OF APPROVAL

This dissertation of **DANNY MALAMBO** is approved in partial fulfilment of the requirements for the award of Certificate Degree in Master of Public Health (Health Promotion and Education) by the University of Zambia.

Dr Zulu Joseph

Signature..... Date.....

Examiner I

Mr Banda John Luke

Signature..... Date.....

Examiner II

Mr Chilala Cheelo

Signature..... Date.....

Examiner III

ABSTRACT

Chikankata district is one of the newest districts of Southern Province and the busiest route as it connects Chirundu, Siavonga and Livingstone boarders to Lusaka. It is located 52kms from the capital city of Lusaka and shares boarders with Mazabuka, Siavonga, Chirundu and Kafue districts. It is a transit district with a huge traffic of people and goods moving through the Livingstone and Chirundu roads respectively to Lusaka and vice versa. According to CSO (2010), the district has a population of 59,909 inhabitants. Recently the general population has increased and this has lead to an increase in the demand for wide variety of food stuffs and eating establishments such as lodges, restaurants and guest houses. This prompted for the need to conduct a study on the beliefs and practices in food safety among food handlers of Chikankata District. The general objective of the study was to determine beliefs and practices in food safety among food handlers in Chikankata district. Specifically the study was designed to establish the socio-demographic characteristics of food handlers, describe beliefs in food safety among food handlers, assess food hygiene practices in food safety among food handlers, determine the level of knowledge in food safety among food handlers in food outlets and to determine association between social demographic characteristics with food safety in the district. The study site was Chikankata district with a sample size of about 120 food handlers working in the 26 restaurants which are registered and unregistered by the local authority. In general, regardless of the education level, there were more female food handlers (87.5%) working in restaurants than male in all age groups. The study revealed that 60% were not trained in any food hygiene and 87.5% of food handlers washed hands after every procedure in the restaurant while 5% washed hands twice in a shift. The study revealed that food handlers that were knowledgeable were among those with secondary level of education. The association between level of knowledge and practices was significant at 95% level of confidence with P-value=0.001. This significance was well supported by what food handlers believe about food safety. This study has therefore revealed that there was an association between level of knowledge and practices among food handlers.

KEY WORDS: Beliefs, Practices, Food Safety, Chikankata District

DEDICATION

This work is dedicated to my late mother (Josephine Chitende) who trained me to work hard and resilient even in situations that are challenging and to my family for their encouragement throughout my studies.

ACKNOWLEDGEMENT

Many thanks to God for granting me love and good health.

My gratitude goes to my supervisors; Mrs Doreen Sitali, Dr. Hikabasa Halwiindi and Mr. Allan Mbewe. I further acknowledge academic support from Prof Patrick Musonda, Dr Oliver Mweemba, Dr Joseph Zulu, Mr Chola Mumbi, Ms Jessy Zg'ambo. Special thanks to my wife (Linda), daughter (Lutangalo) and entire family, others are the Director General Medical Services (DGMS) and his entire team for providing a conducive environment to purse my studies, my immediate supervisors Lt Col Mwanamakwa Samanyama and Major Oscar Shitumbanuma. Special thanks also go to all my friends for their support.

TABLE OF CONTENTS

DECLARATION i
COPYRIGHT ii
CERTIFICATE OF APPROVAL iii
ABSTRACT iv
DEDICATION v
ACKNOWLEDGEMENT vi
CHAPTER ONE 1
INTRODUCTION 1
1.1. Background 1
1.2. Legal Framework in Zambia 3
1.2.1. Food and Drugs Act Cap 303 of the Laws of Zambia 3
1.2.2. The Public Health Act Cap 295 of the Laws of Zambia 3
1.3. Statement of the Problem 4
1.4. Rationale of the study 5
1.5. Significance of the study 5
1.6. Research Questions 5
1.7. General Objectives 5
1.7.1 Specific objectives 5
1.8. Operational definitions 6
CHAPTER TWO 7
LITERATURE REVIEW 7
2.1. Introduction 7
2.2. Global Perspective on Food Safety 7
2.2.1. Association of Food Handlers with Food-Borne Disease Outbreaks 7
2.3. Regional perspective 8
2.4. Local perspective 8
2.4.1. Food Safety Laws in Zambia 9
2.4.2. Hazard Analysis and Critical Control Points Setting Priorities in the Restaurants 10
2.5. Conceptual Framework 11
CHAPTER THREE 13
METHODOLOGY 13
3.1. Introduction 13

3.2. Study type 13
3.3. Research setting 13
3.4. Study population 14
3.5. Inclusion and exclusion criteria 14
3.5.1. Inclusion criteria 14
3.5.2. Exclusion criteria 14
3.6. Determination of sample size 14
3.7. Data collection, management and quality control 14
3.8. Validity and reliability 14
3.8.1. Validity 14
3.8.2. Reliability 15
3.9. Quantitative data collection 15
3.10. Qualitative data collection 15
3.11. Questionnaire 15
3.12. Checklist 15
3.13. Data processing and analysis 16
3.14. Pre-testing of data collection tools 16
3.15. Ethical consideration 16
3.16. Operational Independent Variables which determines Dependant Variable (Food Safety) 16
CHAPTER FOUR 19
RESULTS 19
4.1. Quantitative Results 19
4.2. Qualitative Results 27
CHAPTER FIVE 31
DISCUSSION 31
5.1.1. Knowledge on food Hygiene 31
5.1.2. Hygiene practices of food handlers 32
5.1.3. Beliefs of food handlers 33
CHAPTER SIX 34
CONCLUSION AND RECOMMENDATION 34
6.1. Conclusion 34
6.2. Recommendations 34

6.3. Limitations of the Study 35
REFERENCES 36

List of Tables

Table 1. Demographic characteristics of participants (N=120) 19

Table 2: Knowledge of food handlers on Food Hygiene Practices 22

Table 3: Hygiene Practices of Food handlers 23

Table 4: Association between education level and knowledge of food handlers 25

Table 5: Association between education level and practices of food handlers 25

Table 6: Association between the level of knowledge on food safety and food hygiene practices 26

Table 7. Logistic regression model on demographic factors contributing to food safety in restaurants (N=120) 26

Table 8. Qualitative theme analysis of key informant analysis on food safety among managers of restaurants. 27

List of Figures

Figure 1.1: Conceptual framework 11
Figure 2: Training of Food handlers in food hygiene and safety..... 20
Figure 3: Definition of food hygiene 20
Figure 4: Definition of food borne diseases..... 21
Figure 5: Prevention of food borne diseases..... 21
Figure 6: Number of times when hands are washed in the restaurants..... 22

List of Appendices

Appendix I. Information sheet..... 42

Appendix II. Consent Form.....44

Appendix III. Checklist.....48

Appendix IV. Interview guide.....50

Appendix V. Questionnaire.....51

ABBREVIATIONS/ ACRONYMS

CDC :	Centre for Disease Control
CDHMT :	Chikankata District Management Team
E. Coli :	Escherichia coli
FAO :	Food Agriculture Organization
FBI:	Food-borne Illness
GMP :	Good Manufacturing Practices
HACCP :	Hazard Analysis and Critical Control Point
SSOP :	Standard Sanitation Operation Procedures
WHO :	World Health Organization
GOZ:	Government of the Republic of Zambia

CHAPTER ONE

INTRODUCTION

1.1. Background

Food safety is a scientific discipline describing handling, preparation, and storage of food in ways that prevent food-borne illness (FBI) (World Health Organization, 2012). This includes a number of routines that should be followed to avoid potentially severe health hazards. Food can transmit diseases from person to person as well as serve as a growth medium for microorganisms that can cause food poisoning (WHO, 2012).

Food-borne diseases present a serious challenge to public health in both developing and developed countries. Food-borne diseases are widespread and present a serious threat to good health especially for children who die annually from diarrhoeal diseases, while hundreds of millions suffer from frequent episodes of diarrhoea (WHO, 2002). The global incidence of food borne diseases is difficult to estimate, but it was reported that about 2.1 million people die each year from diarrheal diseases associated with food contamination. Almost 75% of food-borne diseases outbreaks are suspected to be related to improper food handling practices by employees in food establishments (WHO, 2012). Jones and Angulo (2006) also demonstrated that eating in restaurants is a risk factor for food-borne diseases. Though it is not clear as to the percentage of the 48 billion episodes of food-borne illness that was related to consuming food in a restaurant, food industry has a role to play in reducing food-borne diseases outbreaks. This can be achieved by addressing food handler-related risk factors in these food establishments.

A relatively new emerging risk factor in the food industry is food safety belief (Griffith et al., 2010). Griffith et al., (2010) propose a definition of food safety beliefs as the aggregation of the prevailing, relatively constant, learned, shared attitudes and values contributing to the hygiene behaviours used within a particular food handling environment. An organization‘s culture is ultimately its beliefs, attitudes and values that the employee is exposed to everyday (Griffith et al., 2010). In other words the work place culture or belief constitutes workplace practices that reflect the visible symbols that can be specific to a business culture and maybe subject to planned change (Hofstede, 1998). Investigating the culture of an establishment and understanding the

beliefs and attitudes toward food safety may help understand why employees do not perform safe practices while working. Yiannas (2009) defines food safety belief as "how and what the employees in a company or organization think about food safety". It's the food safety behaviours that they routinely practice and demonstrate. Griffith et al (2010) identified six indicators of food safety beliefs that may be applied to food safety: management systems, leadership, communication, commitment, environment and risk awareness, perception and risk taking behaviour.

In Africa poverty is the underlying cause of consumption of unsafe food ((Dewaal et al., 2006). High incidences of diarrhoeal diseases among children are indications of the food hygiene situation in the African region (Dewaal et al., 2006). There are many factors associated with food handling practices such as socio demographic factors i.e. level of income, gender etc, environmental factors such as temperature, solid waste storage, solid waste disposal, latrine condition and hand washing facilities of the food and drinking establishments etc (Dewaal et al, 2006). Food-borne diseases are common in developing countries like 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 (FAO/WHO, 2005b). In Kenya, the report by the Ministry of Health (MOH, 2006) showed that among the ten leading causes of outpatient visits to health institutions were all forms of diarrhoeal diseases and intestinal parasites which may be directly or indirectly associated to food. However health institutions that compile monthly morbidity statistics did not identify if the cause for such illnesses was due to food or other causes (FAO/WHO, 2005).

Food safety is an issue that is drawing increasing concern in Zambia. Unfortunately, the current food safety system in Zambia faces increasing challenges due to ineffective enforcement of laws required to reduce the number of food-borne related diseases and the contradictions in food regulations and inspection procedures. Few studies have been carried out in Zambia to estimate the health impact of food-borne diseases (MoH, 2014). In addition, no systematic surveillance system is in place due to weak structural organization and insufficient resources allocated to food-borne surveillance. Occurrences of such diseases are 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).

