THE LEVEL OF COMPLIANCE OF FOOD HANDLERS WITH NATIONAL REGULATIONS ON FOOD HYGIENE AND SAFETY PRACTICES: A CASE OF SELECTED FAST FOOD OUTLETS IN THOHOYANDOU, SOUTH AFRICA

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DECLARATION

I, Murwira Tinotenda Success, declare that 'THE LEVEL OF COMPLIANCE OF FOOD HANDLERS WITH NATIONAL REGULATIONS ON FOOD HYGIENE AND SAFETY PRACTICES: A CASE OF SELECTED FAST FOOD OUTLETS IN THOHOYANDOU is my own work and that all sources I used or quoted have been acknowledged by means of complete references, and this work has not been submitted for a degree at this university or any other institution.

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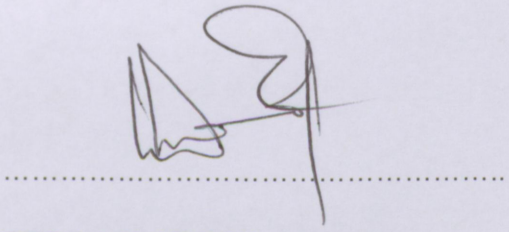
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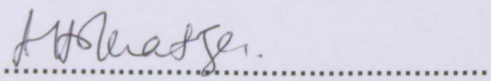
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DEDICATION

This dissertation is dedicated to the glory of God, for His steadfast love, mercy, wisdom and understanding.

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ABBREVIATIONS AND ACRONYMS

EUFIC	Europe Food Information Council
FAO	Food and Agricultural Organisation
FCD	Food, Cosmetics and Disinfectant Act, 1972
FERG	Food- Borne Disease Reference Group
FBDs	Food borne diseases
H.A.M	Health Action Model
HACCP	Hazard Analysis Critical Control Points
MHS	Municipal Health Services
SABS	South Africa Bureau of Standards
W.H.O	World Health Organisation
SPSS	Statistical Package for Social Sciences

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ABSTRACT

Food borne diseases (FBDs) comprise a large group of illnesses that are caused by the ingestion of contaminated food. Global statistics estimate that each year, unsafe food makes at least two billion people ill worldwide. This represents about one third of the global population. The greatest concern is that failure to comply with food safety and hygiene requirement by food handlers has contributed to the outbreak of food borne diseases despite an array of legislation meant to protect public health.

The purpose of the study is to assess the level of compliance of food handlers in Thohoyandou with national regulations on food hygiene and safety practices. The study was a cross sectional observational study. All the 60 fast food outlets were selected and simple random sampling was used to select 122 food handlers who participated in the study and data was gathered using a structured observation checklist and personal interviews. Descriptive statistics were used to analyse the data.

RESULTS: The results of the study revealed that on personal hygiene 115(94%) had their finger nails cut, 87(71%) washed hands with soap. Furthermore 118(98%) were observed wearing clean uniforms while 122(100%) make use of aprons or hair nets to cover head. One hundred and twenty (98%) were observed washing raw vegetables before cooking whilst 110(90%) washed utensils before cooking or serving. Food handlers also engaged in unhygienic practices. Only 2(1.6%) of the respondents were observed shaking hands whilst preparing food, whilst 1(0.8%) were found chewing whilst preparing food. Five (4%) of the respondents were observed collecting money at the same time serving or dishing food. Concerning health surveillance practices of the respondents, 44(36%) food handlers undergo regular medical check-up, 108(89%) reported illness to management when sick and 26(21.3%) prepared food when they had cough. Furthermore 30 (24.5%) were observed with open sores on their hands.

In terms of provision and adequacy of basic hygiene infrastructure of the fast food premises 55(92%) of fast food outlets are built in such a manner that the design and layout ensure good

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or proper hygiene, 57 (95%) of the premises are designed in a way which allows adequate cleaning, whilst 55 (92%) protect against the accumulation of dirt. Concerning provision of water, 60(100%) of the facilities have potable running water whilst 59(98.3%) allows for enough ventilation. Fifty five (92%) of the facilities walls are free from dust, soot and spider web. Furthermore 49 (82%) of the facilities are designed to prevent contamination of food, whilst 51 (85%) floor are free from cracks. Forty (66%) of premises do not have hot and cold water whilst 60 (100%) had hand washing basins had soap and drying facilities. The observed environment around food premises showed that 55 (92%) were clean and located a distance far from contaminating material such as waste water, toilet facilities, open drains and animals. Concerning the provision of soap, tissues and nail brushes in toilets. Fifty seven (95%) of toilets observed had soap and 60(100%) had tissues rolls.

Conclusion: Generally compliance levels to regulations are fair in fast food outlets in Thohoyandou.

KEY WORDS: Compliance, fast food outlets, Food Safety and Hygiene, Food handler

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CHAPTER ONE

INTRODUCTION

1.0. Background of the study

Food safety is the assurance that food will not cause harm to the consumer when prepared and or eaten in accordance with its intended use (WHO, 2007). Food hygiene is the set of basic principles employed in the systematic control of the environmental conditions during production, packaging, delivery, transportation, storage, processing, and preparation, selling and serving of food in such a manner as to ensure that food is safe to consume and is of good quality. The consumption of contaminated or unsafe foods may result in illness, also referred to as foodborne disease. When food handlers do not comply with proper personal hygiene or correct food preparation, they may become vehicles for microorganisms, through their hands, cuts or sores on the skin, and hair, among others (Silva, Germano and Germano, 2003).

A food handler is a person with any job that requires him/her to handle unpackaged foods or beverages and be involved in preparing, manufacturing, serving, inspecting, or even packaging of food and beverage items (Codex Alimentarius Commission, 2003). All food handlers are required to use proper hygiene and sanitation methods when working with food. Poor personal hygiene by food handlers frequently contributes to outbreaks of foodborne illnesses caused by staphylococcus aureus (S. aureus) and gram negative bacilli such species as Salmonella, Shigella, Campylobacter jejuni, Enter toxigenic E. coli as well as viral agents, such as hepatitis A, and Norovirus (Hundy and Cameron, 2002).

Food borne diseases are increasingly recognized as a major public health problem across the globe. Food safety has emerged as a global challenge and most of the developing countries are the victims of the devastating perils of food borne illness. Food is the source of nutrients, central to health, prosperity and social well-being of individuals and societies. However if not handled safely, it could be a medium for disease transmission (Mensah, Mwanakamba, Mohamed and Nsue –Milang, 2012). Unsafe food has been a cause of human health problems since beginning of history and many food safety problems encountered today are not new. Although governments all over the world are doing their best to improve the safety of the food supply, the occurrence of food borne diseases remains a significant health issue in both developed and developing countries. It has been estimated that each year 1.8 million people die as a result of

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diarrheal diseases and most of these cases can be attributed to contaminated food or water (WHO, 2008).

The burden of food borne diseases in the African region is difficult to surmise. However available data for diarrhoea due to contaminated food and water, estimate mortality to be around 700 000 persons per year in all ages. African children suffer an estimated five episodes of diarrhoea per child per year, mostly due to contaminated infant food. Unless these issues are addressed, countries will have difficulty in achieving the health-related Millennium Development Goals (WHO, 2008).Mortality due to diarrhoea in under-fives is estimated at 15% and is the second cause of under-five mortality both globally and in Africa. Recent findings from the work of the WHO Food borne Diseases Reference Group (FERG) revealed that there were more than 1.15 million estimated deaths from diarrhoea in South East Asia and Africa each year in children older than 5. This is almost a million more deaths than was previously estimated.

Millions of South Africans contract food poisoning every year. The National Department of Health published South African statistics relating to food poisoning in 2006. The report looks at the number of reported food borne illnesses and fatalities between 2001 and 2005. A total number of 51 food borne illness related deaths were reported to the National Department of Health. It is noteworthy that many cases of food borne illness go unreported or are misdiagnosed or undiagnosed. Most of the cases reported were from the Eastern Cape followed by KwaZulu-Natal and Limpopo province (National Institute for Communicable Diseases, 2014).

Recently, in the Limpopo province of South Africa there have been 44 cases of diarrheal disease all linked to the attendance of an event at a lodge. Patients reported at the local hospital with diarrhoea and vomiting within 48 hours of first checking in on 20 January 2014 into the lodge and enjoying several meals. The first case was presented on 22 January 2014. A non-typhoid Salmonella species was confirmed by laboratory tests on stool specimens from the patients. The outbreak was investigated and preliminary reports pointed to a food borne illness directly related to food consumed by attendees of the event at the lodge (National Institute for Communicable Diseases, 2014).

There must be laws for controlling the activities of people who prepare food intended for public consumption. To ensure effective food control, it is crucial that the catering industry control regulatory activities that are enforced by health authorities or local authorities so as to provide consumers with the necessary protection. This requires a safety and sanitation system that will

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consistently provide the certainty that food is prepared and served under safe and sanitary conditions. This demands the compliance to standard hygiene requirements specified in the regulation to prevent the outbreak of food borne illnesses. This entails the implementation of a food system such as hazard analysis critical control point (HACCP) that prevents problems before they occur. Health regulations were developed for people who prepare food for public. Compliance to the health regulations stipulated by Food, Cosmetic and Disinfectant Act of 1972 will ensure that food prepared for human consumption is safe and healthy.

It will also ensure that innocent lives are saved and unnecessary deaths are prevented. Since health and safety is a global issue of concern, and in order to safeguard customers health against the risk of food poisoning arising from unhygienic preparation conditions, especially at public eating places like hotels and restaurants, certain health and safety laws are put in place by governments to regulate hotel and restaurant business operations (WHO, 2007). The purpose of the law is to regulate human activities (Schmalleger, 2006; and Aibor and Olorunda, 2006) in order to ensure that human and other forms of existence are not jeopardized in any way which includes health and safety. Even though laws are meant to be obeyed, certain degree of enforcement is necessary to serve as a measure of control.

Providing safe food to consumers is the responsibility of the food service provider. There is an added obligation on authorities to ensure that any establishment serving food to the general public does so in a manner that complies with the regulations, and to monitor compliance. These regulations are detailed in the Health Act, No. 63 of 1977 and the Foodstuffs, Cosmetics and Disinfectants Act of 1972. Furthermore, standards have been developed to guide food service establishments in providing safe food for human consumption. Regular sanitary inspection can improve adherence of food handlers to personal hygiene and food safety practices. In South Africa, the food handlers have to adhere to a number of health regulations and guidelines which are updated with international standards from Code Alimentarius regulations on food hygiene. However periodic evaluation of food handler's compliance to the national regulations on food hygiene and safety practices will help to control the level of food safety violations.

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1.2. Problem Statement

Although restaurants in Thohoyandou are subject to local inspections by environmental health officers, epidemiologic and inspection data show that there is low compliance with food hygiene and safety requirements in the fast food establishments (Vhembe District Municipality, 2013). Furthermore, the local Limpopo Mirror newspaper has reported a number of incidences of diarrhoea and abdominal pains especially after eating food from fast food outlets. Around Vhembe district, food poisoning cases have been on the increase and about five cases of food poisoning in the district claimed lives. All the cases have been linked to eating in public places such as schools and mass catering events. In all these incidents, they cited that they had eaten food bought from restaurants and street vendors (Limpopo Mirror 2012).

The researcher resides in Thohoyandou and observed with concern that restaurants, fast foods outlets and unbranded kitchens in town are not complying with national regulations on food hygiene and safety practices. Due to the booming fast food outlets in Thohoyandou ambitious entrepreneurs have turned neglected industrial buildings into fast food outlets. This resulted in restaurants being established in unhygienic areas of the town. There is a lot of patronage of these fast food outlets. In many cases, the demand for foods ranging from snacks, soft drinks and major meals is very high. Due to the fast rate at which the meals are prepared, the possibility of food contamination cannot be ruled out. There is the possibility of not thoroughly washing utensils and equipment used for food preparation and service. The foregoing discussion shows that there is the need to assess the compliance levels of food handlers to national regulations on food hygiene and food safety in Thohoyandou.