A total number of 129 cases of cholera were recorded in August 2012 in Mpulungu northern Zambia and over 600 cases of cholera with over 10 deaths were reported and confirmed in Lusaka between January and April, 2016, (Zambia Daily-mail. dated 23th August 2012 and 11th April, 2016) respectively.

1.2. Legal Framework in Zambia

1.2.1. Food and Drugs Act Cap 303 of the Laws of Zambia

This is the law that governs the "sale of food in 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 license from the local authority authorizing them to do so". The license is issued on the grounds that the person meets the requirements in terms of hygiene practices, waste disposal, water supply and all the relevant requirements. According to regulation 420 and 421(1) (iii) of the Food and Drugs Act Cap 303 it states that "**420** Cleaned and sanitized portable equipment and utensils with product-contact surfaces shall be stored in such a location and manner that product-contact surfaces are protected from splash, dust, and other contamination. **421.** ***(i)*** *All operations in the receiving, inspecting, handling, segregating, preparing, processing, packaging, storing and transporting of food shall be conducted in such a manner and environment as not to expose the food to risk of contamination from dust, dirt or any other material objectionable to the processed product.****(iii)*** *water used for washing, rinsing, or conveying of food products shall be of adequate quality, and shall not be re-used for washing, rinsing, or conveying products in a manner that may result in contamination of food products; Process and controls 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.

1.2.2. The Public Health Act Cap 295 of the Laws of Zambia

The Public Health Act Cap 295 in section 76 (1) states that all warehouses or buildings of whatever nature used for the storage of foodstuffs shall be constructed of such materials and in such manner as shall, in the opinion of the Medical Officer of Health, render such warehouse or building rat-proof and also section 77 (1) No person shall reside or sleep in any kitchen or room in which foodstuffs are prepared or stored for sale. It is for this reason that monitoring of the

quality of food being offered to the public is enhanced in order to protect the health of the people from food-borne illnesses that have negative effects on the economy of the country.

People are becoming increasingly concerned about the health risks posed by microbial pathogens and potential contaminants of food. It is against this background that, a study was conducted in Chikankata district to determine beliefs and practices in food safety among food handlers in restaurants.

Taking into consideration that Chikankata district is one of the newest districts in Zambia and known for source of bananas, potatoes and beef with a good number of upcoming food and drinking establishments, it was desirable to select it as a study area.

1.3. Statement of the Problem

Reports from Chikankata mission hospital showed that the incidence rates of diarrhoeal diseases were increasing 80/1000 in 2012, 86/1000 in 2013 and 92/1000 in 2014. The reports also indicate that diarrhoea was the second major cause of morbidity for all age groups. This might be attributed to food and water contamination (Chikankata Mission Hospital, 2014). The causes of this increase of diarrhoeal cases were not known as no investigation was done to ascertain the source of these diarrhoeal diseases. No information was available in Chikankata to investigate whether research was conducted or not to establish what causes this high number of diarrhoeal cases. Studies conducted in Lusaka (2010) and Kabwe (2014) respectively, revealed that poor hygiene practices in food establishments, improper cleaning and bad habits such as smoking and poking of nose, wearing jewelleries and lack of protective gear were potential health hazards (Shinando, et al. 2010 and, Chipabika, 2014).

Knowledge is a prerequisite for positive attitudes and practices but there are many other factors such as beliefs, environmental, social behaviour etc that can determine whether food handling positively impacts food safety practices in a workplace (Seaman, 2010).

Therefore it was important to evaluate the significance of beliefs and practices in food safety among food handlers of Chikankata district because food contamination, beliefs and personal hygiene practices might have contributed to these high incidences of diarrhoeal cases in the district.

1.4. Rationale of the study

While the extent of food borne risks surveillance in Zambia is not fully known, recurrent cholera, typhoid and many other related diarrhoeal outbreaks as well as the fact that 60 percent of the population, mostly, suffer from diarrhoea suggest that food-borne pathogens due to poor hygiene and sanitation and other food safety risks are having a negative impact (World Bank, 2014).

This research was needed because assessment of food handlers is one of the most important strategies proposed by the WHO (2007) to reduce the global burden of food-borne diseases. A quick survey in Chikankata district showed that most restaurants operated under unsanitary conditions. They have inadequate sanitary facilities, hand washing facilities, latrines, water supply and poor waste disposal system.

1.5. Significance of the study

The information gathered will help in developing appropriate interventions and policy to reduce or eliminate the risk of food-borne diseases. The study will also contribute in the prevention of food-borne diseases, reducing their prevalence rates by providing useful information to body of knowledge and relevant authorities such as Chikankata District Council, Chikankata District Health office and Ministry of Health in particular.

1.6. Research Questions

What food safety beliefs and practices are found among food handlers in food establishments of Chikankata district?

1.7. General Objectives

To determine beliefs and practices in food safety among food handlers in Chikankata District

1.7.1 Specific objectives

1. To describe the socio-demographic characteristics of food handlers working in food outlets of the district
2. To explore beliefs in food safety among food handlers working in food outlets of the district.
3. To identify food hygiene practices among food handlers in food outlets of the district.

4. To determine the level of knowledge in food safety among food handlers in food outlets of the district
5. To determine the association between social demographic characteristics and food safety

1.8. Operational definitions

The following operational definitions apply to this study according to Codex Alimentarius 1995;

Food Hygiene: All conditions and measures necessary to ensure the safety of the food chain (FAO/WHO 2007).

Food Safety: The scientific discipline describing handling, preparation and Storage of food in ways that prevent food borne illnesses (Codex Alimentarius 1969).

Food Handling Practices: The processing and manufacturing steps used to manage food products.

Food-borne illness: A disease transmitted to people by food

Restaurant: Establishment which prepares and serves food and drinks to customers in exchange of money either paid before a meal or after a meal.

Food Handler: Any person employed in a food premise who at any time may be involved in the manufacturing, preparation or packing food for sale.

Contamination: The presence in the food of harmful chemicals and microorganisms which can cause consumer illness.

Beliefs: The psychological state in which an individual holds a proposition or premise to be true.

Hazard Analysis and Critical Control Points: A systematic preventive approach to food safety that identifies physical, chemical and biological hazards in production and processing of food (Codex Alimentarius 1969).

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This chapter involves a review of literature related to food safety beliefs and practices standards in food establishments. 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 on Food Safety

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 diseases 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. Developing countries such as Zambia with inadequate surveillance systems are unable to accurately capture the magnitude of food-borne illnesses, but an inordinately high incidence of diarrhoeal diseases seems to suggest underlying food safety problems.

Researchers have linked diarrhoeal diseases to the mishandling of food and poor personal hygiene of food handlers. Therefore, from as early as 1938, there has been a call for training of food handlers (Nesbitt et al, 2009). Most training programs are based on the knowledge, attitude and practices (KAP) model, which is geared toward improving knowledge and practice through information giving. In most cases, food handlers' knowledge remained low even after training, and knowledge was not always translated into practice. This could be attributed to individual's beliefs towards food safety and many of these scholars used the survey method to determine knowledge and practice.

2.2.1. Association of Food Handlers with Food-Borne Disease Outbreaks

A number of food-borne disease outbreaks have been associated with food handlers. Pakalniskiene, et al. (2009) conducted epidemiological studies over a 5-week period to determine the cause of the largest *Salmonella* outbreak in Texas. It was found that the outbreak was due to the mishandling of food by food handlers. Eleven food service employees had positive stool

cultures for *Salmonella enteritidis*. This was the largest food-handler associated outbreak in the United States, and the transmission only ended when policies were implemented to screen food handlers and exclude those with positive cultures for *Salmonella*.

Barrabeig et al. (2010) also demonstrated the role of an asymptomatic food handler in an outbreak associated with food-borne norovirus in Barcelona, Spain in 2005. Barrabeig et al claimed that the norovirus was present in seven stool samples, including that of an asymptomatic food handler who did not eat the implicated food but cooked and served the lunch. Infectious agents are possible in asymptomatic food handlers, which warrant the practicing of safe food handling techniques, especially hand washing, at all times

2.3. Regional perspective

Studies conducted in the African region have demonstrated beliefs and practices are associated with food handling e.g. a study done in Bahir Dar town, Ethiopia indicated that beliefs of food handling are significantly related with food handling practices (Nigusse et al., 2012), whereas, a study done in central Nigeria indicated that food handling practices were related with educational status of food handlers (Kibret et al, 2012). Moreover, a study done in 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).

2.4. Local perspective

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 to determine risk factors associated with existing sanitation practices and facilities in restaurants and bakeries (Shindano and Hamoonga. 2010). An assessment of microbial loads 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 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 and Hamoonga. 2010). The high levels of hygienic indicator microorganisms such as coliforms and E. coli from hand swabs of food handlers entailed that most food handlers were not observing good personal hygiene. In a similar manner, 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 diseases.

Another study conducted by Schmitt et al. (2010) following identification of some cases of diarrhoeal from persons who sought treatment at a health clinic that serves two townships in Lusaka, 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. It was therefore concluded that these organisms were responsible for diarrhoeal diseases which was as a result of poor hygiene practices among food handlers in various homes where these patients came from.

2.4.1. Food Safety Laws in Zambia

Zambia is deficient of a distinct and published policy for food safety. Separate laws have however been put in place to safeguard the consumers. The primary food safety laws are the Food and Drugs Act, Chapter 303; The Public Health Act, Chapter 295 (GOZ, 2005). The law mandates the ministers for Health and Local Government to orchestrate all the activities by the various agencies concerned in food safety management through the Department of Public Health (DPH). Moreover, the minister is mandated to form boards to manage enforcement of the basic laws for safety of food. This is targeted towards minimization of replication of responsibilities and possible omission of obligations in the enforcement of food laws by the various implementing agencies (Nguz, 2007).

Each agency performs its duties with reference to its mandate as stipulated in the law. Some agencies execute the task of regulation as in the case of the ministry of Health and Ministry of Local Government and Housing. Other specified roles of the agencies include: training and advisory services on policy formulation; provision of certification audits on food safety for particular products upon demand; laboratory analysis; development of standards; inspection of safety of agricultural products; inspection and surveillance during movement and storage of food items; and coordination of food safety management systems (FAO/WHO, 2005).

The Public Health Act Chapter 295 gives authority to the local government to put in food safety and environmental sanitation guidelines (GOZ, 1995). Proper implementation of food safety laws is vital to reduce the outbreak of food-borne diseases and hence minimize the pressure on healthcare providers (FAO/WHO, 2005). Moreover, it enhances economic growth and food security by promoting tourism and foreign trade. There is a very strong link between the health of a nation and its economic progress (FAO/WHO, 2005).

2.4.2. Hazard Analysis and Critical Control Points Setting Priorities in the Restaurants

A complete Hazard Analysis and Critical Control Points (HACCP) study cannot be done for every type of restaurant in Chikankata district. If possible, epidemiological data should be used to set or establish priorities. Foods that are commonly implicated as sources of food-borne diseases should be given first priority; however, Zambia does not have food-borne surveillance programmes which could provide data (MoH, 2014). Therefore, priorities can be based on the following risk factors: Intrinsic properties of the foods involved, preparation and handling, volume of food prepared and susceptibility of consumers. The HACCP system consists of seven principal activities which should be considered during the HACCP process but in implementing the process, each step should be applied in a manner consistent with the needs and resources of the restaurants. The steps in the HACCP process can be outlined as follows; 1. Hazard analysis, 2. Determine Critical Control Points, 3. Establish critical limits, 4. Establish monitoring, 5. Establish corrective action, 6. Establish verification and 7. Establish documentation procedures (Codex Alimentarius, 1969). HACCP system concentrates on prevention strategies on known hazards; it focuses on process control, and the steps within that, rather than structure and layout of premises (Worsfold and Griffith, 2003). HACCP establishes procedures whereby these hazards can be reduced or eliminated and requires documentation and verification of these control procedures (CAC, 1999). Local and international agencies are acting to encourage better public health protection against foodborne diseases. One of the principal actions has been the development of HACCP based regulations or by federal agencies and the United Nations Codex Alimentarius Commission (Sperber, 1998).

2.5. Conceptual Framework

This study was guided by the conceptual model in figure 1.1 below. Five main variables or factors were identified to have an effect on food safety, namely; beliefs, practices, perception, socio-demographic factors and level of knowledge of food handlers.

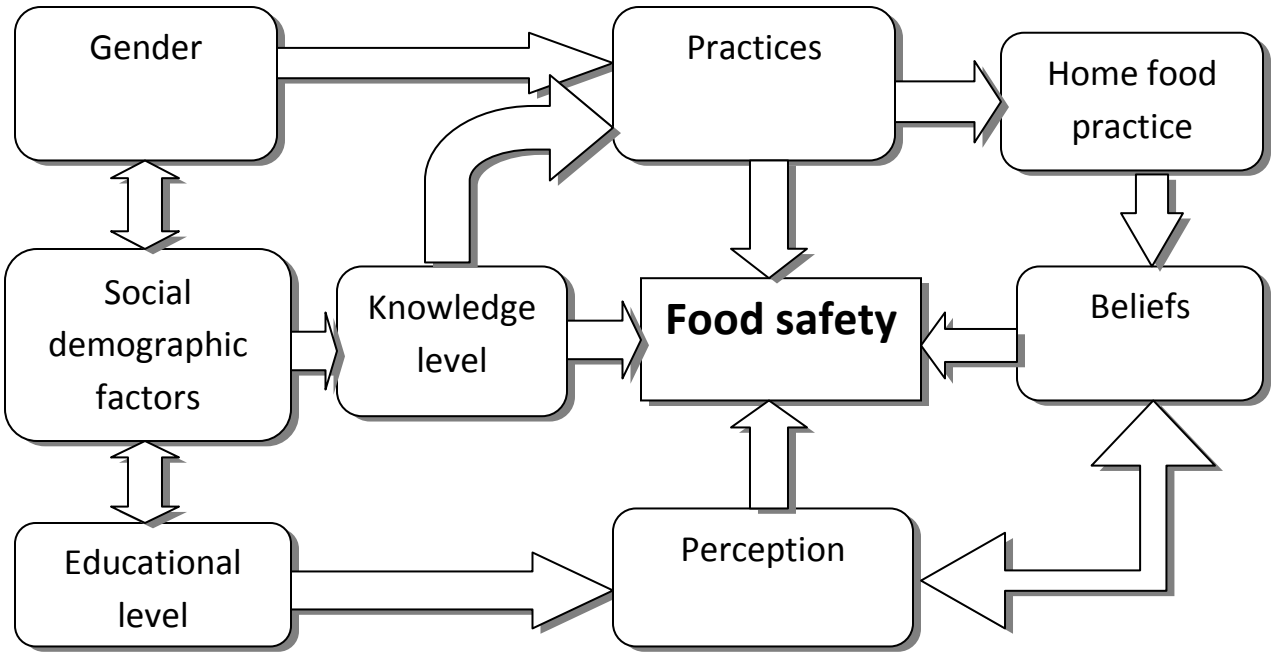


Figure 1.1: Conceptual framework

It is these factors that influence food safety positively or negatively in any environment. It is for reason that the conceptual framework on the left arm, is categorizing social demographic factors and knowledge level to see what association whether negative or positive, do these factors have on food safety. Level of education has also an impact on how an individual perceive food safety in the sense that if an individual has never been educated about food safety, it becomes very difficult for such a one to be up to standard of food safety practices. The framework also allude that perception help improve food handlers' behaviour in the way they perceive effective performance in safe handling of food. Beliefs have an influence either directly or indirectly on food safety or can affect both perception and practices, depending on how someone's background or the home where they come from. Therefore these factors can have an influence on food safety either negatively or positively and it was important to assess their impact on food safety. Food handlers with poor personal hygiene can inoculate item with excreta or 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 perception and hygiene practices (Kaferstein, 2003). These factors were explored and used to understand how they affect food safety in various ways. All these factors in general can operate singly and/or collectively to influence the food safety aspects. The food safety situation equally determines the extent to which food-borne infections can occur in a particular setup.

CHAPTER THREE

METHODOLOGY

3.1. Introduction

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

3.2. Study type

The study employed mixed methods (Concurrent Nested) where both semi structured questionnaire and key informants interviews were conducted. The quantitative approach was used to establish the practices and knowledge levels in food safety while the qualitative approach was used to explore beliefs in food safety. Furthermore the qualitative data was embedded in the quantitative data.

3.3. Research setting

The research was conducted in Chikankata District in Southern province which got its district status in 2013. It is about 55 Kms from the capital city Lusaka with an area of 2500 km2 shares district boundaries with Kafue on the northern, Mazabuka on the western, Siavonga on the south-west and Chirundu on the southern part respectively. It is a transit route with a huge traffic of people, goods and services moving through Chirundu and Livingstone roads to various parts of the country via Lusaka and vice versa. It has a total population of about 59,909 (CSO, 2010).

The district is mainly rural with 17 health centre facilities, 2 hospitals i.e. Chikankata Mission General and Kafue Gorge District hospitals respectively provide first level health services. Being strategically located among busy towns, the trading outlets and markets are well articulated and facilitate the necessary internal and external exchange of goods and services and could provide the much needed employment for the local people in the near future as the district grows. It has 26 restaurants, a number of Bars, Bottle stores and Taverns which provide various services including food stuff to local people.

3.4. Study population

The study population was all the 120 food handlers in the 26 restaurants registered and unregistered with Chikankata District Council. The food handlers consisted of female and male adults who worked in those identified restaurants.

3.5. Inclusion and exclusion criteria

3.5.1. Inclusion criteria

Only people who were 15 years and above who were working and managers of these restaurants were included in the study. These employees had pre-requisite knowledge about practices in food safety in the restaurants in which they were working and managers were either owners of these restaurants or were employees in these particular food outlets.

3.5.2. Exclusion criteria

All those people who were below 15 years, those who did not work in the restaurants and those food handlers who were not willing to participate in the study were excluded. People who were below 15 years cannot be employed as they are considered to be under age.

3.6. Determination of sample size

The study recruited all 120 food handlers working in the restaurants (Chikankata District Council, 2015) and a pilot study was done in March 2016 to ascertain the existing number of restaurants and food handlers in the district.

3.7. Data collection, management and quality control

Data in this study were collected using semi-structured questionnaires which were administered to food handlers. Key informants were interviewed and checklists as well as observations were used to observe behaviours of food handlers. There was no research assistant involved in this study.

3.8. Validity and reliability

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 (questionnaire) before designing the tools and some questions in the tool were adapted from similar studies. Pre-test of the

instruments was conducted in Lusaka to determine whether they are 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 researcher used descriptive study design process where the researcher got various views and incorporated in the instrument.

3.9. Quantitative data collection

The semi structured questionnaires were distributed to food handlers to assess practices and knowledge. Thereafter, they were coded manually and entered in a statistical package called EXCEL and exported to STATA version 13 for analysis.

3.10. Qualitative data collection

Purposive sampling was employed to select participants to provide relevant information. The researcher encouraged participants who were knowledgeable and willing to provide information for generation of data (Creswell, J., & Plano V, 2007). A total of 26 Key informants (managers) interviews were conducted out of which the sample size was determined by theoretical saturation (i.e. no new information was forth coming from participants). An interview guide on food beliefs was developed and used to collect information through key informant interviews.

3.11. Questionnaire

This involved the administration of semi-structured questionnaires to food handlers. The questionnaires were addressed to the food service staff and managers focusing on their demographic characteristics, knowledge and practices in food safety i.e. knowledge on common occurring food-borne diseases, practices regarding the use of preventive measures against food cross contamination. Some questions were translated in Tonga for those who did not understand English among food handlers.

3.12. Checklist

This was designed to assess the availability of running water, sanitary facilities and waste management in the restaurants.

3.13. Data processing and analysis

The questionnaires were thoroughly checked for completeness and consistency. Then, they were coded manually and entered in a statistical package called EXCEL and exported to STATA Version 13 for simple and multiple logistic regression analysis. Chi-square was used to check the association between independent variables i.e. knowledge and practices. The cut-off point $P<0.05$ statistical level of significance was carried out for testing levels of significance and to measure association of independent variables (knowledge and practices) to dependant variable (food safety).

The data from key informant interviews were organized with NVIVO version 10 where themes were developed by repeatedly reading through the information collected. This information was analyzed to support the quantitative data.

3.14. Pre-testing of data collection tools

The data collection tools (questionnaire, checklist) etc were pre-tested on food handlers found in the restaurants in Lusaka district. This was done in order to determine the quality of the information which was collected using the described tools above.

3.15. Ethical consideration

Ethical clearance was sought from University of Zambia Biomedical Research Ethics Committee (UNZABREC), Chikankata District Council and Chikankata District Heath Office for Institutional clearance. Permission was obtained from the owners of the restaurants. Consent was also obtained from the respondents themselves. The researcher adhered to anonymity and confidentiality of the respondents throughout the research process.

3.16. Operational Independent Variables which determines Dependant Variable (Food Safety)

Independent Variable	Operational Variables	Type of Variables
	Follow proper food safety practices is important to me.	