1.3. Rationale for the Study

Research around compliance with food safety practices among food handlers is a new field of endeavour that has received little academic attention. Information on food handler's compliance with regulations in fast food outlets is largely scarce and this research seeks to develop a better understanding of this domain. In Vhembe District and Thohoyandou in particular there are no studies on the level of compliance of food handlers with national regulations on food hygiene and safety practices. Complying with food hygiene and safety legislation was recommended as a priority area for all countries and it is on the agenda of many governments worldwide (FAO/WHO, 2003). In South Africa, there is total lack of such practice.

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1.4. Significance of the Study

This study seeks to assess the compliance levels of food handlers with national regulations on food hygiene and safety. Non-compliance to food hygiene and safety practices can lead to outbreak of diseases such as diahorrea and gastroentiris which have negative impact on the health of customers. Findings from this study might assist future researchers who want to research on related topics as they may use the recommendations of the study to identify strategies to improve the level of compliance of food handlers with national regulations on food hygiene and safety practices. The results of the study may also assist relevant government departments and stakeholders to deal with issues on compliance of food handlers with national regulations. This study will also help policy makers to provide guidelines on how to increase the level of compliance of food handlers on the importance of complying with national regulations on food hygiene and safety.

1.5. Aim of the study

The aim of this study was to assess the level of compliance of food handlers with the national regulations on food hygiene and safety practices stipulated by R962 of 23 November, 2012 in selected fast outlets in Thohoyandou.

1.6. Objectives

- To assess the extent to which food handlers adhere to personal hygiene practices during food preparation.
- To assess the extent to which food handlers adhere to health surveillance practices.
- To assess the provision and adequacy of basic hygiene infrastructure in fast food outlets.

1.7. Definition of Concepts

Food handler:

A food handler is any person who directly handles packaged or unpackaged food, food equipment and utensils, or food contact surfaces and is therefore expected to comply with food hygiene requirements (Codex Alimentarius Commission, 2003). A food handler is thus any person involved in the processing, production, manufacturing, packaging, preparation, sale or serving of any foodstuff, including water and beverages (Department of Health, 2000). For this research, food handlers are defined as anyone who is employed exclusively for food preparation and services in the kitchen or dining hall.

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Fast food outlet:

Fast foods are ready to-eat-foods. The FAO/WHO, (2003), referred to fast foods as foods which are prepared and served quickly at fast food restaurants, shops, market, schools and other similar places. A fast food outlet is where fast foods are sold.

Food Hygiene: All conditions and measures to ensure the safety and suitability of food at all Stages of the food chain (FAO/WHO, 2003).

Food safety:

Food safety refers to the assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use (Codex Alimentarius (2003). Food safety is also defined as the degree of confidence that food will not cause sickness or harm to the consumer when it is prepared, served and eaten according to its intended use (FAO/WHO, 2003). In this study it refers to the conditions and practices that preserve the quality of food to prevent contamination and food borne illnesses.

Compliance:

The (Codex Alimentarius (2003) says that compliance is a state in which someone or something is in accordance with established guidelines, specifications, or legislation. In this research it means the adherence to rules and responsibility of the food handler regarding basic food handling and personal hygiene practices, training, personal medical examinations.

Practices:

A practice is an action or behaviour that an individual engages in and is normally induced by an attitude either consciously or unconsciously. Practice is also defined as the actual doing of something, to do or engage frequently, or to make the habit of (Merriam-Webster, 2006). Thus, food hygiene and safety practice in this research is conceptualized as a habit to engage in health prevention activities.

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CHAPTER 2

LITERATURE REVIEW

2.1. Introduction

This section is divided into two parts: data based literature and conceptual based literature. This literature covers the food safety, legislation on food hygiene and safety in South Africa and international standards, previous studies on compliance to food safety, initiatives to promote compliance in fast food outlets. The conceptual based literature utilises Health Action Model to develop the framework for investigation.

2.2. Global Food Safety Situation

Food borne diseases remain a major public health problem across the globe. Food borne diseases (FBDs) comprise a large group of illnesses that are caused by the ingestion of contaminated food (WHO, 2013). Food borne diseases are preventable but remain the leading cause of worldwide morbidity. The WHO estimates that each year, unsafe food makes at least two billion people, representing about one third of the global population ill worldwide. Food - borne diseases are widespread and constitute a growing public health problem, both in developed and developing countries (Arpanutud, Keeratipibul, Charoensupaya and Taylor, 2009). The WHO fact sheet number 237 (2007) reveals that food-borne diseases are a widespread and growing public health problem, both in developed and developing countries with over 1.8 million deaths recorded globally in 2005 alone which resulted from food contamination.

The global burden of food-borne disease is currently unknown but the World Health Organization (WHO, 2007) has responded to this data gap by launching a new initiative to provide better estimates. It is estimated that 48 million cases of food borne diseases occur each year in the United States of America (USA) alone, resulting in 128,000 hospitalizations and 3,000 deaths (Center for Disease Control, 2013). In Europe a total of 5,262 food borne diseases outbreaks were reported in 2011, causing 43,473 human cases, 4,695 hospitalizations and 25 deaths (European Food Safety Authority, 2012). The World Health Organization reported that over 30% of the population of industrialized countries suffer from food borne diseases (WHO, 2008).

Food borne diseases are increasing in both developed and developing countries. Diarrhoeal diseases, mostly caused by food borne microbial pathogens, are leading causes of illness and

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deaths in the developing countries, killing an estimated 1.9 million people annually at the global level (Schlundt, 2004). Most of the annual 1.5 billion episodes of diarrhoea in children under five years of age occur in developing countries. A significant proportion of diarrheal cases are food-borne in origin, and the more than 3 million resultant deaths per year are an indication of the magnitude of this problem (WHO 1999 and 2000).

2.2.1 Africa Region

The problem is severe in developing countries due to difficulties in securing optimal hygienic food handling practices. In developing countries, up to an estimated 70% of cases of diarrheal disease are associated with the consumption of contaminated food. Reliable statistics on food borne diseases are not available due to poor or non-existent reporting systems in most developing countries. In Africa poverty is the underlying cause of consumption of unsafe food. Lack of access to potable water, poor government structural arrangement, communicable diseases, trade pressure, and inconvenient environmental conditions are notable reasons. High incidences of diarrheal 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. A study done in Ankara, Turkey, Mekelle town, and Bahir Dar town, Ethiopia indicated that knowledge of food handling is significantly related with food handling practices (Dewaal et al, 2006) whereas, a study done on central India, Bangladesh, and Nigeria indicated that food handling practices was related with educational status of food handlers (Kibret et al, 2012).

More ever, a study done in Nigeria and Kenya in 2009 showed that type of premise, unclean equipment and work responsibility were factors affecting food handling practices (Havelaar et al, 2013). Gender was also found to be associated with food handling practices of vendors of street foods in Nairobi, Kenya (Muinde et al, 2005). In addition to socio demographic factors, environmental factors such as temperature, solid waste storage, solid waste disposal, latrine condition and hand washing facilities of the food and drink establishment were associated with food handling practices. Food borne diseases are common in developing countries including Ethiopia because of the prevailing poor food handling and sanitation Practices, inadequate food safety laws, weak regulatory systems, lack of financial resources to invest in safer equipment and lack of education for food handlers.

2.2.2. Local context South Africa

Millions of people in South Africa eat out every day, utilising the food service sector. Although the lack of an effective reporting system makes it difficult to know how many of these people suffer from food-borne illness, statistics from the developed countries show that this number

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may be significant (Jackson 2011). In South Africa a study was conducted in Durban eThekwini fast food outlets which examined the hygienic practices of food handlers and microbial loads in food samples. The overall microbiological quality of the food served by the take-away food outlets were found within acceptable safety limits. Escherichia coli, Staphylococcus aureus and Salmonella were evaluated and no incidence of these organisms was detected in all the food products sampled. 76% of samples showed high total bacteria count and coliforms were detected in 50% of food products. The results of the study indicate that there are some handling practices in the preparation process of ready- to-eat food that require more attention. In particular, control in food handling needs to be observed by food handlers as a result of significant incident of a high total bacteria count. There was a lack of correlation between bacterial count and the observed cleanliness of preparation areas and food handling practices. A study done by Van Tonder (2004) tested for, and results showed the presence of Escherichia coli and Staphylococcus aureus among 300 participants in 35 outlets in a retail group in the Western Cape, South Africa.

2.3. The food handler and food safety

According to Griffith (2000), up to 70 % of food-borne illness outbreaks in the UK were associated with food service functions such as restaurants, hotels, institutions and caterers. A common denominator in these sectors of the food chain (often collectively referred to as the food service sector), is the reliance on many manual processes resulting in large numbers of food handlers. In attempting to determine the reasons for these outbreaks, researchers have focused on the role of the food handler and findings suggest that the food handler does indeed play a significant role. In one such study, poor personal hygiene has been identified as a contributing factor in some outbreaks as identified by the Center for Disease Control (Mead et al., 1999).

In two US Food and Drug Administration studies, inadequate hand washing practices by food handlers were found in all types of retail food services (Strohbehn et al., 2008). Inadequate hand washing was also cited as a contributory factor in (31 %) of outbreaks occurring in Washington State from 1990 to1999 (Todd et al., 2009). Food handlers have been observed to wash and dry their hands and then wipe their clean hands on their dirty pants. Contamination can also be transferred to and from food handlers through raw food, hands (including dirty fingernails, rings, and other jewellery), clothing, aerosols, fomites, food waste, food packaging and other environmental sources.

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They may also, themselves be sources of organisms either during the course of gastrointestinal illness or during and after convalescence, when they no longer have symptoms. During the acute stages of gastroenteritis large numbers of organisms are excreted and by the nature of the disease are likely to be widely dispersed. Food handlers who are symptomatically ill may present a real hazard and should be excluded from work. Those with poor personal hygiene working in food establishments could be potential sources of infections of many intestinal helminthes, protozoa, and pathogenic bacteria. Food handlers may carry pathogens without experiencing any serious ill-effects themselves. Staphylococcus aureus is commonly associated with skin, nose, throat and infected skin lesions, particularly in primate such as humans where 20-50% of healthy individuals can carry organism. It is easier to keep hands clean if finger nails are kept short and jewellery such as rings are removed as dirt can become lodged under these and may be difficult to remove. Food handlers should avoid coughing into their hands or touching their hair, nose, mouth while handling food without washing their hands after (Adams.and Motarjemi, 1999).

The link between food handlers and food safety has been well established by many authors hence the study sought to directly observe food handling activities to ensure that they are complying with the regulations.

2.4. Legislations Applicable to Fast Food Outlets in South Africa.

The Food Control directorate in the Department of Health is responsible for the administration of legislation related to foodstuffs that are guided by the Codex Recommended International Code of Practice: General Principles of Hygiene. The Foodstuffs, Cosmetics and Disinfectants Act 1972 (Act 54 of 1972) governs the manufacture, sale and importation of all foodstuffs and is guided by the Codex Code of Practice, Section III on Primary Production which includes handling, storage and transport. The Health Act of 1977 which relates to hygiene standards of food and resembles the Codex Code of Practice with specific reference to Section III and Section IV. Both refer to Primary Production of food and the Establishment: Design of Facilities. The South African legislation relating to food safety and the authorities that are involved in the administration and enforcement of such legislation include the following:

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2.4.1. Regulations governing General Hygiene Requirements for Food Premises and the Transport of Food R962 of November 2012 of Foodstuffs, Cosmetics and Disinfectants Act of 1972.

This section discusses fast food outlets hygiene and safety regulations. The main regulations relevant to fast food outlets in South Africa are as follows: Regulations governing General Hygiene Requirements for Food Premises and the Transport of Food R918 of 1999 of the Health Act, 1977 (Act no. 63 of 1977 has been replaced by R962 of 2012 under the Foodstuffs, Cosmetics and Disinfectants Act of 1972. These regulations are enforced by district municipalities and govern the handling, transportation, storage and sale of unpacked foods to the general public of South Africa by food producing establishments.

This legislation serves to protect the food industry from legal action, by giving it rules within which to operate. Food operators who handles and prepare food for general consumption and has a legal and moral duty to protect the people he or she serves from potential illness. This regulation is enforced by municipal health officers or environmental health officers. Among other duties, the municipal health inspectors process applications for health certificates, inspect premises and issue certificates. The regulation has specifications for the food premises (layout, floors, walls, ceilings, lighting, ventilation and drainage, refuse, sanitary conveniences, water supply, and facilities for washing hands, food and equipment); equipment (construction and cleaning); food handlers personal cleanliness, protective clothing, personnel health and training); as well as specifications on temperature control; provision of first aid materials; and accommodation for clothing changing room. These regulations are discussed in detail below in conjunction with other relevant South Africa Department of Health Food and Safety guidelines, International standards prescribed by Codex Alimentarius and HACCP regulations.

- **Standards and Requirements for Food Premises.**

(a) .Location design and construction

According to section 5 (1),(2) and (3) Regulation 962 of 2012) of the Foodstuffs, Cosmetics and Disinfectants Act of 1972food premises must be located, designed, constructed and furnished without creating a health hazard and must enable food to be handled hygienically and prevent any spoilage or contamination of food. Food premises shall be of such location, design, construction and finish and shall be so equipped, in such condition and so appointed that they can be used at all times for the purpose for which they were designed, equipped. This implies that the layout, design, location and size of the business is maintained, such that premises can be adequately cleaned and/or disinfected. All areas and structures such as ceilings are to be

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made accessible for maintenance and cleaning. The traffic pattern of the employees, product flow and equipment should prevent contamination of food through physical or operational separation. The interior surface walls, ceiling and floors have specific requirements to ensure that they can be easily cleaned and will not contaminate food.

Ideally, food preparation premises should be purposely built sited in an area that is free from objectionable odours, smoke and dust and allocated away from refuse areas. One usually has a limited choice about the building to be used and its location. The Vhembe district by laws specifies that it should be of sound construction and well maintained. It further specifies that the working environment should be well lit, well ventilated and promote food safety.

(b).Ventilation

Adequate ventilation in catering premises is required for the following purposes:

- to introduce sufficient clean, cool air and remove excess hot air in order for the occupants to remain comfortable
- to provide sufficient air for complete combustion in appliances.
- to dilute and remove odours, vapours and steam from the cooking process.

Each room must be ventilated effectively either by natural or artificial ventilation through opening or openable sections which are directly connected to the outside air and so positioned artificial ventilation that complies with the requirements of the National Building Regulations and Building Standard Act, 1997(Act 103 of 1977). Provided that such opening shall have a surface area equal to at least 5% of the floor area of the room concerned.

(c).Hand washing facility with hot and cold water.

According to sub regulation 5(3) (d) (I) all food businesses should have at least one wash hand basin, the number of which is dictated by the number and gender of food handlers and customers. This would imply that:

Table 1: Hand washing stations

The number of staff members and the maximum number of customers for whom provision is made to consume food on any	**Numbers of hand washing stations**	
	Men	**Women**

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premises at any time		
For a population up to		
10	1	1
20	2	2
40	2	3
60	2	4
80	3	5
100	3	6
120	4	7
140	4	8

(d) An adequate water supply

An adequate supply of potable water with appropriate facilities for its storage, distribution and temperature control, shall be available. Adequate supply implies that water should be available at all times at an adequate pressure. According to Code Alimentarius (2003), potable water should be as specified in the latest edition of WHO Guidelines for Drinking Water Quality, or water of a higher standard. Non-potable water (for use in, for example, fire control, steam production, refrigeration and other similar purposes where it would not contaminate food), shall have a separate system. Non-potable water systems shall be identified and shall not connect with, or allow reflux into, potable water systems.

(e).Sufficient latrines and urinal stalls

Toilets are to be made available. The number of lavatories required depends upon the number of food handlers and the size of the business. This implies that:

Table 2: Latrines and urinal stalls

The number of staff members and the maximum number of customers for whom provision is made to consume food on any premises at any time	**Numbers of urinal stalls and latrine**	
	Men	**Women**

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For a population up to	Latrines	Urinal stalls	latrines
10	1	1	1
20	2	2	2
40	2	3	3
60	2	3	4
80	3	4	5
100	3	4	6
120	4	5	7
140	4	5	8

Toilets are to be connected with an appropriate drainage system and should be equipped with a working flushing apparatus, toilet seat, toilet paper and paper bin.

❖ **Standards and Requirements for Personal Hygiene Practices**

(a).Protective clothing

Health regulations, state that no person shall be allowed to handle food without wearing suitable protective clothing. Such clothing should be 1) clean and neat before any food is handled, 2) in a clean condition at all times during the handling of food, 3) of such design and material that it would not contaminate the food, and 4) designed not to come into direct contact with any part of the food. Management is responsible for the cleaning and issuing of protective clothing and should ensure that it is not removed from the premises for cleaning or repair without authorization (South African Bureau of Standards, 2001).

(b).Hair

Hair is constantly falling out and, along with dandruff, can result in contamination of food. As the scalp often contains pathogenic organisms such as Staphylococcus aureus, steps must be taken to prevent contamination from this source. Hair should therefore be kept clean and completely enclosed by suitable head covering.

(c).Hands

Since hands are often in direct contact with food, they are considered one of the principal agents in transferring pathogens to food. That is why handling should be reduced to a minimum. Although the use of gloves in the handling of food should be limited to cases in which workers' hands need to be protected against physical, chemical, or temperature harm, or where

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foodstuffs are to be protected from possible contamination by the worker (South African Bureau of Standards, 2001), health regulations stipulate that no food handler may touch ready-to-eat non pre-packed food with his or her bare hands unless doing so is unavoidable for preparation purposes (Regulations Governing General Hygiene for Food premises and Transport of Food R962 of 2012).

Section 9(1) (2) and 11(1) (2) and (3) of Regulations Governing General Hygiene for Food Premises and the Transport of Food and (R962 of 2012) standard and requirements for facilities: No person is allowed to handle unpacked food if:

- His/her fingernails, hands or clothes are not clean;
- She/he who has not washed his or her hands thoroughly with soap and water or cleaned them in another effective manner

Hands should be washed:

- immediately prior to the commencement of each work shift;
- at the beginning of the day's work or after a rest period;
- after every visit to a latrine or urinal;
- every time he or she has blown his or her nose or after his or her hands have been in contact with perspiration or with his or her hair, nose or mouth;
- after handling a handkerchief, money or a refuse container or refuse;
- after handling raw vegetables, fruit, eggs, meat or fish and before handling ready-to-use food;

Furthermore the SABS guidelines recommend supplying change rooms, clothing, toilets and washing facilities with applicable soap and hand wash procedure notices as the only other requirements for hygiene (SABS, 2001). Handlers should always wash their hands when their level of cleanliness may affect food quality. This should be done just before food handling, after any interruption, after touching contaminated material, after using the bathroom and whenever else needed. They should not smoke, sneeze, spit, cough, eat, handle money or engage in any act that could contaminate the food during the performance of their activities (Codex Alimentarius, 2003).

The health regulations stipulate that it is the responsibility of food handlers to wash their hands thoroughly with soap and water under all relevant circumstances (R962 of 2012). Facilities for personnel should be adequate, and all hand washing basins in toilet areas must be supplied

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with hot and cold water, and hand-cleaning preparations in dispensers and paper towels or air hand-dryers should be provided (Codex Alimentarius, 1997).

(d).Food or facility shall not be handled by:

People known, or suspected, to be suffering from, or to be a carrier of a disease or illness likely to be transmitted through food, should not be allowed to enter any food handling area if there is a likelihood of their contaminating food. Any person so affected should immediately report illness or symptoms of illness to the management. The Codex Alimentarius, (2003) determines that persons, who are known or suspected of having any disease that might be transmitted by food, are forbidden to handle food items. It should also be pointed out that any such individual must immediately inform management about the disease or symptoms in addition to undergoing a medical examination. The Codex and the WHO do not require periodical health examinations. Medical examination of a food handler should be carried out if clinically or epidemiologically indicated. Conditions which should be reported to management so that any need for medical examination and/or possible exclusion from food handling can be considered, include, jaundice, diarrhoea,vomiting,fever, sore throat with fever, visibly infected skin lesions (boils, cuts and discharges from the ear, eye or nose(Codex Alimentarius, 2003).

- **Standards and requirements for Environmental hygiene practices**

Regulation 5(3) 962 of 2012 prescribes that food handling premises should have latrines for the use by workers on the food premises and for the use by persons to whom food is served for consumption. Sub-regulation 3 of regulation 5 prescribes that hand washing facilities should be provided with hot and cold running water. The sub-regulation prescribes that soap should be provided for hand washing by workers on the food premises and by the persons to whom food is served. Good housekeeping is extremely promoted by the health regulations as a way to ensure food safety and the maintenance of good environmental hygiene. Environmental hygiene plays a crucial role in preventing food and waterborne diseases. Availability of clean toilet facilities and good hand washing practices will ensure that customers consume food free from faecal contaminants (Regulations 5(3) 962 of 2012).

During the course of preparation, wastes are generated in the store, kitchen and restaurant. These wastes are either organic (waste food, used cooking oils,) or inorganic (papers, plastics, cans). These wastes become breeding ground for microbes and serve as potential sources of

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contamination when allowed to accumulate, or become centres of attractions for rodents, pests and flies if not disposed of properly. An adequate water supply, refuse containers for solid and liquid waste should be provided in the premises (Regulation 5(3) 962 of 2012. Pests and pets are known to be carriers of pathogenic micro -organisms. Pest control is thus necessary to prevent diseases.

❖ Standards and requirements for food handlers training

All food handlers are obliged to have basic food hygiene training as per regulation 10 (1) 962 of 2012. It goes on to stipulates that managers have a legal obligation to ensure that all food handlers in their employment are trained to appropriate levels, using methods suited to the staff being trained as well as keeping records of the level, coverage and date of training for each member of staff. This requirement is supported by guidelines from the South Africa Department of Health, regarding the management and health surveillance of food handlers. This document highlights the training of food handlers as the responsibility of the health authorities who should ensure that appropriate programmes are implemented.

Food hygiene training is very important. All personnel should be aware of their role and responsibility in protecting food from contamination or deterioration. Food handlers should have the necessary knowledge and skills to enable them to handle food hygienically. Those who handle strong cleaning chemicals or other potentially hazardous chemicals should be instructed in safe handling techniques (Code Alimentarius, 2003). According to the Code Alimentarius, (2003), periodic assessments of the effectiveness of training and instruction programmes should be made, as well as routine supervision and checks to ensure that procedures are being carried out effectively.

Managers and supervisors of food processes should have the necessary knowledge of food hygiene principles and practices to be able to judge potential risks and take the necessary action to remedy deficiencies. Training programmes should be routinely reviewed and updated where necessary. Systems should be in place to ensure that food handlers remain aware of all procedures necessary to maintain the safety and suitability of food (Code Alimentarius, 2003). Management is obligated to arrange for all food handlers to receive adequate and continued training in the hygienic handling of food so that they know which precautions to take to preclude contamination of food (South African Bureau of Standards, 2001).

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2.5. Strategies to Improve Compliance with Food Hygiene and Safety Practices

2.5.1. Food Safety Health Promotion/Education.

Food safety education is most effective when messages are targeted toward changing behaviours most likely to result in foodborne illness. The core messages of the WHO five keys to safer food are: keep clean; separate raw and cooked; cook thoroughly; keep food at safe temperatures; and use safe water and raw materials. The World Health Organization places emphasis on health promotion targeting food handlers, including consumers about their responsibilities for food safety. In 2001 after nearly a year of consultation with food safety experts and risk communicators, WHO introduced a global health message with five steps to prevent foodborne diseases. These are called, the five keys to safer food. The core messages of the WHO five keys to safer food are: keep clean; separate raw and cooked; cook thoroughly; keep food at safe temperatures; and use safe water and raw materials (Mwamakamba et al, 2012).

Five keys to safer food educational projects have been established or are being carried out in several countries in the African Region. The strategies being used by the countries involve addressing several levels of intervention, targeting different settings, high-risk groups as well as professional food handlers including street food vendors (WHO Five Keys to Safer Food Manual 2006).