1. Beliefs	Refrigerating food overnight to serve the following day is important. It is important for me to dry my hands with a hand towel that is available to others. Am interested in learning more about food safety. I have cooked foods, such as rice and beans and left overnight on the counter top to be used the following day.	Categorical (Ordinal)
2. Practices	After washing my hands, I dry them using a hand towel that is available to others. I use hot, soapy water to clean my countertops after preparing food. When buying food I check for expiry date. Before preparing or handling food, I wash my hands with soap and warm water. If I have a cut or sore on my hand, I cover it before preparing food. I put frozen meat and chicken on the counter in the evening so that it will defrost and be ready to be cooked the following morning.	□□Very good practice = >80% □□Good practice = >60 - 79% □□Moderate = >50 - 59% □□Poor = < 50% Categorical (ordinal)
3. Demographic factors	Gender (Male and Female) Level of education Age	Categorical (Nominal & Ordinal)

4. Knowledge	Level of Knowledge	Categorical (Ordinal) □□Very knowledgeable = >80% □□Knowledgeable = >60 - 79% □□Moderate = >50 - 59% □□Poor = < 50%

Independent operational variables above include beliefs, practices, demographic factors and level of knowledge. These are the variables which determined the outcome variable food safety. These independent variables were measured based on whether the variable is ordinal or nominal and all those variables are categorical variables. It was also from these independent variables where analysis was done as outlined above on plan for data processing and analysis.

CHAPTER FOUR

RESULTS

4.1.Quantitative Results

This chapter presents the results of analysis of the responses collected by use of questionnaires administered to food handlers in restaurants of Chikankata district. The results are presented in respect of the objectives of the study. A total of 120 food handlers were interviewed on practices and knowledge on food hygiene and safety. The variables were grouped in order to give the overall picture. Similarly, findings have been presented in different forms that comprise frequency tables, pie-charts, cross tabulations and logistic regression model.

Table 1. Demographic characteristics of participants (N=120)

Age/ Gender	**Male n (%)**	**Female n (%)**	**Total n (%)**
15-20 yrs	0 (0)	9 (7.5)	9 (7.5)
21-25 yrs	9 (7.5)	33 (27.5)	42 (35)
Above 25 yrs	6 (5)	63 (52.5)	69 (57.5)
Total	**15 (12.5)**	**105 (87.5)**	**120 (100)**
Educational level			
None	0 (0)	3 (2.5)	3 (2.5)
Primary	9 (7.5)	45 (37.5)	54 (45)
Secondary	3 (2.5)	48 (40)	51 (42.5)
Tertiary	3 (2.5)	9 (7.5)	12 (10)
Total	**15 (12.5)**	**105 (87.5)**	**120 (100)**

The majority 105 (87.5%) were females and most of the food handlers were in age group above 26 years 69 (57.5%). On education attainment 54 (45%) had attained the primary education level, of this number (45%), 45 (37.5%) were females and 9 (7.5%) were males. In the secondary level of education category 51(42.5%) attained that level, 48 (40%) were females and 3 (2.5%)

were males. Those who attained tertiary education level were 12 (10%), (7.5%) were females and (2.5%) were males while in the category of those who never attended any education level, were 3 (2.5%) and they were all females.

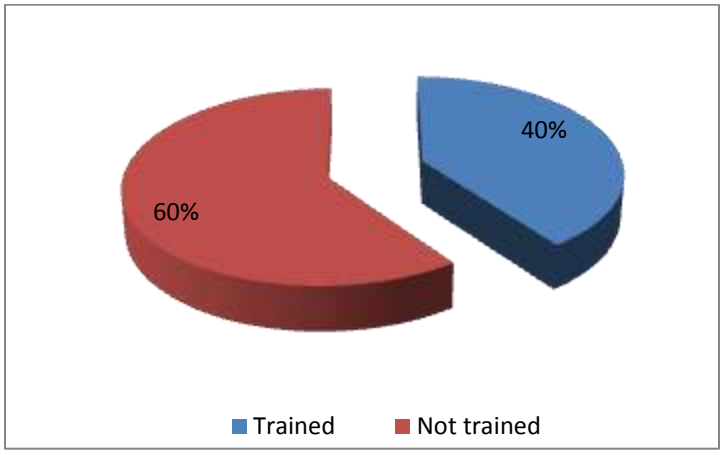


Figure 2: Training of Food handlers in food hygiene and safety

Out of 120 food handlers that were interviewed, results in figure 2 show that 40% were trained in food hygiene and safety while 60% were not trained.

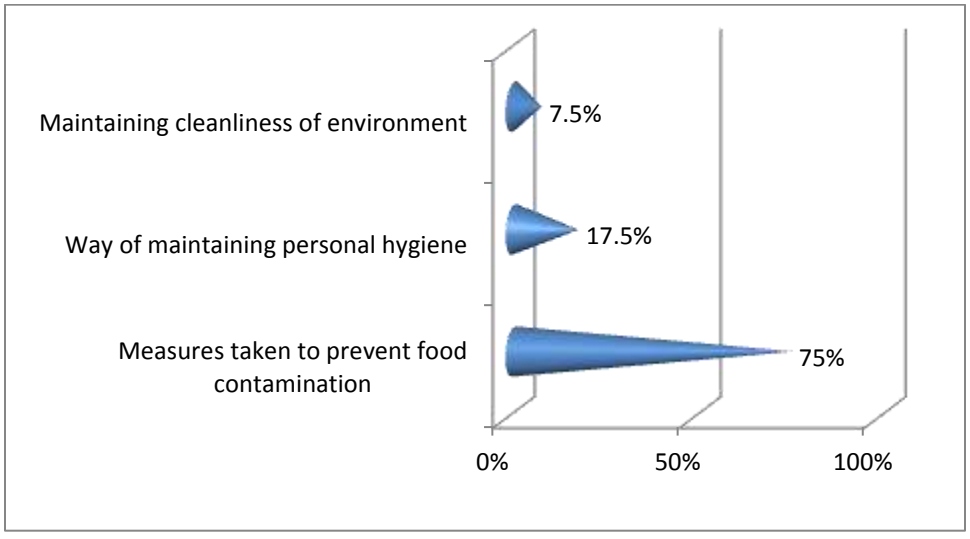


Figure 3: Definition of food hygiene

Figure 3 above shows the knowledge of food handlers on the definition of food hygiene, 90 (75%) 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, 21 (17.5%) indicated that it is a way of maintaining personal hygiene and 9 (7.5%) referred it as a way of maintaining cleanliness of the environment.

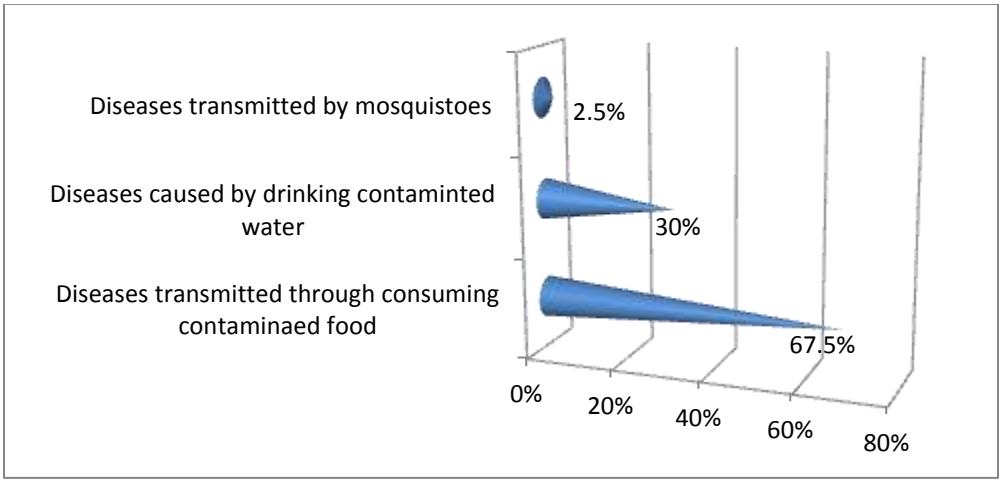


Figure 4: Definition of food borne diseases

Figure 4 above shows knowledge of food handlers on what they know about food-borne diseases. 81 (67.5%) said that these are diseases transmitted through consumption of contaminated food, 36 (30%) indicated that food borne diseases are diseases caused by drinking contaminated water and 3 (2.5%) indicated that these are diseases that are transmitted by mosquitoes.

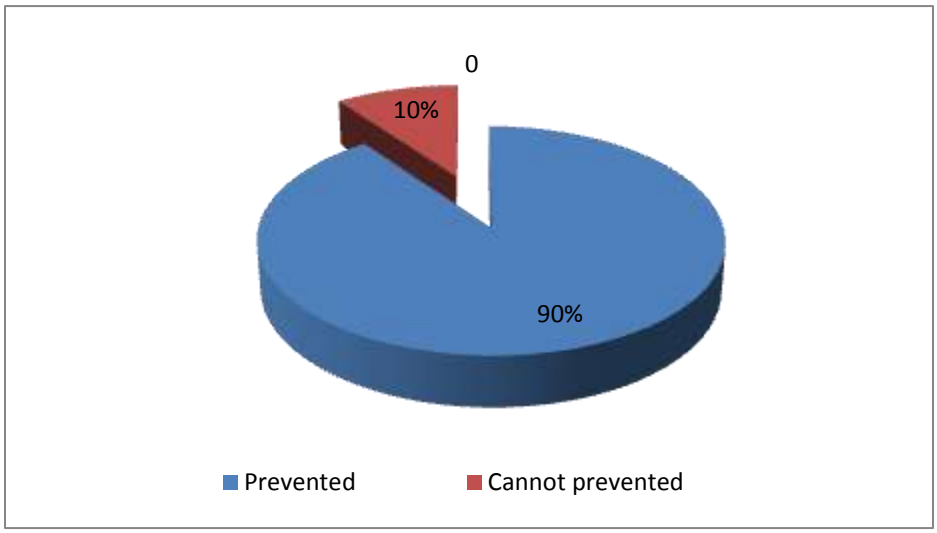


Figure 5: Prevention of food borne diseases

Figure 5 shows knowledge of food handlers on prevention of food borne diseases. 108 (90%) indicated that food borne diseases can be prevented through good hygiene practices.