2.5.2. Food Safety training as a measure to improve food safety compliance

In South Africa, as in many countries, training food handlers in food safety is a legal requirement, with regulations governing General Hygiene requirements for Food Premises and the transport of food, published under Government Notice no. R.962 of November 2012, of the Food Cosmetic and Disinfectant Act, 1972 (Act no. 54 of 1972), stating in regulation 10(b): "A person in charge of food premises shall ensure that any person working on the food premises is adequately trained in food hygiene by an inspector or any other suitable person. "The importance of food safety training is more than merely legal compliance. A lack of food handler training is a pivotal factor in the constant incidence of food-borne illnesses (Motarjemi and Kaferstein, 1998). Despite the lack of congruence in literature on the effectiveness of training, there is no dispute regarding the need for it. Hand washing has been found more likely to be

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practiced in restaurants where workers had food safety training (Green et al., 2006).In another study, the hand hygiene of workers with more work experience (>10years) was found to be superior to inexperienced ones and even workers with higher educational levels would still require specific training on food and personal hygiene.

2.5.3. Food Safety Management and enforcement

Using food handler training as the only strategy to improve food safety is considered flawed by researchers, as a number of studies indicate that although training may bring about an increased knowledge of the correct food safety practices, it does not always result in a positive change in food handling behaviour (Howes et al., 1996). Managers in the food industry have an important role in minimizing the risk of contamination of food by ensuring that all staff understand the importance of good personal hygiene and receive training in the safe handling of food (Little and McLauchlin, 2007.In order for food hygiene training to be effective, commitment, motivation and management supervision is, therefore necessary.

It is the responsibility of managers to develop systems in order to ensure that all employees are able to carry out their tasks effectively by using safe food handling practices. The key to the success of an integral quality programme (extrapolating this to the aspect of food safety management) and to the motivation of each employee is the manager (Vasconcellos, 2003). Workers work "in" the system whereas management works "on" the system. A manager is thus responsible for the system as a whole and its continued improvement. A good system should be fully integrated into the company and be a cohesive system that offers internal consistency and harmony.

The HACCP approach to food safety is a pro-active preventive method to control problems. Food safety management systems based on this method for assuring safer food have been adopted in many food sectors (Griffith, 2000).The HACCP system is an internationally agreed approach to food safety management and control. The reference standard for implementation of HACCP is published by the Codex Alimentarius Commission of the Food and Agricultural Organisation (FAO) and the World Health Organisation (WHO) (CAC RCP, 2004).

HACCP is designed to control significant food safety hazards i.e. hazards that are likely to cause an adverse health effect when products are consumed (Wallace et al., 2005). However, it is important to implement a support system of pre-requisite programmes. These programmes

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have been referred to as "the universal steps" or procedures that control the operational conditions within a food establishment allowing for environmental conditions that are favourable for the production of safe food". These programmes also simplify the HACCP plan and ensure there is the appropriate focus on the significant hazards (Wallace and Williams, 2001).

2.6. Conceptual Based Literature.

2.6.1 Health Action Model

Developed by Tones et al (1990), the Health Action Model takes account of beliefs, normative influences and motivating factors, including attitudes, along with other strong motivating forces, such as hunger, pain, pleasure and sex, in order to understand behaviour. The Health Action Model (HAM) was chosen as the framework. Developed by Tones, the HAM conceptually incorporates the Health Belief Model and Ajzen and Fishbein`s Theory of Reasoned Action (Tones, Tilford, & Robinson, 1990). The Health Action Model provided a framework in which the variables that influence food safety behaviours will be identified and described. For use in food safety research, Rennie (1995) adjusted the definitions of its five constructs or systems, all of which influence behaviour. These are as follows:

The health action model (HAM) expands the HBM by adding elements of Fishbein`s theory of reasoned action (TRA). TRA emphasizes the importance of significant others on an individual's intention to act. While many food safety behaviours, such as washing hands, may become routines or quasi routines, HAM defines the factors leading to discrete single time choices an individual deciding to perform a specific act. The model begins with the normative system from an individual perspective, including a person's belief about normal practices and the likely reaction of significant others. These norms influence motivation and belief systems and, combined with general knowledge, lead to behavioural intentions. Intention is further moderated by the appropriate environment and conditions and specifically relevant knowledge and skills to produce decisions on whether or not to perform particular health actions (Tones et al., 1990).see figure 1

2.6.2. Applications of Health Action Model

This research adopts the individual and worksite environmental systems. Worksite factors that affect food handler's behaviour helps identify the sources of the problem for which intervention will be developed. The food safety and hygiene practices and the premise (environment) will be observed through a checklist. Having concrete information on the status of these factors in mass catering establishment it is crucial to evaluate design appropriate strategy to improve the sanitary condition so as to safeguard the health of the public particularly in our set up where

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mass catering establishments are flourishing and less attention is given to the sanitary condition.

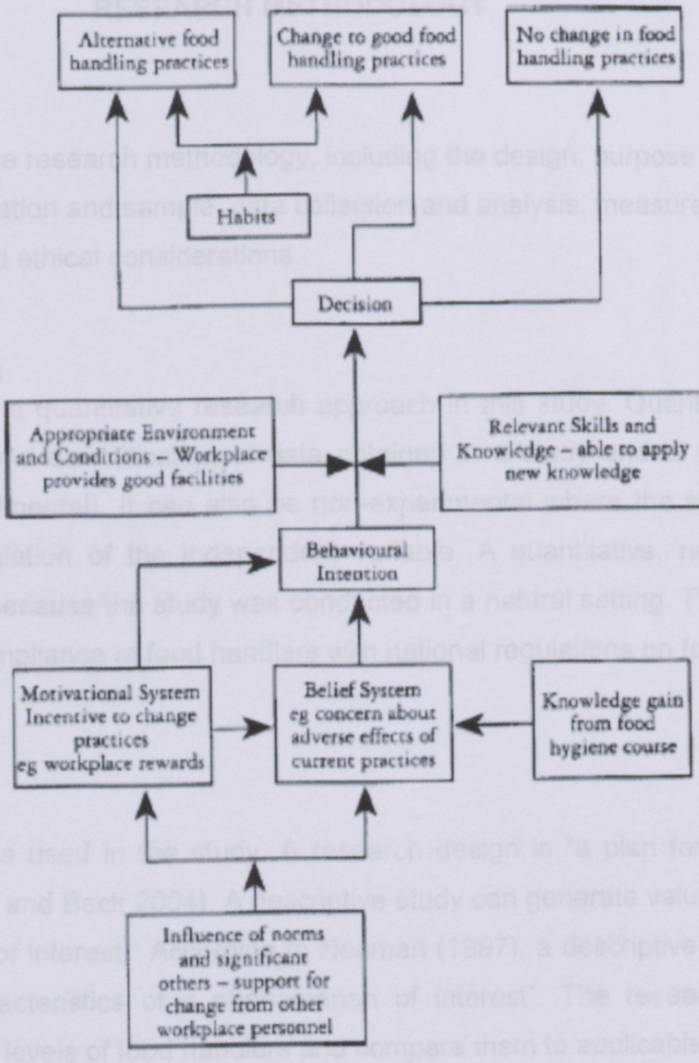


Figure 1: Health action model by Rennie (1995)

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RESEARCH METHODOLOGY

3.1. Introduction

This chapter describes the research methodology, including the design, purpose and research objectives, setting, population and sample, data collection and analysis, measures to ensure reliability and validity, and ethical considerations.

3.2. Research approach

The researcher adopted a quantitative research approach in this study. Quantitative research involves measurement and quantification of data obtained in a study and is often done in a controlled setting (experimental). It can also be non-experimental where the setting is natural and there is no manipulation of the independent variable. A quantitative, non-experimental approach was selected because the study was conducted in a natural setting. The study sought to assess the level of compliance of food handlers with national regulations on food hygiene and safety practices.

3. 3.Study Design

A descriptive design was used in the study. A research design is "a plan for approaching a research question" (Polit and Beck 2004). A descriptive study can generate valuable information about the phenomenon of interest. According to Neuman (1997), a descriptive study "seeks to give details about characteristics of a phenomenon of interest". The researcher sought to describe the compliance levels of food handlers and compare them to applicable legislations.

3.4 Study Setting

Thohoyandou is a town in the Limpopo Province of South Africa. It is the administrative centre of Vhembe District Municipality and Thulamela Local Municipality. Thohoyandou is situated in the south of Vhembe district, on the main road between Louis Trichardt and the Kruger National Park. This is the lush agricultural centre of Vhembe, with banana plantations, subtropical fruit, and tobacco and maize lands. Thohoyandou is the second largest town in Venda after Makhado (Louis Trichardt), situated 79 km from Makhado and 53 km from Dzanani. (See attached map of Thohoyandou) The fast food outlets are situated in Thohoyandou central and its surrounding townships such as Shayandima and Sibasa.

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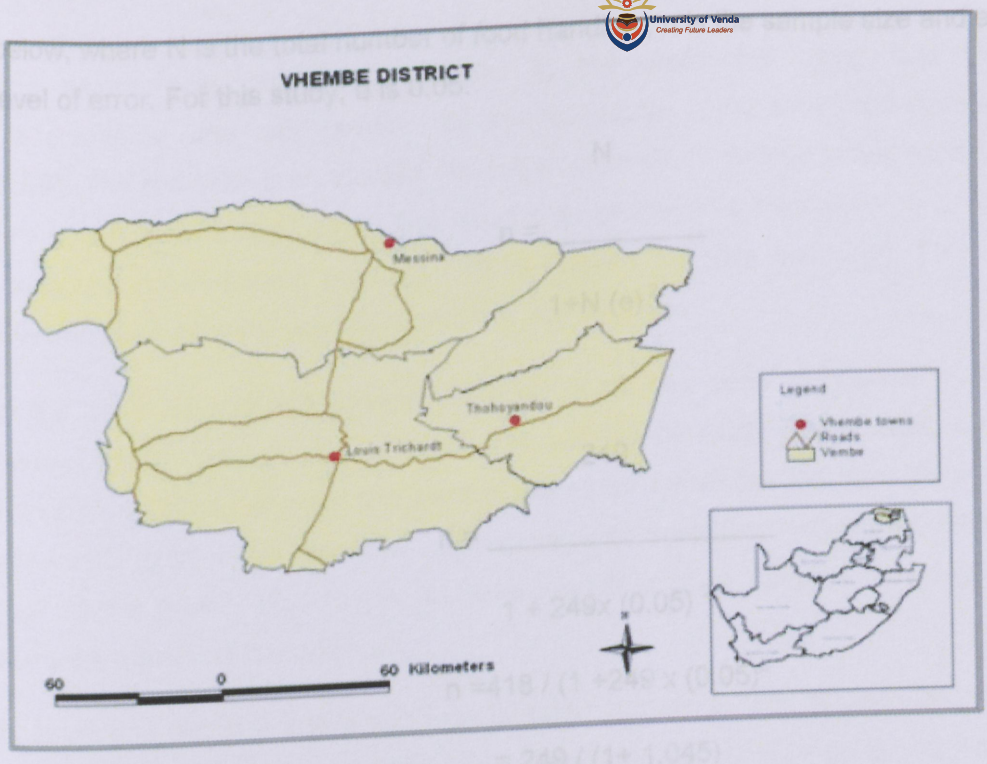


Figure 1
Location of the study area

Figure 2: Location of the study area

3.5. Study Population

A target population is "the total group of people who possess the characteristics that the researcher is interested in studying and to whom the findings of a study can be generalised. The accessible population is the population that is available for the study" (Polit and Beck 2004). The study population consisted of all licensed fast food outlets within Thohoyandou. There are about 60 premises and 249 food handlers registered as fast food outlets within the data base of Vhembe District Municipality database.

3.5.1 Eligibility criteria

- Be employed as a food handler in the fast food outlet.
- Be involved in food preparation, serving and supervision.
- Have not participated in the pre survey.

3.6. Determination of sample size

Taking 60 as the total number of restaurants and 249 as the sampling frame for food handlers, the sample size is calculated as follows; The sample size was calculated using the formula

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below, where N is the total number of food handlers, n is the sample size and e is the accepted level of error. For this study, e is 0.05:

$$n = \frac{N}{1+N\,(e)^2}$$

$$n = \frac{249}{1 + 249x\ (0.05)^2}$$

$$n = 418 / (1 + 249 \times (0.05)^2$$

$$= 249 / (1 + 1.045)$$

$$249/2.045$$

Sample size (n) = 122

Therefore the study recruited and observed 122 food handlers

3.7. Sampling

Sampling is "the process of selecting elements or respondents who are representative of the population under study" (Polit and Beck 2004). This study used random sampling.