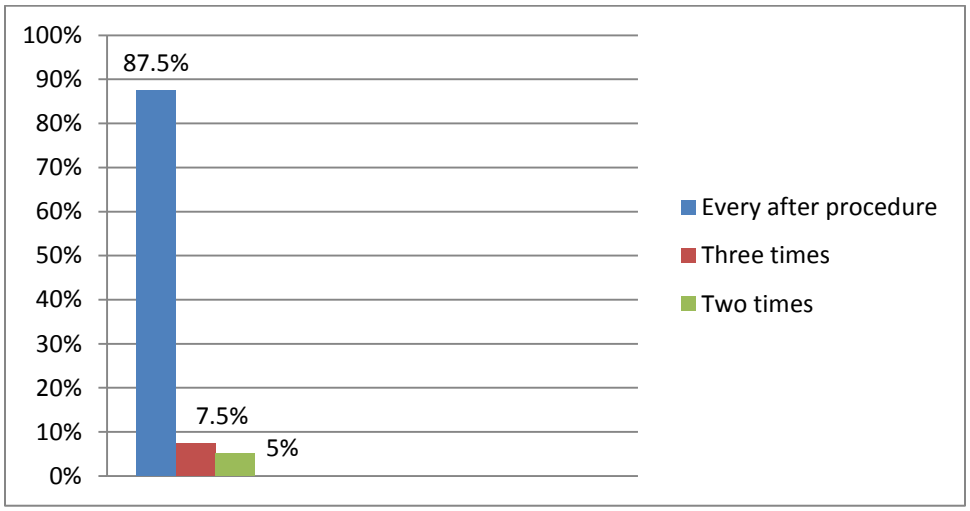


Figure 6: Number of times when hands are washed in the restaurants

Figure 6 above shows the number of times food handlers wash their hands in the restaurants, 105 (87.5%) respondents indicated that they knew that hands are supposed to be washed after each procedure for food preparation.

Table 2: Knowledge of food handlers on Food Hygiene Practices

	Frequency	Percentage
Importance of food hygiene training		
Important	111	92.5
Not important	9	7.5
Importance of food hygiene and safety policy		
Important	78	65
Not important	42	35
Responsibilities regarding food hygiene		
Aware	93	77.5
Not aware	27	22.5

Poor personal hygiene

Contribute to food contamination	102	85
Does not contribute to food contamination	18	15
Skin infection can contaminate food		
Can contaminate	93	77.5
Cannot contaminate	27	22.5

Table 2 above shows knowledge levels of food handlers on food hygiene practices. 111 (92.5%) of food handlers knew the importance of food hygiene training. On the importance of food hygiene and safety policy, 78 (65%) of respondents knew about the importance of this information. Meanwhile 93 (77.5%) food handlers were aware about whose responsibility is regarding food hygiene in the working environment. 102 (85%) of respondents knew that poor personal hygiene can cause cross contamination. 93 (77.5) % knew that skin infection can contaminate food.

Table 3: Hygiene Practices of Food handlers

Hygiene Practices	Frequency	Percentage
Wash hands before handling food		
Wash hands	108	90
Do not wash hands	12	10
No of times you wash hands in restaurant		
Once a day	15	12.5
Three times a day	3	2.5
After every procedure	102	85
Wash your hands with soap		
Wash with soap	105	87.5
Do not wash hands with soap	15	12.5
Covering hair		
Is always covered	99	82.5
Not covered	21	17.5
Cooking utensils washed in hot water		
Wash in hot water	63	52.5
Do not wash in hot water	57	47.5
Personal Protective Equipment		
Wear protective clothing	57	47.5

Do not wear protective clothing	63	52.5
No of times when nails are cut		
None	9	7.5
Once a month	3	2.5
Twice a month	15	12.5
Once a week	93	77.5
No of times when working area is cleaned		
One time	9	7.5
Two times	36	30
Every after a procedure	75	62
Kitchen utensils are washed using		
Water only	27	22.5
Water and soap	93	77.5
Provided with changing rooms		
Provided	12	10
Not Provided	108	90
Provided with shower room		
Provided	9	7.5
Not Provided	111	92.5

Table 3 shows hygiene practices of food handlers in the restaurants. 108 (90%) of food handlers confirmed that they washed hands before handling food. Of the (90%) who washed hands, 102 (85%) washed hands every after procedure. Furthermore, out of 85% who washed hands every after procedure, 115 (87.5%) washed hands with soap.

A total of 99 (82.5%) of food handlers confirmed that they covered their hair when working in the restaurants. The food handlers who did not cover their hair indicated that they were not provided with personal protective equipment. 63 (52.5%) indicated that they wash their utensils in hot water. Of the (52.5%) who washes their utensils in hot water, 93 (77.5%) wash using hot water with soap.

About 93 (77.5%) indicated that they cut nails once in a week, 15 (12.5%) cut their nails twice a month, 3 (2.5%) cut nails once a month and 9 (7.5%) do not cut nails atoll. 75 (62%) cleaned their working area every after procedure, 36 (30%) cleaned two times and 9 (7.5%) just cleaned

once a day. 12 (10%) of respondents were provided with changing rooms and 9 (7.5%) were provided with shower rooms.

Table 4: Association between education level and knowledge of food handlers

	Level of knowledge on food safety				
Education	**Very knowledgeable n(%)**	**Knowledgeable n(%)**	**Moderate n(%)**	**Poor n(%)**	**Total n(%)**
None	3 (3.85)	0 (0)	0 (0)	0 (0)	3 (2.5)
Primary	21 (26.9)	21 (70)	3 (100)	9(100)	18 (45)
Secondary	45 (58)	6 (20)	0 (0)	0 (0)	51 (42.5)
Tertiary	9 (11.54)	3 (10)	0 (0)	0 (0)	12 (10)
Total	78 (100)	30 (100)	3 (100)	9(100)	120(100)

Fish exact= <0.001

Table 4 presents the results of the association between the education level and level of knowledge of food handlers. 58% of respondents who had attained secondary education were very knowledgeable about food safety compared to those who did not. There was a significant association between educational level and knowledge of food safety ($p<0.001$)

Table 5: Association between education level and practices of food handlers

	Hygiene practices of food handlers				
Education	**Very Good n(%)**	**Good n(%)**	**Moderate n(%)**	**Poor n(%)**	**Total n(%)**
None	13 (4.6)	0 (0)	0 (0)	0 (0)	3 (2.5)
Primary	18 (27.3)	24 (61.5)	3 (50)	9(100)	54 (45)
Secondary	36 (54.6)	12 (30.8)	3 (50)	0 (0)	51 (42.5)
College	9 (13.6)	3 (7.8)	0 (0)	0 (0)	12 (10)
Total	22(100)	39 (100)	6(100)	9(100)	120(100)

Fisher exact =<0.001

Similarly, an analysis of the association between education level and hygiene practices of food handlers on food hygiene revealed that those that had good practices fell in the secondary school of education (54.5%) of the 36 food handlers with $p<0.001$ at 95% level of significance. Those with poor practices fell in primary level of education

Table 6: Association between the level of knowledge on food safety and food hygiene practices

	Food hygiene practices of food handlers				
Knowledge	**Very good n(%)**	**Good n(%)**	**Moderate n(%)**	**Poor n (%)**	**Total n(%)**
Very knowledgeable	57 (86.4)	18(46.2)	3 (50.0)	0 (0)	78 (65)
Knowledgeable	9 (13.6)	18(46.2)	3 (50.0)	0 (0)	30 (25)
Moderate	0 (0.0)	3 (7.7)	0 (0.0)	0 (0)	3 (2.5)
Poor	0 (0.0)	0 (0.0)	0 (0.0)	9(100)	9 (7.5)
Total	66(100)	39(100)	6 (100)	9(100)	120(100)

Fishers exact= 0.001

The majority of the food handlers (86.4%) were very knowledgeable. Among these, 57 out 66 representing 86.4% had very good food hygiene practices at 95% level of significance with a P<0.001

Table 7. Logistic regression model on demographic factors contributing to food safety in restaurants (N=120)

Food safety	**Odds Ratio**	**P>z**	**95% Confidence interval**	
Gender	1.83	0.32	0.56	5.99
Age	1.40	0.27	0.77	2.58
Educational level	2.68	0.001	1.49	4.84
Constant	0.32	0.020.	0.0	0.56

Table 7 presents the results of the logistic regression model which shows that the level of education has a significant effect on food safety. Specifically, the increase in ones' education level, improves food safety practices by 2.68 times, which is statistically significant with p<0.001 while adjusting for gender and age which are statistically insignificant with p=0.32 and 0.27 respectively.

4.2. Qualitative Results

Key informants were interviewed on beliefs about food safety and the following major themes emerged from interviews; food safety belief, preservation of leftover food, food storage, hand washing practice, wash surface, utensil and cutting boards and capacity building in food hygiene and safety.

Table 8. Qualitative theme analysis of key informant analysis on food safety among managers of restaurants.

Major Theme	Sub Themes
Beliefs	Very important in prevention of food-borne diseases Food safety should never be compromised Take necessary precautions to avoid food contamination Hand wash before handling anything Covering food after preparation Food must be kept warm
Preservation of leftover food	Discard leftover food Do not have preservative such as a fridge Store food in a receptacle such as bow or food warmer Immerse in water at room temperature Re-cook the following day Store in the fridge and cook the following day
Food storage	Very important to refrigerate Food cannot be spoiled Microorganism cannot survive in low temperature
Hand washing practice	Wash hands often Wash with warm soap water After visiting toilet Before preparing food When changing tasks Wash hands after sneezing, coughing etc
Wash work surface, utensils and cutting boards	Sanitize after preparing raw food such as poultry, meat etc Use sponged cloth with sanitizer Cut fresh foods separately as well as vegetables Others said that they flipped cutting board after using it
Capacity building	Participants were interested to be given such an opportunity Acquire knowledge and learn modern food safety practices
Beliefs	

The key informants were asked to describe how they understood food safety belief; most key informants stated that food safety is cardinal in the prevention of diseases especially diarrhoeal diseases such as cholera and typhoid. Once food safety is compromised, it becomes a problem because people will be forced to buy and eat contaminated food. When someone is preparing food such as nshima or relish, such an individual is supposed to take necessary precautions to avoid food contamination, such as washing food before preparation, hand wash before touching anything, covering food after preparation while the food must be kept warm until a customer or individual consume it.

*Prevention of food contamination during food preparation is very cardinal because it's one way of food safety quality assurance e.g. when someone is handling food, it is advisable that the particular individual should wash his or her hands as a safety measure throughout working period. When food is prepared, the food is supposed to be kept warm throughout the period when it is in storage; usually this is achieved by leaving the food near fire or on fire with low temperature (***Manager *# 4**).*

Preservation of leftover food

When asked how they kept and preserved leftover food after a long working day, some key informants said that they threw away leftover food because they do not have fridges for food to be kept until the following day. Others said that they store food in a receptacle such as a bow and immerse it in water which is at room temperature so that the following morning it could be re-cooked, others said that they kept the food in the fridge and it is re-cooked the following morning and while others said that whatever remains, it is always thrown away.

*Leftover food can be recycled, we would get that food and put it in the receptacle such as a bow and cover it, thereafter immerse that receptacle in the dish of water and leave it in that state overnight in order to avoid food spoilage. In some cases, we get that food and cover it nicely and put or leave it on the table in order to serve the following day. In some cases we throw away the food or we ask our neighbour with a fridge for storage but it is very rare because of challenges with people who have fridges. We strongly believe that this practice makes food safe and it can be re-reserved the following day (***Manager # 12***).*

Food storage

Participants were asked about the importance of food storage to which most of them indicated that it was very important to store food in refrigerator because food cannot be spoiled or cannot go bad. They believe that refrigeration can prevent food spoilage and that some microorganisms cannot survive at very low temperature. They further expressed the goodness of a freezer or fridge though most of the restaurants do not have such a facility to refrigerate food stuff.

*Yes it is very important as it is one way to avoid spoilage of food stuff and it can even be kept in the fridge for some time if it is not for immediate use (***Manager # 14**).

Hand washing practice

When asked to describe how and when they washed their hands, some participants said they wash their hands so often especially after visiting the restroom, before preparing food and when changing tasks, work station or items they were handling e.g. money etc. Others said they wash their hands periodically with soap, warm water and wipe with clean tower. To lesser extent others said they washed their hands after sneezing, coughing or torching their face, hair or clothes.

It is very important because it is one of the ways designed to avoid food contamination while handling food, preparing and serving customers. It is also important to dry hands with a hygienically clean towel, to avoid dripping of water in the food. Hand washing in food establishment is practiced and done every time you handle anything as you are preparing or serving customers, as well after sneezing, using restrooms, coughing or torching hair (**Manager # 9**).

Wash work surface, utensils and cutting boards

When asked to describe how they wash work surface, utensils and cutting boards in order to prevent cross contamination. All restaurant managers said they clean and sanitize their work surfaces, utensils and cutting boards after preparing raw poultry, meat or vegetables. Some said they cleaned and sanitized with a wet cloth or towel from a sanitizer bucket. In addition they said most fresh foods are prepared separately. They also emphasized that they washed hands after

preparing raw meat or poultry. Finally others said that they flipped over the cutting board rather than cleaning it or getting another one.

*We clean the work surfaces by using a piece of wet cloth which has been sponged in water containing detergent soap. The utensils and cutting boards are immediately washed using dishwashing soap especially after cutting meat or chicken and then later rinse with water (***Manager # 16***).*

Capacity building

When asked about their willingness to learn about food hygiene and safety, all the participants expressed willingness that if such an opportunity was availed, they will take it as they desire new knowledge in food hygiene and safety practices because this is the only way they can improve food safety. They further said that this field of food safety is very diverse and as a result it requires periodic training to learn modern practices introduced by the experts in this particular field.

*We can be so happy to have such a program because we do not have enough knowledge in food safety and such a program can increase awareness about food safety to food handlers in the restaurants of this district. There are a number of people who are running restaurants but do not have enough knowledge on food safety and once such a program is done, a lot of diarrhoeal cases can be reduced as most of these cases come as a result of consuming contaminated food and luck of knowledge in food safety and hygiene (***Manager # 19**).

CHAPTER FIVE

DISCUSSION

This study revealed that the majority of food handlers 69 (57.5%) were above 26 years. Among the food handlers interviewed 105 (87.5%) were females. This is similar to the studies done by Carol et al (2010) and Kara V et al (2015) who found that the majority of study participants were females (55% and 81% respectively). From these studies it is clear that the majority of food handlers in most food establishments are females and this could be attributed to the number of reasons which include society status, economical status, 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 Kisembi (2010) on hygiene practices in urban restaurants where he found that most staff working in these restaurants were mostly male (65%) as compared to female (35%) and another study done by Kasturwar 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.

This study also revealed that 54 (45%) attained primary level, 51 (42.5%) attained secondary level. 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.

5.1. Knowledge on food Hygiene

This study has revealed that knowledge levels among food handlers were generally high. The respondents demonstrated good knowledge in the areas of hand washing, general cleaning, causes of food contamination and definition of food-borne diseases. Most respondents 105 (87.5%) indicated that hands should be washed before food preparation and after every procedure. Despite exhibiting good knowledge in these areas, it was found that only 40% of the food handlers were trained in food hygiene and the rest (60%) indicated that they came to know about food hygiene practices when they were growing up in their various homes and through Health Inspectors as they 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 this found that the average correct answers were at 46% lower in comparison to this study that has found an average of 65% to be knowledgeable in food hygiene practices. The results of the association between level of knowledge and hygiene practices, however, indicated that there

was a significant relationship between the levels of knowledge and food hygiene practices in this study at 95% level of significance with (P-value <0.001). Knowledge on food hygiene is key and very important because poor practices have been shown to be a significant contributing factor to food-borne illnesses in various food retailers (Taylor et al, 2000)

5.2. Hygiene practices of food handlers

Hand hygiene and food hygiene practices are the two most critical factors in ensuring food safety. This study has revealed that (85%) of food handlers washed their hands before handling food and every after a procedure however only (87.5%) were found to wash their hands with soap. Food handlers (12.5%) indicated that they washed with plain water because they were not provided with soap by the manager. About (47.5%) of food handlers however indicated that they covered their hair when handling food while 52% did not cover their hair. This finding is contrary to regulation 422 (b) (i-iv) of the Food and Drugs Act Cap 303 which demands that all food handlers must wear clean garments, wash their hands thoroughly and cover their hair etc. The reason for not covering their hair was that these food handlers were not provided with protective clothing and were also ignorant about this requirement. With regards to washing utensils in hot water, 52.5% of respondents indicated that they washed their utensils in hot water while 47.5% indicated that they did not wash their utensils in hot water.

Regulation 419 (1-4) of the Food and Drugs Act Cap 303, however, states that utensils are supposed to be washed in hot water and sanitized appropriately. While running water was very much inadequate in most of the restaurants, only 15 % of food outlets had running water and the rest (85%) did not have running water. This is against the Food and Drugs Act Cap 303 regulation (416) (2) which states that "*The water supply shall be sufficient for the operations intended and shall be derived from an adequate source. Any water that contacts food or food-contact surfaces shall be safe and of adequate quality. Running water at a suitable temperature and under pressure as needed shall be provided in all areas where the processing of food, the cleaning of equipment, utensils, or containers, and the employee sanitary conveniences require."* This study has revealed that only (10%) had changing rooms while the rest (90%) of the respondents were not provided with changing rooms and they did not change clothes when they report for work. This finding is similar to a study done by Chipabika (2012) in Kabwe where it was revealed that most food handlers (85%) were not provided with changing rooms. On the

contrary to the study done by Safee (2010) where all respondents were provided with changing rooms, they were found taking baths and changing clothes before starting to work daily.

5.3. Beliefs of food handlers

Food safety was on top of their daily practice such that most food establishment managers believed that the only way to reduce cases of food-borne diseases was to take measures which can reduce food contamination such as; hand washing, keep food warm throughout the period it is in storage and keeping pets away from food preparation area. This study has similar findings to a study done by Carol et al (2010) on food safety knowledge and beliefs of middle school children who found that majority of study participants had good hygiene practices as key in reducing food contamination such as; kitchen cleanliness, good food preparation, boiling water before using or drinking, cooking temperatures and making sure that the person cooking is not sick and keeping food away from pets.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1. Conclusion

This study revealed that the majority of food handlers in restaurants of Chikankata District are female and this could be attributed to the number of factors which include; the nature of the job which most favour female employs, poverty in the community due to the district being rural, cheap labour and assumption that females are known to maintain proper personal and food hygiene. Further, the majority of the food handlers (65%) in Chikankata District are knowledgeable about food hygiene. This study revealed that there was a 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 food safety as outlined by logistic regression output. On the beliefs, most key informants outlined practices which are performed by various food handlers that were found to be in agreement with hygiene practices. It can therefore be concluded that the level of knowledge is high among food handlers of Chikankata district and that the majority of these handlers had good hygiene practices.

6.2. Recommendations

In order to maintain the hygiene practices among the food handlers in restaurants of Chikankata District, the following are recommendations;

1. **Chikankata District Council**

- A bacteriological food quality assessment should be conducted to ascertain the relevance of this study results
- Design short courses for food handlers in order to transform the high knowledge levels into practice
- Restaurants owners to provide protective clothing (PPE) to food handlers
- Encourage Restaurants owners to employ food handlers who are trained in food hygiene

2. **Chikankata District Health Office**

- Employ more Health Inspectors to carry out inspections of restaurants and other premises in order to maintain and improve the current status quo.
- To continue with sensitization programmes on food hygiene and safety in the restaurants

6.3. Limitations of the Study

- The scope of the study was limited to 26 restaurants and its findings may not wholly explain the beliefs and practices of the entire Chikankata District population.
- Data collection was a challenge as most study population were scattered apart from the Central Business District (CBD) as it became expensive to collect data in these various places.

REFERENCES

Angulo, F.J. and Jones, T.F., (2006). *Eating in Restaurants: A Risk Factor for Foodborne Diseases.* Clinical Infectious Diseases, 43(10), 1324-1328.

Beatty, M,E. (2006*). Epidemic Diarrhea due to Enterotoxigenic Escherichia Coli*. Clinical Infectious Diseases; 42: 329–334.

Barrabeig, I., Rovira, A., Bartolomé, R., Pintó, R., Prellezo, H. and Dominguez, À. (2010). *Food borne Norovirus Outbreak: the Role of an Asymptomatic Food Handler*. BMC Infectious Diseases, 10(1), 269.

CAC. (1999). Codex Alimentarius: General requirements 1A.

Center for Disease Control and Prevention. (2011). *Surveillance for Food borne Disease Outbreaks--United States, MMWR. Morbidity and Mortality Weekly Report*, 60 (35), 1197.

Carol, B.B., Jaclyn, M. A., and Virginia Q. (2010). *Food Safety Knowledge and Beliefs of Middle School Children: Implications for Food Safety Educators*. Journal of Food Science education.

Clayton, D. A., Griffith, C. J., Price, P. and Peters, A. C. (2002*). Food Handlers' Beliefs And Self Reported Practices. International Journal of Environmental Health Research*, 12, 25-39.

Chikankata district Council, (2015). *Council Register*.

Chikankata Mission Hospital (2014) *Health Management and Information System*.

Chipabika E (2014).*An Assessment of Food Hygiene Practices among Food Handlers in Restaurants in Kabwe Urban District*.

Creswell, J., and Plano Clark, V. (2007). *Designing and Conducting Mixed Methods Research*. Thousand Oaks, CA: Sage

Egan, M.B., Raats, M.M., Grubb, S.M., Eves, A., Lumbers, M.L., Dean, M.S. and Adams, M.R., (2007). *A Review of Food Safety and Hygiene Training Studies in the Commercial Sector.* Food Control, 18(10), 1180-1190.

Emilio E. Debess, Eric Pippert, Frederick J. Angulo and Paul R. Cieslak. (2009). *Food Handler Assessment in Oregon. Foodborne Pathogens and Disease,* Volume6: Number 3

FAO/WHO (2005). *Regional Conference on Food Safety for Africa, National Food Safety System in Ethiopia, a Situation Analysis*.