3.7.1. Simple random sampling

Probability or random sampling refers to "the selection of a sample in such a way that every individual in the accessible population has an equal chance of being selected for the study. Random sampling is done from a list of all the members of the population" (Brink et al 2006:126). The fast food outlet register was used and participants were randomly selected from the register. In this respect a register of 249 food handlers constituted the sampling frame. The researcher made a list of those food handlers who met the eligibility criteria and assigned a number to each food handler and were randomly selected.

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3.8. Measurement Instrument

The biographical data was gathered by the researcher using face to face interview. Observational data was gathered by the researcher using structured observations (Creswell, 2009). The researcher conducted the observation study directly in fast food outlets playing the role of a complete participant. The researcher employed a structured observational protocol. A structured observational protocol was developed for data collection. Fixed-alternative close ended questions were used to collect the required data.

In the observation methodology literature, much has been mentioned on the impact of the measurement tool, or observer, on the actions of study participants, also known as the Hawthorne Effect, wherein the participant varies behaviour because of awareness of being observed. To minimize Hawthorne Effect, participants in this study were briefed and told that the goal of the project was to use observed behaviours to develop materials and programs to enhance their work experience.

In assessing the extent to which food handlers adhere to food hygiene and safety practices an observational checklist was developed to evaluate the compliance levels. The evaluation form was based on the legal requirements prescribed in the Foodstuffs, Cosmetics and Disinfectants Act, 1972 (Act, 54 of 1972) and Regulations Governing General Hygiene Requirements for Food Premises and the Transport of Food R962 of 23 November 2012. The sections are categorized according to the study objectives as follows:

Section A: Demographic Details:

It entails the details of the fast food outlets and food handlers.

Section B: Personal Hygiene Practices

Observations/evaluations of personnel hygiene of food handlers were done to determine their bodily/personal hygiene (cleanliness). Food preparation observations covered: food itself, preparation, protective clothing, washing utensils, cleanliness, storage, serving and food handler's practices, including their habits.

SECTION: C Health Surveillance Practices.

Observations on medical examination certificates were conducted to determine the number of food handlers examined and certified medically fit to work in fast food outlets. Furthermore their

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practice of reporting to the management and also whether they are working whilst suffering from communicable disease.

SECTION: D. Provision and adequacy of basic hygiene infrastructure.

Observations/evaluations of the direct environment around the Fast food outlets were done to assess the provision and adequacy of basic hygiene infrastructure. The observations include: the design and layout of the food premises, availability of water, hand washing basins, provision of hot and cold water, and state of ceilings, provision of toiletry. These were compared with the regulation to assess compliance levels with the food legislation (FCD Act of 1972 and R962 of 2012.

The observation checklist was developed from a combination of legislation different checklists used in previous studies by Kinfe(2005), Griffith and Clayton,(2004),Adebitan 2011,Cele,(2009)and the legislations such FCD Act of 1972,Code Alimentarius Basic Texts on Hygiene and R962 of 2012. Pre-structured checklist forms were used to observe the physical conditions, hygiene state of food premises and food hygiene safety practices of food handlers by recording all observations.

3.9. Reliability

Reliability refers to accuracy of measurement. Reliability for quantitative research focuses mainly on stability and consistency (Polit and Beck, 2010). Reliability refers to the accuracy, consistency and stability of research instrument. The researcher obtained the supervisor's assistance to ensure that the instrument was reliable. In addition, pre-testing of the instrument was also conducted before the study.

3.10. Validity

Polit and Beck (2010), define the validity of an instrument as the degree to which the instrument measures what it is intended to measure. In this study, concern was given to face validity and content validity

3.10.1. Face validity

Face validity checks whether the observation checklist seems to measure the concept being tested (LoBiondo-Wood and Haber, 2010). Face validity refers to "whether an instrument appears to measure the construct appropriately" (De Vos 2001). The instrument has to appear

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to be a relevant measure of the attributes of interest to the study even to the respondents. The supervisors' guidance was sought to ensure face validity.

3.10.2. Content validity

A content validity test checks whether there are enough relevant questions covering all aspects being studied and that irrelevant question are not asked (Parahoo, 2006). Content validity refers to whether an instrument measures what it is supposed to measure; looking at the items it contains (De Vos 2001). In this study the observation checklist contained items that measured the aspects under study appropriately and adequately.

3.11. Method of Data Collection

The instrument was administered by a team comprising of the researcher and environmental health officers. The researchers were trained by the environmental health officers on how to carry out observations using the instrument and in turn the environmental health officers were trained to conduct research by the researcher. For each of the selected restaurants copies of instrument were completed by a team member who made direct observation and record the observation in the observation log immediately.

3.12.. Data Analysis and Management

Data analysis is a mechanism for reducing and organising data to produce findings that require interpretation by the researcher (Burns & Grove 2003). Data analysis and management was carried out by the researcher. All the data from the observation checklists were coded using a code book and subsequently entered into SPSS version 19.0. The code was assigned to the data. The data was first checked using the frequent tables, to see whether there are any incorrect values. If the data seemed to be missing or incorrect they were checked using the data collection form and the observation checklists. Descriptive statistics was used to analyse the data. The data derived from the analysis was presented in the form of tables and charts.

3.13. Ethical Consideration

According to Polit and Beck (2010), researchers must deal with ethical issues when their intended research involves human beings. The research proposal was submitted to the School Higher Degrees Committee then later to Research Ethics Committee of the University of Venda for approval. From there, it was submitted to the Vhembe District Municipality and Thulamela municipality for approval before conducting the study. Consent forms were signed by the owner

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and food handlers during data collection. The standard ethical consideration of anonymity and confidentiality were maintained throughout the research period.

3.13.1. Permission to conduct research

The permission to carry out the study was obtained from the research and ethical committee of the University of Venda Ethics Committee and the Vhembe District Municipality. Permission was also obtained from the fast food outlets managers, owners and food handlers. Permission on the use of digital camera was explained to the participants, and the researcher explained to participants how information will be protected. The participants food handlers in the food outlets were asked to participate in the study voluntarily by seeking written consent.

The main ethical principles that will be considered in conducting this research study are

3.13.2. Informed consent

Informed consent was secured from each of the study participants prior to the distributions of questionnaires. In securing consent food handlers and owners were informed of the objectives of the study, the ethics to be afforded them, what shall be expected of them and the amount of time their participation was to entail. Participants were given introductory-consent letters bearing the contact details of the researcher, briefing them on the study.

3.13.3. Confidentiality

This is a continuation of privacy in the sense that the researcher should respect the information that will be obtained from the respondents. It will be unethical to disclose such information to unauthorized individuals. It was made clear to the participants that the researcher and the supervisor will access this information. The issue of publication of the findings were discussed with the respondents in order to get their permission and they were assured for all participants in this study with details of their participation kept confidential. Access to any identifying markers that could link observation to specific individuals will be restricted to the researcher.

3.13.4. Privacy

Privacy is defined as that which normally is not intended for others to observe or analyse. To ensure that the researcher protect respondents information so that unauthorized individuals would not get access to the information, the researcher will keep observational checklists and information related to the respondents' data in a safe place where no one can access them.

3.14. Limitation of the Study

The major limitation was that the study was limited to fast food outlets in all fast food outlets in the Central Business District of Thohoyandou consequently the findings cannot be generalised

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to other catering outlets in the whole province or the whole country. The owners of the restaurants declined the use of digital camera in their facilities so the quality of the observation was enough only visually inspecting.

Reactivity was likely to occur in the study since the researchers were not employees of the fast food outlets and spent multiple hours in the kitchen observing food safety behavioural instances conducted by the participants. Since the participants were aware that an unknown individual was watching their actions, it was very likely that the participants became more conscious of their food safety actions and performed food safety more accurately as well as at the right instances.

Another limitation to the study is that most of the studies conducted in the field of food safety were carried out in the developed countries. It becomes difficult to compare this study with the international studies because the settings are different with that in Thohoyandou.

Therefore, the researcher advises the readers to be cautious in generalizing results of the study

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CHAPTER FOUR

THE RESULTS

4.1 Introduction

The results are presented in regards to the objectives of the study that is status of compliance to food hygiene and safety regulations in terms of personal hygiene practices, health surveillance practices of food handlers and provision and adequacy of hygiene infrastructure of the premises. This section presents the results of the study. The results are as follows: demography; personal hygiene practices, health surveillance practices of food handlers, provision and adequacy of hygiene infrastructure in the premises.

SECTION: A

4.2 Demography

Table 3: Age and sex distribution

Age distribution	**Sex distribution**				**total**
(years)	**Male**		**female**		
	N	**%**	**N**	**%**	
19-25	12	9.8	17	13.9	29(24%)
26-35	14	11.5	44	36	58(48%)
>36	12	9.8	23	18.9	35(29%)
Total	**38**	**31**	**84**	**69**	**122(100)**

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As shown in table 3 one hundred and twenty two respondents participated in the study, out of these 38 (31%) were males and 84 (69%) were females. Fifty eight (48%) were between age 26-35, 29 (24%) were between ages 19-25 years and 35(29%) were 36 years and above.

4.2.1. Level of education

Table 4: The distribution of food handlers according to level of education

N=122	No.	%
Level of education		
Primary	25	20.5
Secondary	66	54.1
Tertiary	31	25.4

Table 4 shows the level of education of the respondents. Twenty five (20.5%) had primary education while 66 (54.1%) had matriculated and 31 (25.4%) had tertiary qualification

4.2.2 Food safety training received

Table 5: Training attended by food handlers

Food handlers who attended food safety training	N	%
Yes	40	33
No	82	67
Total	122	100

Table 5 shows the training in food safety attended by respondents. Forty (33%) of the respondents attended food safety training regularly and 82 (67%) do not attend training regularly.

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SECTION: B

4.3. Food hygiene and safety practices

4.3.1. Personal hygiene practices

Table 6: Distribution of food handlers according hygiene practices

Personal hygiene practices	N=122	%
Finger nails cut short	115	94
Wash hands with soap	87	71
Wearing clean clothes while working	118	98
Wearing apron	122	100
Hair covered	122	100

Table 6 shows personal hygiene practices of the respondents. One hundred and fifteen (94%) had their finger nails cut, 87 (71%) washed hands with soap. Furthermore 118(98%) were observed wearing clean uniforms while 122 (100%) make use of aprons and hair nets to cover head.

4.3.2 Other Personal unhygienic behaviour observed

Table 7: Distribution of personal unhygienic behaviour observed

Other personal unhygienic behavior	N=122	%
Shaking hands whilst preparing food	2	1.6%
Chewing whilst preparing food	1	0.8%
Changing money when preparing food	5	4%

Table 7 shows other unhygienic behaviours spotted by the researchers. Only 2 (1.6%) of the respondents were observed shaking hands whilst preparing food, whilst 1 (0.8%) were found chewing whilst preparing food and 5 (4%) of respondents were observed collecting money at the same time serving or dishing food.