FAO/WHO (1999). *Informal Food Distribution Sector in Africa (Street Foods) Importance and Challenges.*

Field house, P. (1995). *Food and Nutrition* (2nd ed.). San Diego, CA: Chapman and Hall

Firestone D., Stier, R.F. and Blumenthal, M.M (1991): *Regulation of frying fats and oils*. Food Technology, 45:88-94.

Fischer, A.R., De Jong, A.E., Van Asselt, E.D., De Jonge, R., Frewer, L.J. and Nauta, M.J., (2006). *Food Safety in the Domestic Environment: An Interdisciplinary Investigation of Microbial Hazards during Food Preparation*. Risk Analysis, 27(4), 1065-1082.

Fowler, F.J. (1993). *Survey Research Methods: Applied Social Research Methods Series* pp. 18-19. London & New Bury Park: Sage publication.

Flyers L, (2008): *Minimizing the Cost Associated with Monitoring. Food Technology Systems Ltd.* United Kingdom, London.

Gessner B.D and Beller M. (1994): *Protective Effect Of Conventional Cooking Versus Use of Microwave Ovens an an Outbreak Of Salmonellois*. American Journal of Epidemiology, 1994, 139:903-909.

Glanz, K., Rimer, B.K. and Lewis, F.M. (2002). *Theory, Research, and Practice in Health Behavior and Education. Health Behavior and Education: Theory, Research, and Practice,* Pp.22-39.

Government of the Republic of Zambia, (2005). Volume 17, *the Food and Drugs Act Cap 303 and Public Health Act Cap 295 of the Laws of Zambia*. Government printers Lusaka, Zambia.

Griffith, C. J., Farber, J. M. and Todd, E. C. (2000). *Food Safety in Catering Establishments*. Safe Handling of Foods, 235-256.

Hislop, N. and Shaw, K., (2009). *Food Safety Knowledge Retention Study*. Journal of Food Protection®, 72(2), 431-435.

Howes M, McEwan S, Griyths M, Harris L, (1996). *Food Handler Certification By Home Study: Measuring Changes In Knowledge And Behaviour*. *Dairy Food Environ* S16:737-44.

Hughner, R.S., McDonagh, P., Prothero, A., Shultz, C.J. and Stanton, J. (2007). *Who Are Organic Food Consumers? A Compilation and Review of Why People Purchase Organic Food*. *Journal of consumer behaviour*, *6*(2-3), pp.94-110

Hundy, R.L and Cameron, S. (2002). *An Outbreak of Infections with a New Salmonella Phage Type Linked to a Symptomatic Food Handler*, Communicable Diseases Intelligence, 26 (4) 562–567.

Isara, A. R, and Isah, E.C (2009). *Knowledge and Practice of Food Hygiene and Safety Among Food Handlers in Fast Food Restaurants in Benin City*, Edo state, Niger. Postgraduate medical journal, September 16, 2007

Jones T, F,. and Angulo F, J. (2006). *Eating in restaurants: A risk factor for food borne disease? Clinical Infectious Diseases,* Volume 43, 1324-1328.

Käferstein, F.(2003*). Foodborne Diseases in Developing Countries: Aetiology, Epidemiology and Strategies for Prevention*. *International Journal of Environmental Health Research*, *13*(S1), pp.S161-S168.

Kara V, Paula, R and Julie A. (2015*). Food Safety Knowledge, Attitudes, and Behaviors of Native American Families with Young Children*: Nebraska-Lincoln: Nutrition and Health Sciences-FacultyPublications

Kasturwar, NB, Shafee, S (2011). *Knowledge, practices and practices among food handers*

Kisembi, R. M. (2010*).Hygiene Practices in Urban Restaurants: Investigating Possibilities of Introducing HACCP Systems in Thika Town*

Kuczmarski, M. F., and Cole, R. P. (1999). *Transcultural Food Habits Travel Courses: An Interdisciplinary Approach to Teaching Cultural Diversity*. Top Clinical Nutrition,15(1), 59-71.

Little, J., Barnes, R.T. and Mitchell, T. (2002), *Microbiological Quality of Take-Away Cooked Rice and Chicken Sandwiches: Effectiveness of Food Hygiene Training of The Management. Communicable Disease and Public Health*, 5 (4), 289–298.

Mccabe-Sellers, B.J. and Beattie, S.E. (2004). *Food Safety: Emerging Trends in Food-borne Illness Surveillance and Prevention. Journal of the American Dietetic Association*, *104*(11), Pp.1708-1717.

Mead, P. S., Slutsker, L., Dietz, V., Griffin, P. M. and Tauxe, R. V. (1999). *Food-Related Illness and Death in the United States.* Emerging Infectious Diseases, 5, 607.

Ministry of Health (2014). *Epidemic Preparedness Committee Report*

Moren A., Mccaig, L. F., Bresee, J. S. and Shapiro, C. (1991). *Practical Field Epidemiology to Investigate a Cholera Outbreak in a Mozambican Refugee Camp in Malawi*, 1988. Journal of Tropical Medicine and Hygiene 94:1-7.

Motarjemi, Y. and Mortimore, S. (2005). *Industry's Need And Expectations to Meet Food Safety, 5th International Meeting:* Noordwijk Food Safety and *Food control*, *16*(6), pp.523-529.

Nesbitt, A., Majowicz, S., Finley, R., Marshall, B., Pollari, F., Sargeant, J., Ribble, C., Wilson, J. and Sittler, N., (2009). *High-risk food consumption and food safety practices in a Canadian* community. *Journal of Food Protection®*, *72*(12), pp.2575-2586.

Ndungu N.K (2002). *Assessment on Implementation of HACCP as a Strategy for Quality Control in Food Establishments; Food Science and Inspection*, (2001 -2002). Nairobi: Kenya Medical College.

Nguz, K. (2007). Assessing Food Safety System in Sub-Saharan Countries: An Overview of Key Issues. *Food Control*, *18*(2), Pp.131-134.

Nyamari, J., (2013). *Evaluation of Compliance to Food Safety Standards amongst Food Handlers in Selected Hospitals in Kenya*

Ozawa, K., Oka, T., Takeda, N. And Hansman, G.S. (2007*). Norovirus Infections in Symptomatic and Asymptomatic Food Handlers in Japan*. *Journal of Clinical Microbiology*, *45*(12), Pp.3996-4005.

Pakalniskiene, J., Falkenhorst, G., Lisby, M., Madsen, S.B., Olsen, K.E.P., Nielsen, E.M., Mygh, A., Boel, J. and Mølbak, K. (2009). *A Foodborne Outbreak Of Enterotoxigenic E. Coli And Salmonella Anatum Infection After A High-School Dinner In Denmark, Epidemiology and Infection,137*(03), pp.396-401.

Pierson, M.D. (2012). *HACCP: Principles and Applications*. Springer Science and Business Media.

Rangel, J.M., Sparling, P.H., Crowe, C., Griffin, P.M. and Swerdlow, D.L (2005). *Epidemiology of Escherichia coli O157: H7 Outbreaks,* United States.

Redmond and Griffith, C.J. (2003). *Food Safety in Catering Establishment, Safe Handling of Foods,* Marcel Dekker, New York, 4 (2), 235–256.

Seaman, P. (2010). *Food Hygiene Training: Introducing the Food Hygiene Training Model*. Food Control, 21(4), 381-387.

Scharff, R. (2012). *Health-Related Costs from Food Borne Illness* in the United States.

Schmitt, R. Jermini, M. Chilufya, E. Hakalima, Lubasi, D. (2012). *Hazard and Critical Control Points of Food Preparation in Homes in Which Persons Had Diarrhea in Zambia*.Journal of food protection. 60 (12) 161-1771

Shindano, J and Himoonga, B. M. (2010). *Report on the Food Hygiene of Food outlets in Lusaka*. University of Zambia. School of Agricultural Sciences Department of Food Science and Technology. Lusaka, Zambia.

Stuart A.S., (2002): *Integrated Approaches to the Management of Food Safety throughout the Food Chain.*FAO/WHO, Global forum of food safety regulators;

Todd ECD (1996): *Worldwide Surveillance of Food Borne Disease, the Need to Improve, Journal of Food Protection,* 59: 82–92.

Umeche N. (1991). *Parasite Ova and Cysts in Fruits in Calabar*, Nigeria. The Nigeria Journal of Parasitology.

WHO (2000): *Food-borne diseases: A focus on health*. WHO, Geneva, 24.

WHO. (2002). *Methods for Foodborne Disease Surveillance* in Selected Sites.

WHO (2005): *Guidance on Regulatory Assessment of HACCP*. WHO/FSF/FOS/05.5.

WHO (2006) *Food Safety Risk Analysis: A Guide for National Food Safety Authorities*. Food and Nutrition Paper.

WHO. (2010).*Technical Guidelines for Integrated Disease Surveillance and Response in the African Region,* Brazzaville.

WHO (2012) *Manual for Integrated Food borne Disease Surveillance in the WHO African Region*, Brazaville.

Worsfold, D. and Griffith, C.J (2004). *An Assessment of the Standard of Consumer Food Safety Behavior; Journal of Food Protection*, 60, 1–9.

World Bank, (2014). *Food Safety in Zambia: How Small Improvements Can Have Big Impac*t

Yiannas, T. (2009). *Food Safety Culture: Creating A Behavior Based Food Safety Management System*. Springer, New York.

Zain M.M, and Naing N. (2002*). Socio Demographic Characteristics of Food Handlers and their Knowledge.* South East, Asia.

Zambia Daily-Mail. Dated 23 August 2012.

Zambia Daily-Mail. Dated 11th April 2016

APPENDICES

Appendix I. Information Sheet

University of Zambia

School of Public Health

Department of Health Promotion and Education

Box 50110

LUSAKA.

Study Title: Beliefs and practices in food safety among food handlers in restaurants in Chikankata district

Dear participant,

I am a studentin the School of Medicine in the Department of Public Health at the University of Zambia. I am conducting this study in partial fulfilment of the qualification of Master of Public Health.

Purpose of the study

1. To assess beliefs in food safety among food handlers working in food outlets.
2. To assess food hygiene practices in food safety among food handlers in food outlets.
3. To assess the level of knowledge in food safety among food handlers in food outlets

Procedure

I therefore ask you to participate in this study. Your duty as a respondent is to answer the questions in order to improve food safety among food handlers in restaurants. Your decision to take part in this study is your choice and shall be respected.

Risks / Discomforts:

There will be no physical risks involved in this study. You may also feel uncomfortable answering some of the questions. You may refuse to answer any questions that you do not want to answer or questions that make you feel uncomfortable. You may stop being part of the study at any time. Your responses or participation in this study will not affect you in any way.

Benefits: There is no direct benefit to you personally for participating in this study. Being in this study may not change the way you work in your restaurant, the results from this study may help others in the future in the provision and improvement of food safety in restaurants.

Alternatives to Participation: You can either choose to be in the study or choose not to be in the study. If you choose to be in the study you do not have to stay in the study until it ends. You can decide to leave the study at any time. Your leaving this will not affect you or any other privileges that you enjoy now.

Confidentiality: You are invited to take part in this study. If you agree to be in the study we will ask you some questions on food safety. In order to make sure of confidentiality, your name will not be used on any survey forms. Once we are finished with the study, information collected will be destroyed.

Voluntariness: Your taking part in this study is completely voluntary. You are free to withdraw at any time, for any reason. In the event that you decide to withdraw from the study, the information you have already provided will be kept in a confidential manner. It will not be shared with anyone else to personally harm or affect you. This will not in any way affect you or your taking part in future or any other privileges.

Re-Imbursement: There is no financial re-imbursement for participating in this study.

Contact: If you want to talk to anyone about this study because you think you have not been fairly treated, or you have any other questions about the study, you should call the following Investigator of the study or call the University of Zambia, Department of Public Health on 0977490747 or 290258.

Principal Investigator,
Danny Malambo.

Appendix II. 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 and I can also skip questions that may deem personal or otherwise.

What does your signature (or thumbprint/mark) on this consent form mean?

Your signature (or thumbprint/mark) on this form means:

- You have been informed about this study's purpose, procedures, possible benefits and risks.
- You have been given the chance to ask questions before you sign.

You have voluntarily agreed to be in this study

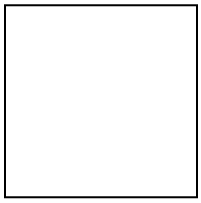
I …….. (Names) Agree to take part in this study.

Signed …….. Date…… (Participant)

Participant's signature or thumb print.

Signed…… Date……. (Witness)

Signed…… Date …… (Researcher)



The participant to mark a "left thumb impression" in this box if the participant is unable to provide a signature above

Persons to contact for problems or questions

1. Danny Malambo, University of Zambia, Department of Health Promotion and Education, P. O Box 50110, Lusaka. Cell: 0977490747

2. Mrs. Doreen Sitali (Principal Supervisor), University of Zambia, Department of Department of Health Promotion and Education , P. O Box 50110, Lusaka.

4. The Chairman, University of Zambia Biomedical Research Ethics Committee (UNZABREC), University of Zambia, P.o Box 50110, Lusaka.

Pepa lipandululula cabalo (Information Sheet)

University of Zambia

School of Public Health

Department of Health Promotion and Education

Box 50110

LUSAKA.

Mutwe Wacibalo: Bushomi alimwi amicito mukukwabilila zilyo mumasena aliidwa muciliki ca-Chikankata.

Noyandwa Otola Lubazu,

Ndili hicikolo mubbaba lilanga bukwabilizi bwanseba zyabuleya aacikolo cipati mu-Zambia naa University of Zambia mukakolo kabu-silisi. Ndila bala kuzuzukizya cipepa cipati mulwiyo lwakukwabibila malwazi naa Master of Public Health.

Muzezo wakubala;

1. Nkulanganya bushomi bwabulondo bwa-zyakulya akati kabantu bajika babeleka mumanda mobasambalila zyakulya.
2. Nkulanganya micito mubulondo bwazyakulya mukukwabibila zyakulya akati kabantu bajika babeleka mumanda mobasambalila zyakulya.
3. Nkulanganya busonko mukukwabibila zyakulya akati kabantu bajika babeleka mumanda mobasambalila zyakulya.

Mbocicitwa aawa

Ndamilomba kuti mutole lubazu mumubandi ooyu. Ncemweezele kucita mumubandi ooyu Kkuvwiila mibuzyo kutegwa tusumpule mukwabilizi abulondo bwa- zyakulya akati kabantu bajika babeleka mumanda mobasambalila zyakulya. Kuzumina kwanu mukutola lubazu mumubandi ooyu kkusala kwaanu aalimwi kulalemekwa kapati.

Buubi na kutalivwa kabotu

Kunyina bubi bujatikizya mubili weenu kwiinda kutola lubazu mucibalo eeci. Abona inga kwaba kutalivwa kabotu mwana kuvwiila mibuzyo iimbi. Cili kuli ndinywe kutavwiila mibuzyo iimbi

imupa kutalivwa kabotu. Inga mwacileka kutola lubazu mu-cibalo eeci kufwumba ciindi ccimwanda. Kutola lubazu mumubandi ooyo taujisi buubi muzila iili yoonse pee.

Bubotu; Kwiina bubotu bwacigaminina mukutola lubazu mu-cibalo eeci. Moona kutola lubazu mumubandi ooyu, Kwiina kucincca mubukutausi bwancinto eenu, peele ibulumbu bwacibalo eeci buyogwasha bantu bambi kumbele mukusumpula bulondo bwazyakulya mumanda mobasambalila

Busale bwakutola lubazu: Iinga mwasala kutola lubazu naanka kukaka kutola lubazu muci-balo eeci. Naa mwazumina kutola lubazu mumubandi ooyu, inga mwacileka kufumbwa ciindi ncomwayanda kuleka. Kuleka kweenu takuko biha buumi bweenu munzila iili yoonse.

Maseseke; Mwatambwa kutola lubazu mumubandi ooyu. Naa mwazumina kutola lubazu mumubandi, tulamibuzya mibuzyo ijatikizya bulondo bwacakulya. Nkaambo kamaseseke aali mumubandi ooyu, zyiina lyeenu talyambwi mumundi ooyu. Twakumana buyo kufu-fula mubandi ooyu, twaambo toonse twagomemenwa tuyo-umpwa tuli mumapepa aaya.

Kulipa olike; Kutola lubazu mumubandi wacibalo eeci nkwakuli kalipede. Mulangulukide kucileka kutola lubazu kufumbwa ciindi. Munzila iimbi mwayanda kuti mucileke kutola lubazu, twaambo twalo tumwamba kale, tuyoyobolwa camaseseke alimwi tatukaabaanwi bantu bambi.

Kubbadelwa; Kwiina kubbadelwa kuliko nkaambo kakutola lubazu mumubandi ooyu.

Mibuzyo: Naa mwaanda kubuzya cilocoonse kujatikizya cibalo eeci, inga mwatuma luwaile ku-University of Zambia mucibeela cilanganya bukwabilizi bwanseba zyabantu ama-nambala aaya 0977490747 nakuba 290258

Ndime mwendelezi mupati mumubandi ooyu

Danny Malambo

Cipepa cakuzumina na Consent Form mucikuwa

Muzezo wamubandi wacibalo eeci wapandululwa kabotu kabotu kuli ndime alimwi ndautelela muzezo, bulumbu naanka buubi alimwi amaseseke acibalo eeci. Ndaya-ambele kutelela kwamba kuti naa ndazumina kutola lubazu mumubandi wacibalo eeci, inga ndacileka kufumbwa ciindi kakunyina aakwamba ncindalekela alimwi kutola lubazu mumubandi ooyu nkwakulipa. Mibuzyo iimbi itali kabotu kuli ndime iinga ndaisotoka mumubandi.

Hena kusaina kwenu naanka kubikka cigubo camunwe aacipepa cakuzumina caamba nzii?

Kusaina kwenu naanka kubikka cigumo acipepa aawa caamba ncecaamba nceeci;

- Mwaambilwa muzezo, bwendelezi, bubotu abubi bwacibalo eeci
- Mwapegwa ciindi cakuti mubuzye mibuzyo kamutana saina akusaina

Mwalipa kwakuzumina kuti mutole lubazu mucibalo eeci

Mebo……..……(**Zyiina langu**) ndazumina kutola lubazu mucibalo eeci.

Saina……**Buzuba bwamwezi**……(**Neetola lubazu**)

Kusaina naanka kubikka cigumo camunwe kwautola lubazu mumubandi

Saina…….. **Buzuba bwamwezi**……(**Kamboni**)

Saina…….**Buzuba bwamwezi**……(**Uuvwuntauzya**)

Uutola lubazu mumubandi abikke cigumo camunwe walumwehyi mukabbokesi aaka naa kuti tacikohya kusaina ajulu aawa.

Muntu wakutumina kuti kakuli pezi naanka mibuzyo

1. Danny Malambo, University of Zambia, Department of Health Promotion and Education, P. O Box 50110, Lusaka. Cell: 0977490747

2. Mrs. Doreen Sitali (Supervisor), University of Zambia, Department of Health Promotion and Education, P. O Box 50110, Lusaka.

3. The Chairman, University of Zambia Biomedical Research Ethics Committee (UNZABREC), University of Zambia, P.o Box 50110, Lusaka

Appendix III. Checklist

Checklist on Beliefs and Practices in Food Safety among Food Handlers in Restaurants in Chikankata District.

Theme	Logistics	Yes	No	Remarks
1. Personnel	Is there evidence of medical examination for handlers			
	Is there evidence of training in food safety			
	Do food handlers wear Personal Protective clothing			
	Cutting of finger nails			
2. Hand washing facilities	Running water (Hot and Cold)			
	Hand dryer			
	Soap			
3. Utensils	Are there appropriate storage facilities			
	Presence of washing facilities			
	Presence of drying facilities			
4. Water supply	Running water			
	Water			
	Storage facilities			

5. Waste management	Record on the 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			

Appendix IV. Interview guide

Key informant interview guide on beliefs in food safety

1. How do you keep food safe culturally
2. What do you do with leftover food?
3. Is refrigerating food overnight to serve the following day important
4. Is washing of your hands with warm soapy water for atleast 20 seconds a priority and do you dry your hands with hand towel?
5. Do you wash countertops, utensils and cutting boards after preparing raw meat or chicken?
6. Are you interested in learning more about food safety?

Appendix V. Questionnaire

Questionnaire for Food Handlers Working In Restaurants

THE UNIVERSITY OF ZAMBIA

SCHOOL OF PUBLIC HEALTH

DEPARTMENT OF HEALTH PROMOTION AND EDUCATION

Topic: Beliefs and Practices in Food Safety among Food Handlers in Restaurants in Chikankata 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) 15 to 20 years ( )

(b) 21 to 25 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 dinking 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 ( )

26. How often do you cut your nails

(a). Once a week ( )

(b). Twice a month ( )

(c). Once a month ( )

(d). There's no need.

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

(a). one time ( )

(b). two times ( )

(d). Every after a procedure ( )

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

(a). Water and soap ( )

(b). Water only ( )

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

(a). Water and soap ( )

(b). Water only ( )

30. Do you have running water in your restaurant?

(a) Yes ( )

(b) No ( )

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

(a) Yes ( )

(b) No ( )

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

(a) Yes ( )

(b) No ( )

"Thank you for sparing this time "