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4.3.3. Types of protective wear worn by food handlers

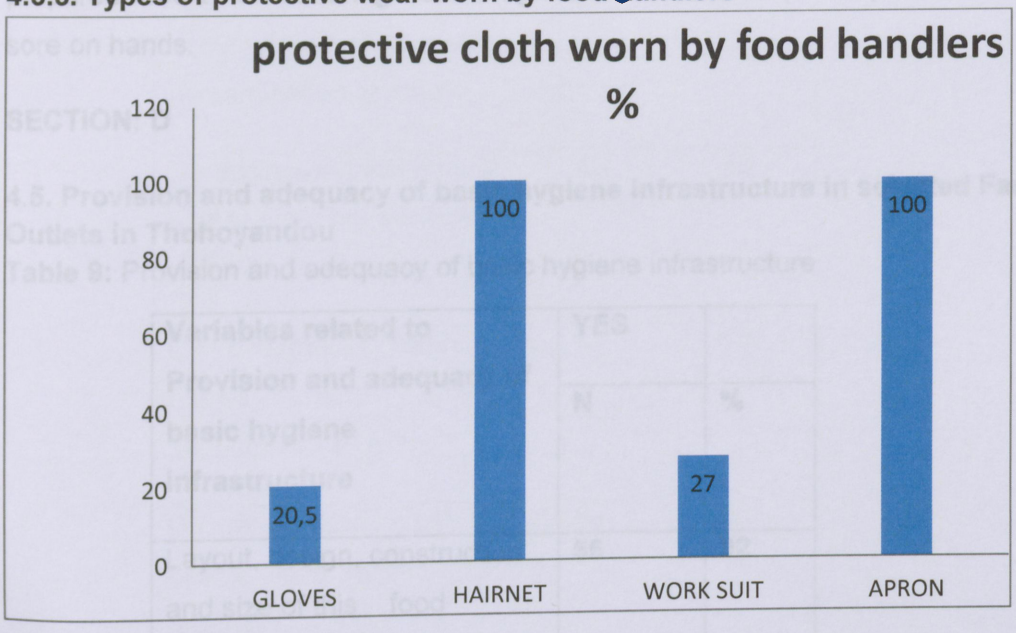


Figure 3: Type of protective worn by food handlers

Fig 3 shows that 122 (100%) of the respondents wore hairnets and apron respectively, while 25 (20.5%) were observed wearing gloves when preparing food. Furthermore thirty three (27%) were observed wearing work suits.

SECTION: C

4.4 Health surveillance Practices.

Table 8: Health status of food handlers

HEALTH STATUS	N=122	%
Have medical examination	44	36
Reported illness to management	108	89
Preparing food with cough during visit	26	21.3
Any visible open wounds, injuries at time of visit	30	24.5

Table 8 shows health status of the respondents. Forty four (36%) food handlers undergo regular medical check-up, 108 (89%) reported illness to management when sick, whilst 26 (21.3%)

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prepared food when suffering from cough. Furthermore 30 (24.5%) were observed with open sore on hands.

SECTION: D

4.5. Provision and adequacy of basic hygiene infrastructure in selected Fast Food Outlets in Thohoyandou

Table 9: Provision and adequacy of basic hygiene infrastructure

Variables related to Provision and adequacy of basic hygiene infrastructure	**YES**	
	N	**%**
Layout, design, construction and size of this food premises is designed and built to ensure good hygiene.	**55**	**92**
Does the layout protect against the accumulation of dirt?	**55**	**92**
Is there access to potable water at the site or close to the site?	**60**	**100**
Are adequate ventilation facilities which are also accessible and suitable for cleaning?	**59**	**98.**
Is the wall free from visible dust, soot, and dirt or spider web?	**55**	**92**
Are ceilings and overhead fixtures designed and	**49**	**82**

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finished to prevent the accumulation of dirt and contamination of food?		
Do designated wash hand basins have hot and cold water?	**40**	**66**
Do designated wash hand basins have soap / antibacterial soap?	**60**	**100**
Do designated wash hand basins have hygienic drying facilities?	**50**	**83**
Is environment around the food premises clean, far from rubbish, waste water, toilet facilities, open drains and animals?	**55**	**92**
Is the toilet clean &comfortable to use at time of visit?	**56**	**93**

Table 9 shows hygiene infrastructure in selected fast food premises. As observed by the researcher 55 (92%) of fast food outlets are built in such a manner that the design, layout ensure good or proper hygiene, 57(95%) of the premises are designed in a way which allow adequate cleaning, whilst55 (92%) protect against accumulation of dirt. Concerning provision of water, 60(100%) of the facilities have potable running water whilst 59(98.3%) allows for enough ventilation, 55(92%) of the facilities walls are free from dust, soot and spider web. Furthermore 49(82%) of the facilities are designed to prevent contamination of food, Forty (66%) of premises had hot and cold water whilst 60(100%) hand washing basins had soap and (83%) had drying

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facilities. The environment around observed food premises showed that 55(92%) were clean far from contaminating material such as waste water, toilet facilities, open drains and animals. Fifty six (93%) of toilets were clean and comfortable to use.

4.5.2 Provision of soap, tissue and nail brush in the toilet

Table 10: Provision of soap, tissue and nail brush in the toilet

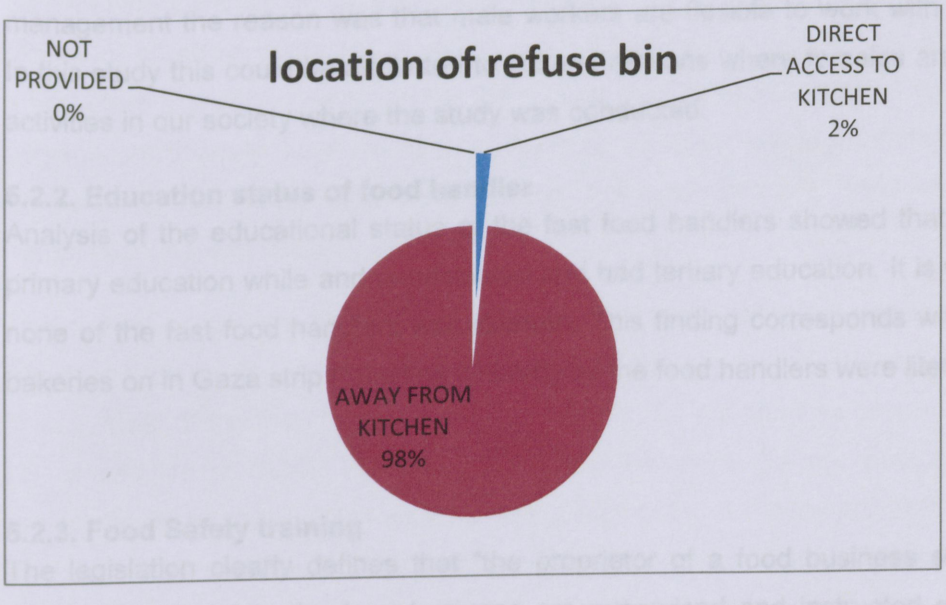
Are toilets provided with soap	**N=60**	**%**
Yes	57	95
Are toilets provided with tissue	**N=60**	%
Yes	60	100

Table 10 shows the provision of soap, tissues and nail brushes in toilets. Fifty seven (95%) of toilets observed had soap, 60(100%) had tissues rolls.

4.5.3 Location of refuse bin

Figure 4: Location of refuse bin

Fig 4 shows the location of dust bin in fast food outlets. Fifty nine of the dust bins were located away from the kitchen whereas 1(2%) were inside kitchen.



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CHAPTER FIVE

THE DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5. 1.INTRODUCTION

This chapter discusses the results of the study. The discussion is presented according to each study objective. In this chapter an analysis was made based on the standards and the requirements prescribed by Regulation R962 of November 2012. The food safety practice, training of food handlers, health surveillance practices, provision and adequacy of hygiene infrastructure were compared with health regulation to determine compliance levels

5.2 Biography

5.2.1. Age of respondents

The age distribution of the respondents revealed that the majority of the food handlers (Fifty eight (48%) were between the ages 26-35, 29 (24%) were between ages 19-25 years and 35n (29%) were 36 years and above. The high number of respondents within the age group 26-35 years is probably due to the fact that they have experience in terms of food preparation.

There is high disparity in the percentage between males and females 84 (69%) were females and 38 (31%) were males. This in contrast with findings by Muinde (2010) who discovered that the restaurants had more male than female staff workers and after an enquiry from the management the reason was that male workers are flexible to work with than female workers. In this study this could be attributed to cultural reasons where females are engaged in catering activities in our society where the study was conducted.

5.2.2. Education status of food handler

Analysis of the educational status of the fast food handlers showed that majority had passed primary education while and matriculated and had tertiary education. It is worth mentioning that none of the fast food handlers was illiterate. This finding corresponds with the survey of cake bakeries on in Gaza strip Palestine whereby all the food handlers were literate (Yassin 2008).

5.2.3. Food Safety training

The legislation clearly defines that "the proprietor of a food business shall ensure that food handlers engaged in the food business are supervised and instructed and/or trained in food hygiene matters commensurate with their work activities" (Regulation 10(1) (2) of regulations

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R962 of 2012).This requirement is supported by guidelines from the South Department of Health, regarding the management and health surveillance of food handlers. This document highlights the training of food handlers as the responsibility of the health authorities who should ensure that appropriate programmes are implemented. In the present study only forty (33%) were trained and 82 (67%) were not trained. That only forty food handlers were trained this shows that management commitment to food safety is a cause for concern.

5.5. Food hygiene and Safety Practices

5.5 .1.Personal hygiene practices

One of the objectives of this study was to assess the compliance status of personal hygiene practices of food handlers to the food hygiene standards.

According to Section 9(1) (2) and 11(1) (2) and (3) of Regulations Governing General Hygiene for Food Premises and the Transport of Food and (R962 of 2012) the standard and requirements regarding hands are that no person is allowed to handle unpacked food, whose fingernails, hands or clothes are not clean; who has not washed his or her hands thoroughly with soap and water or cleaned them in another effective manner. The sub regulation further stipulates that hands should be washed immediately prior to the commencement of each work shift; at the beginning of the day's work or after a rest period; after every visit to a latrine or urinal; every time he or she has blown his or her nose or after his or her hands have been in contact with perspiration or with his or her hair, nose or mouth; after handling a handkerchief, money or a refuse container or refuse; after handling raw vegetables, fruit, eggs, meat or fish and before handling ready-to-use food. The current consensus is that ensuring personal hygiene, particularly hand washing, is the most effective tool in preventing the spread of food-borne infections. While awareness of the need for frequent hand washing may be high, compliance is often low.

The current study with regard to personal hygiene practices found varying levels of compliance. Short and clean fingernails are also important for prevention of transmission of food borne illness. Most of the food handlers had their finger nail cut short as prescribed by regulation 9(1) (2) of regulations R962 of 2012. Most food handlers did not comply with hand hygiene requirements as only (71 %) washed hands with soap. A survey of 1,000 catering workers and managers by the FSA in 2002 reported that 39% of staff members did not wash their hands after visiting the lavatory, while 53% did not wash their hands before preparing food. This can be attributed to ignorance of by some of the food handlers and low level of inspection by the

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inspectors during busy times such as the festive season. The hands of food service employees can be vectors in the spread of food-borne disease, mainly because of poor personal hygiene and cross-contamination (Ehiri and Morris, 1996). There is need to properly train food handler on hand hygiene procedures.

Health regulations state that no person shall be allowed to handle food without wearing suitable protective clothing. Such clothing should be 1) clean and neat before any food is handled, 2) in a clean condition at all times during the handling of food, 3) of such design and material that it would not contaminate the food, and 4) designed not to come into direct contact with any part of the food. Management is responsible for the cleaning and issuing of protective clothing and should ensure that it is not removed from the premises for cleaning or repair without authorization (South African Bureau of Standards, 2001). The observation revealed that all food handlers 122(100%) were observed wearing clean uniforms, make use of aprons or hair nets to cover head when preparing and serving food. The results show that management in fast food outlets provided their food handlers with the required protective clothing as the regulations prescribe. All the food handlers in the fast food outlets use protective clothing prescribed by the health regulations. Section 9 of Regulations R962 of 23 November 2012 prohibits any food handler from handling food without the use of the required protective clothing. This study is in line with a study conducted among food handlers in the delicatessen industry in South Africa in which all food handlers were observed wearing plastic or material apron, gloves and hairnets (Van Tonder et al 2007).

All food handlers have a basic responsibility to maintain a high degree of personal cleanliness and observe hygienic and safe food handling practices; otherwise they can contaminate food sources with pathogenic microorganisms. It is compulsory that food handlers maintain good personal hygiene to ensure food safety in food preparation. During food handling they should remove all jewellery and makeup. It is recommended that people engaged in food processing should avoid any behaviour that could result in food contamination. Smoking, spitting, chewing or eating, sneezing or coughing directly over food is unacceptable because it increases the probability of contamination. Personal effects such as jewellery, watches, pins or other such items should not be worn or brought into food handling areas. In this study only 2(1.6%) of the respondents were observed shaking hands whilst preparing food, whilst 1(0.8%) were found chewing whilst preparing food and 5 (4%) of respondents were observed collecting money at the same time serving or dishing food. These findings are a concern since the hands are

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vectors for pathogens such as S.aureus. Consequently, it is advised that food handlers should avoid handling food with bare hands and handling money at the same time (Anon, 1999).

5.6. Medical surveillance practices of food handlers

Another objective was to assess the health surveillance practices of the food handlers including their general health status, reporting illness to management, preparing food whilst suffering from a communicable disease.

There was (36%) of compliance in terms of having medical examinations at the time of visiting. The reason for few food handlers undergoing routine medical check-up is because of the position of South African Department of Health on medical check-ups. According to the Department of Health South Africa routine medical examinations of food handlers may lead to a false sense of safety which can cause negligence with regard to general hygienic practices and personal hygiene. A much more effective preventive measure, the education of food handlers in hygienic practices, is often also neglected. For these reasons the Department considers pre-employment and routine medical examinations of food handlers as not being cost-effective and unreliable in the prevention of food borne disease and recommends that it should therefore not be required by health authorities. Regular monitoring and surveillance by health authorities and management of the food handling process are, however, crucial elements in the prevention of food borne diseases (Guidelines for the management and health surveillance of food handlers 2000).

There was (89%) of compliance in terms of reporting illness to management. This was based on evidence for sick leaves and illness reports which were seen by the researcher. In terms of the regulation food handlers should report illness or sickness to management and managers should encourage employees to report to their supervisors whenever they have diarrhoea, sore throat, fever, a cold or open skin lesions, or are jaundiced. Discretion should then be used as to whether or not these persons should be subjected to certain restrictions or suspended from food handling duties. The guidelines issued by the Department of Health in South Africa do not support pre-employment medical examinations but rather the establishment and implementation of procedures to ensure that illness is reported to management. (Guidelines for the management and health surveillance of food handlers 2000).

According to Sub regulation 11(2) of R962 of 23 November 2012 it stipulates that food or facility shall not be handled by any ill person people known, or suspected, to be suffering from, or to be a carrier of a disease or illness likely to be transmitted through food. Such people should not be

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allowed to enter any food handling area if there is a likelihood of their contaminating food. Any person so affected should immediately report illness or symptoms of illness to the management. The Codex Alimentarius, (2003) determines that persons, who are known or suspected of having any disease that might be transmitted by food, are forbidden to handle food items. In this survey there was 21.3% non-compliance of people who prepared food with cough and 24.5% non-compliance of food handlers who continued to prepared food with exposed cuts or wounds.

5.7. Provision and adequacy of basic hygiene infrastructure

5.7.1. Layout, design, construction and size of these food premises is designed and built to ensure good hygiene.

According to section 5 (1),(2) and (3) of Regulation R962 of 2012) food premises must be located ,designed, constructed and furnished without creating a health hazard and must enable food to be handled hygienically and prevent any spoilage or contamination of food. The kitchen is a food preparation area which must meet the requirements that are prescribed by the health regulations. In this study 92% of food premises complied with the legislation. The buildings were built with enough space to ensure rapid movement by staff and the space which allows adequate ventilation. The size of their food premises are built in such a manner that food handlers have enough space to move about freely, have equipment arranged with a definite flow and have a layout that reduces the risk of cross-contamination

Observations made during the visits showed that in only 5 (8%) of the premises were not designed or constructed according to sanitary design principles. There is a great need to redesign the kitchen. There was inadequate space for the circulation of workers in some areas, which may lead to production processes not following the hygienic standards and increase the risk of accidents. The way the kitchens were constructed in these five premises food safety is not guaranteed hence there is a risk of food borne diseases.

5.7.2. *The layout protect against the accumulation of dirt*

The health regulations prescribes in regulation 5(3) that food premises should be constructed such that it does not cause any health hazard and should be made of face bricks, non-absorbent and rust free materials. Fifty five (92%) of the food premises complied and were built in such a manner that there was no accumulation of dirt in food preparing equipment. The results showed however five (8%) of fast food outlets do not meet the requirements prescribed by the regulations. Food safety can be guaranteed in such kitchens for measures to safeguard

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food contaminations can be taken. Food poisoning outbreaks can be easily prevented and outbreaks can be easily contained in such structures.

5.7.3. Access to potable water at the site or close to the site

According to the health regulations food premises should have adequate water supply. The necessity of water lies in the fact that without enough water, hygiene and sanitary practices cannot be met. The World Bank (1995) asserted that safe water is an essential pillar for health. Latham (1997) emphasized that personal hygiene can only be achieved if adequate water is available. Therefore, food handlers should have sufficient potable water for drinking, preparation of all kinds of foods and sufficient running water for all washing operations. In this study all the 60 (100%) fast food outlets complied with the prescribed legislation because they had running water installed in the kitchen and dining areas. Food safety can be guaranteed but Thohoyandou, northern South Africa experiences water shortage during the day due to water scarcity.

5.7.4. Adequacy of ventilation facilities

Ventilation mechanisms are means of extracting fumes, odour and stale air which is necessary for preventing water vapour from condensing and creating moisture that drip from ceilings or run down walls, as well as reduce the build-up of heat and odour. The ventilation mechanisms could either be natural or mechanical as suggested by Little and McLauchlin (2007). According to health regulations each room must be ventilated effectively either by natural or artificial ventilation. Adequate ventilation either natural or artificial must be provided (Regulation (5) R962 of 2012). Fifty nine (98%) of fast food outlets were observed to have complied with the requirements. These food outlets had enough and big windows which allowed air and sunlight to penetrate. They also have well-oiled cooling air conditioners which rotated at 360 degrees. However the observations showed that only 1 (2%) of food outlet did not have enough windows to allow air circulation to flush out the searing heat generated during food preparation. This can contribute to contamination of food considering the fact that Thohoyandou is in northern South Africa and experiences high temperatures with the likelihood of water vapour condensation which may drip from ceilings and walls unto worktops, surfaces and food, causing contamination.

5.7.5. Wall free from visible dust, soot, and dirt or spider web.

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The interior surface walls, ceiling and floors have specific requirements to ensure that they can be easily cleaned and will not contaminate food. Fifty five (92%) fast food outlets observed complied with this requirement. The walls were free from visible dust, soot, and dirt and spider web. On the other hand 5(8%) of fast food outlets did not meet the standards requirements. This means that food can be contaminated and food safety is not guaranteed in these premises. This is due to poor housekeeping practices.

5.7.6. State of ceilings and overhead fixtures

According to the regulation ceilings and overhead fixtures shall be constructed and finished to minimise the build-up of dirt and condensation and the shedding of particles. In this study forty nine (82%) of fast food outlets ceilings and overhead fixture were designed to prevent accumulation of dirt and contamination of food. However 11(18%) do not meet the prescribed standards requirements stipulated by the regulations. The visual examination revealed that in some outlets the paint on the ceiling were peeling off and some were not properly fitted. This can lead to contamination of food which leads to outbreak of food borne diseases

5.7.7. Adequacy of designated hand washbasins with hot and cold water

Adequate facilities, suitably designed should be provided for cleaning food, utensils and equipment. Such facilities should have an adequate supply of hot and cold potable water where appropriate. Adequate means of hygienically washing and drying hands, including wash basins and a supply of hot and cold (or suitably temperature controlled) water. In this study 40(66%) of facilities complied they had running hot water and cold water. Only 20(34%) of the facilities did not meet the standard requirements. According to the observation, the number of hand washing stations was not sufficient for the number of staff in the kitchen, customers and hand wash stations were also not conveniently located. Hand wash stations were provided with hot water and cold water as shown although there was inadequate control of the temperature, as no mixers were provided. Based on the dual purpose of many sinks, it is likely that water coming out of the tap maybe too hot or too cold for effective hand washing purposes. It has been suggested that warm water (43°C-48°C) is sufficient to wash off the pathogens that have been loosened by hand washing with plain soap or detergents (Jackson 2011).

5.7.8. Adequacy of hand wash basins with soap / antiseptic liquid

The health regulations stipulate that it is the responsibility of food handlers to wash their hands thoroughly with soap and water under all relevant circumstances (R962 of 2012). The sub-

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regulation prescribe that hand washing facilities should be provided with soap and with water for hand washing by workers on the food premises and by the persons to whom food is served. The presence of fecal coliforms in foods indicates post-sanitization or post-process contamination, often caused by a lack of hand hygiene on the part of food handlers (Oliveira et al., 2003). Hand washing is critical in the prevention of communicable diseases that can be spread by contaminated hands. Soap is needed to remove contaminants in the hands of food handlers who prepare food for the public. All hand wash stations were stocked with antimicrobial liquid soap. This means that the outbreak of food poisonings is limited and food safety in these facilities is guaranteed. According to the observation, the number of hand washing stations was not sufficient for the number of staff in the kitchen and hand wash stations were also not conveniently located.

5.7.9. Adequacy of hand wash basins having hygienic drying facilities

Paper towels were installed for drying purposes at 83 % of the hand wash stations at the time of the survey. The use of paper towels for drying is also the correct practice for food safety. Hot air drying has been demonstrated to have the capacity of increasing bacterial contamination, while paper towel drying caused a decrease in the level of contamination (Montville et al., 2002). Stemming from the fact that the hands are used extensively to touch and hold things including raw food (which may contain mud and dust), soaps or even poisonous items such as rat poisons, it is necessary that the food handler washes and dry hands.

5.7.10. Cleanliness and tidiness of the environment around the food premises

According to South Africa food regulation (R962) of 2012 food establishment shall not be located anywhere where it is clear that there is a threat to food safety or suitability. In particular, establishments shall normally be located away from:

- Environmentally polluted areas and industrial activities which pose a serious threat to contamination of food.
- Areas subject to flooding unless sufficient safeguards are provided.
- Areas prone to infestations of pests.
- Areas from which waste, either solid or liquid, cannot be removed effectively.

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Food premises must not have direct connection with any area from which gases, odours or vapours can enter and contaminate food. In this study 55 (92%) observed fast food outlets complied with this requirement and 5 (8%) do not comply with the requirements. Some of these restaurants are situated in front of burst water pipes which can facilitate contamination of food. Only in one fast food outlet had flies hovering around.

5.7.11. Adequacy of the latrine, clean and comfortable to use at time of visit/ toilet facilities provided with soap, and toilet paper

Toilet facilities near work areas provide good personal hygiene, reduce lost productivity and permit closer supervision of employees. Adequate, suitable and conveniently located change rooms, toilets and ablution facilities shall be provided at all food establishments (Alli, 2004; South African Bureau of Standards 049, 1989). In this study 56 (93%) of the food premises complied the toilets were cleaned and always ready to be used by another customer or food handlers and they were flushing well. Furthermore the general odour inside toilets was comfortable to endure. Also the study reveals that only four (3%) did not meet the requirements. The toilets were not flushing and there was fetid odour emanating from the toilets. This means that food safety cannot be guaranteed and there is possibility of faecal oral transmission of food borne diseases in these food outlets.

In terms of provision of toilets with soap 57 (96%) of food premises provided soaps in their toilets for customers in the dining area and employees serving food. Only 3 (5%) did not comply with the regulations. Of all the observed toilets all of them were stocked with tissues for the customers and food handlers.

5.7.12. Location of the refuse bin area

In this study fifty nine (98%) of the dust bins were located away from the kitchen whereas 1 (2%) were inside kitchen. Improper removal, storage and disposal of waste can result into contamination of food, equipment, potable water and may attract breeding of pests (South African Bureau of Standards, 2001 and Food and Agricultural Organization, 1997). The result of this study is in line with a cross sectional survey that was conducted by Cele (2009) in one hundred fast food outlets ,most of the refuse bin areas were located away from the kitchen as only 15% had direct access to the food preparation areas. Facilities that had refuse bin areas with the direct access to the kitchen needs to have proper pest control measures.

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5.8 .SUMMARY OF FINDINGS AND RECCOMMENDATIONS

Summary related to food handlers personal hygiene practices

From the findings of this study, it is concluded that a significant number of food handlers observed food hygiene and safety practices therefore complied with food hygiene and safety regulation R962 of November 2012. However (71%) of food handlers were not washing hands with soap and that they were also observed carrying out unhygienic behaviours such as chewing, shaking hands and exchanging money whilst preparing food.

Recommendations

- Promote compliance with food safety regulations through health education and health promotion. Additionally management should supervise food handlers to make sure the prepare food in accordance to the Act.
- The municipality should ensure enforcement of compliance by its Environmental Health Practitioners and relevant law enforcement agents.
- Further regular training should be provided for food handlers and management

Summary related to health surveillance practices

- Only 36% of the food handlers possessed medical examination certificates.
- Majority 89% of food handlers reported illness to management.
- Only 21.3% were observed preparing food when suffering from communicable diseases such as flu.
- About 24.5% of food handlers were observed preparing food with open injuries and wounds.

Recommendations

- Environmental Health practitioners should work out modalities to ensure that persons with any foodborne infections are restricted and treated.
- Environmental health Practitioners should train managers of fast food outlets to identify symptoms of communicable diseases.

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Summary related to physical and environmental conditions of food premises

- The majority 92% of the fast food outlets were built in such a manner that the design, layout ensures good or proper hygiene which complies with the Act
- The majority 95% of the premises observed were designed in a way which allows adequate cleaning which complies with the regulations.
- The majority 92% of the kitchens were designed to protect against accumulation of dirt.
- Concerning provision of water all 100% of the facilities have potable running water which complies with the regulations.
- In regard to ventilation of the food outlets are majority 98% were well ventilated.
- The majority 92% kitchens walls observed were free from dust, soot and spider web.
- Only 82% of fast food outlets overhead fixtures were designed to prevent contamination of food.
- More than half 66% of the premises had hot and cold water.
- All the food premises had hand washing basins with soap and hand drying facilities.
- The environment around observed food premises showed that were clean far from contaminating material such as waste water, toilet facilities, open drains and animals.
- Majority 98% of the dust bins were located away from the kitchen.

Recommendations

- The Environment health Practitioners should closed down premises which are not complying with the regulation.
- Only premises issued with certificate of acceptability should operate.

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APPENDIX: 1.OBSERVATION CHECKLIST
SECTION: A BIOGRAPHICAL DATA.

1. Name of fast food outlet.....

2. Fast food outlet Code.....

3. Date of inspection.....

4. Time.....

5. Age: .....**6.Gender**.....**Female**.....**Male**.....

6. Education level:

Primary.....**Secondary**.....**Tertiary**.....

7. Food safety training:

.....

SECTION B:PERSONAL HYGIENE PRACTICES	**OBSERVATION**		
8. Does the food handler's finger nail cut short?	1.Yes	2.No	
9. Does the food handler wash their hands with soap in clean water each time before the handling, preparation and serving of food?	1.Yes	2.No	
10. Are the food handler's clothes clean and presentable?	1.Yes	2.No	
11. Does the food handler use an apron when handling, preparation and serving of food?	1.Yes	2.No	
12. Is the hair of the food handler covered when handling, preparation and serving of food?	1.Yes	2.No	
13. Other types of protective clothing used by food handlers.	1. Apron..... 2. Overall..... 4. Hairnet.....		

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	5. Other		
14.Please note down any personal unhygienic behaviour you may notice by the food handlers while serving ,preparing and handling food i.e. 1..... 2..... 3..... 4..... 5.....			
SECTION:C.HEALTH SURVEILLANCE PRACTICES OF FOOD HANDLERS			
15 .Does the food handler take medical check-up in the past one year? (See medical certificate)	1.Yes	2.No	
16. Does the food handler report illness to management?	1.Yes	2.No	
17. Preparing food with discharging from nose, eye, ear and cough during visit.	1. Yes	2.No	
18. Any visible skin rash, boils, cut and wound at time of visit?			
SECTION: D.Provision and adequacy of basic hygiene infrastructure.			
19. Layout, design, construction and size of this food premises is designed and built to ensure good hygiene.	1.Yes	2 No	

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20. Does the layout permit adequate cleaning and sanitation?	1.Yes	2.No	
21. Does the layout protect against the accumulation of dirt?	1.Yes	2.No	
22. Is there access to potable water at the site or close to the site?	1.yes	2. no	
23. There are adequate ventilation facilities which are also accessible and suitable for cleaning?	1.Yes	2.No	
24. Is the wall free from visible dust, soot, and dirt or spider web?	1.Yes	2.No	
25. Are ceilings and overhead fixtures designed and finished to prevent the accumulation of dirt and contamination of food?	1.Yes	2.No	
26. Do designated wash hand basins have hot and cold water?	1.Yes	2.No	
27. Do designated wash hand basins have soap / antibacterial soap?	1.Yes	2.No	
28. Do designated wash hand basins have hygienic drying facilities?	1.Yes	2.No	
29. Is environment around the food premises clean, far from rubbish, waste water, toilet facilities, open drains and animals?	1.Yes	2.No	
30. Is the latrine clean &comfortable to use at time of visit?	1.Yes	2.No	
31.Are toilet facilities provided with: (a) Soap – 1.Yes 2.No (b) Toilet paper 1.Yes			

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2.No			
32. Location of the refuse bin area (a) Direct access to the kitchen (b) Away from the kitchen (c) Not provided			

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APPENDIX 2: REQUEST FOR PERMISSION TO CONDUCT RESEARCH TO THE FAST FOOD OUTLETS OWNERS

To : Food Managers/owners/head chefs.

From: Murwira T.S; Masters in Public Health (MPH) Student No 11576134

RE: REQUEST TO CONDUCT RESEARCH IN FAST FOOD OUTLETS

Dear Sir/Madam

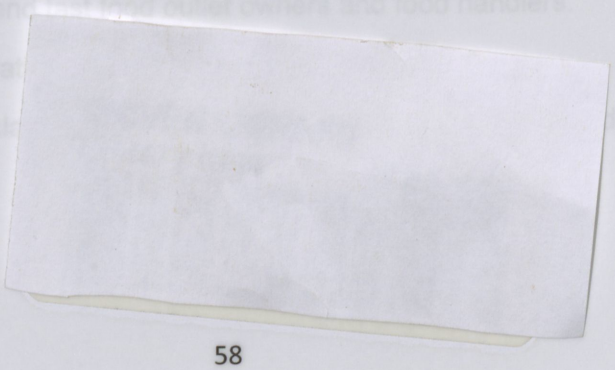
This serves to seek your approval and clearance with regards to my proposal to conduct a research within your premises. This research is towards my master`s study in the Department of Public Health and is entitled **The Level of Compliance of Food Handlers with National Regulations on Food Hygiene and Safety Practices: A Case of Selected Fast Food Outlets in Thohoyandou, South Africa.**

The primary purpose of this to assess the level of compliance of food handlers with national regulations on food hygiene and safety practices in Thohoyandou. The participants will be your workers (food handlers) currently working at the fast food outlets. Furthermore a walk through your premises will be conducted to assess the sanitary conditions in your building and the environmental hygiene. Information will be treated with respect and confidentiality. The study, with its findings, will be made available to your institution when it is completed.

In order to proceed with this study, I kindly request your permission to conduct the study in your premises. Your cooperation in this regard will be highly appreciated. For any further additional information.

Yours

Tinotenda Murwira



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APPENDIX 3: INFORMATION SHEET FOR PARTICIPANTS

Title: The Level of Compliance of Food Handlers with National Regulations on Food Hygiene and Safety Practices: A Case of Selected Fast Food Outlets in Thohoyandou, South Africa.

Principal Investigator: Surname Murwira **Initials** T.S

Address: University of Venda, X5050, Thohoyandou, And Tel: 0769067770

Email:murwiratinotenda@gmail.com

General Information about Research

This study will assess the level of compliance of food handlers with national regulations on food hygiene and safety practices: a case of selected fast food outlets in Thohoyandou, South Africa.

Possible Benefits, Risks and Discomforts

There are no direct benefits to be gained from this study immediately, neither are there any risks associated with it. The data from this study will be used only for the purpose of the study. (Master Thesis)

Confidentiality

Your identity and your participation in this study will be treated strictly confidential. The information that we obtain from you will not be shared with anybody, except the study investigators. Your identity remains secret since your personal information will only be designated by a unique participant number. Your name will not appear in any reports or publications resulting from this study. After the study is completed, you may request information about the study results.

Voluntary Participation and Right to Leave the Research

You participate entirely voluntarily in this study. You have the right to refuse to participate in the study. You also have the right to stop your participation in the study at any time, even after you have signed this informed consent form. The withdrawal of your consent will not cause any disadvantage or loss of advantages/privileges.

Consent

Ethical clearance will be obtained from the University of Venda Ethical Committee. Permission to carry out the study will be obtained from the University of Venda Higher Degree Committee, Vhembe District Municipality and fast food outlet owners and food handlers.

Contacts for Additional Information

Any questions or any further clarifications concerning the study can be directed to:

Contact 0769067770

Tinotenda Success Murwira

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APPENDIX 4: PARTICIPANT CONSENT LETTER

I have been given information sheet on the project above. I have read and understood the information sheet and all my questions have been answered satisfactorily. I understand it is up to me whether or not I would like to participate in the study and that there will be no penalties if I decide not to participate. I understand that I do not have to answer any questions that I am not comfortable with and that I can stop the interview at any time. Furthermore I can decide whether or not the observation will be complemented by the use of digital camera.

I understand that information /photo captured by the camera will be given codes and my name will not be used in the study reports, and that my name will not be used in the study reports and that comments will not be shared by anybody else. The information gathered will be used for scientific and educational purpose. After the study is completed, you may request information about the study results. The study will be published in international journal. Copies of the study reports will be kept confidentially at the University of Venda library. I consent voluntarily to participate in the observations for this study. I have been given telephone number that I may call if having any questions or concern about the research.

The above document describing the benefits, risks and procedures for the research titled the level of compliance of food handlers with national regulations on food hygiene and safety practices: a case of selected fast food outlets in Thohoyandou, South Africa has been read and explained to me. I have been given an opportunity to have any questions about the research answered to my satisfaction. I agree to participate voluntarily.

Researcher's signature _____ Date_____

Participant

I_____ have read through the content of this form and hereby voluntarily consent to participate in this study.

Participants' signature _____ date_____

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VHEMBE DISTRICT MUNICIPALITY
PRIVATE BAG X 5006, THOHOYANDOU, 0950
TEL: 015 960 2000, FAX: 015 962 1017
WEBSITE : www.vhembe.gov.za

REF : VDM 16/20/R
ENQ : Mukwevho N.M
DATE: 13/10/2014
Cell : 083 276 3649

RE: PERMISSION FROM VHEMBE DISTRICT MUNICIPALITY.

TO WHOM IT MAY CONCERN

This is to confirm that Murwirwa T.S student No 11576134 a Masters in Public Health Student (MPH) has been granted permission to conduct research within Vhembe District Municipality, Thulamela local area. It is within my knowledge that the research revolves around the level of compliance of food handlers with National Regulations on Food and Safety practices: A Case of selected fast food outlets In Thohoyandou, South Africa.

Your participation in this regard is of great value to us. Should you have any concerns, please don't hesitate to contact us at the phone numbers listed above.

With kind regards and best wishes

Acting Municipal Manager

03/10/2014
Date

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RESEARCH AND INNOVATION
OFFICE OF THE DIRECTOR

NAME OF RESEARCHER/INVESTIGATOR:
Mr TS Murwira

Student No:
11576134

PROJECT TITLE: The level of compliance of food handlers with National Regulations on Food Hygiene and Safety practices: A case of selected fast food outlets in Thohoyandou, South Africa.

PROJECT NO: SHS/14/PH/15/1411

SUPERVISORS/ CO-RESEARCHERS/ CO-INVESTIGATORS

NAME	INSTITUTION & DEPARTMENT	ROLE
Prof AM Amosu	University of Venda	Supervisor
Dr H Nemathaga	University of Venda	Co-Supervisor
Mr TS Murwira	University of Venda	Investigator - Student

ISSUED BY:
UNIVERSITY OF VENDA, RESEARCH ETHICS COMMITTEE

Date Considered: November 2014
Decision by Ethical Clearance Committee Granted
Signature of Chairperson of the Committee: .....
Name of the Chairperson of the Committee: Prof. G.E. Ekosse

University of Venda
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