FOOD HYGIENE, SAFETY, HANDLING PRACTICES AND KNOWLEDGE OF FOOD HANDLERS IN A FOOD RETAIL COMPANY IN DURBAN, KWAZULU-NATAL, SOUTH AFRICA.

Dissertation submitted in fulfillment of the requirements of the Masters of Applied Science in Food and Nutrition in the Department of Food and Nutrition Consumer Sciences, Faculty of Applied Sciences at the Durban University of Technology

By

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DECLARATION

This work has not been previously accepted in substance for any degree and is not being concurrentl[redacted]egree.

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Lord, God, Master and King. The creator of Heaven and Earth. The Almighty God and the Great I AM. Akekho umunye ofana nawe. Jesus my Lord and Savior, the Son of God, the concurring King. Precious Holy Spirit, the Master teacher and counselor. I am at awe and I am eternally grateful. Thank you for the Grace of God that super abounds towards me. You deserve all the praise. Thank you for being my present helper in times of need. You are God and there is no other God besides you. You are the Lord Yahweh, Adonai Jehovah and you hasten it in its time. You make the impossible possible. You have done it again.

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ABSTRACT

FOOD HYGIENE, SAFETY, HANDLING PRACTICES AND KNOWLEDGE OF FOOD HANDLERS IN A FOOD RETAIL COMPANY IN DURBAN, KWAZULU-NATAL, SOUTH AFRICA

The purpose of this study was to investigate the food hygiene, food safety, food handling practices and knowledge of Food Handlers in a food retail company in Durban, KwaZulu-Natal, South Africa in order to inform management on the knowledge of the Food Handlers in the company of the standards of food hygiene, food safety, and food handling practices. The objective was to determine and describe the knowledge of food hygiene and safety versus the standard of the observed food hygiene, safety and handling practices demonstrated by the Food Handlers in the particular establishments. Literature suggests that there is a direct correlation between knowledge and performance with regard to the food hygiene and safety standards that would exist in an establishment (Seaman 2010). This study attempted to draw a correlation between the managers/supervisors (Mngrs/Sups) knowledge and that of the Food Handlers (FHs) as it was of particular interest, in order to verify the assumptions made by other researchers with regard to management/supervisory knowledge being linked to the level of food knowledge and practices demonstrated by the Food Handlers (Medeiros, Cavalli, Salay, and Proenca 2011).

The research was conducted in 20 food service establishments that belonged to the same food retail company in Durban, KwaZulu-Natal. This food retail company has about 150 stores which practice voluntary trading. The company has a very solid food safety policy which is made available to the owners of each establishment to implement and maintain. Quarterly food safety audits by an external company are carried out at each establishment and the results are shared with the owners in order to close any gaps that may exist. This research aims to provide data that will report on the food safety standards in each establishment as assumed by the company to be practised. The sample was randomly selected (all the names of the stores were put into a container and randomly selected) based on the establishment category i.e. mini market, super market and hyper store. Ethical approval was granted by the Institutional Research Ethics Committee at Durban University of Technology. The total sample for the study was 250 which was made up of 234 Food Handlers and 16 managers/supervisors. Information letters and consent forms were presented to and signed by the participants before data collection commenced.

The study design was observational and descriptive by nature. To determine the food hygiene, food safety, food handling practices and knowledge of Food Handlers, two questionnaires were administered and an observation checklist was administered. All data collection was quantitative and all participation was voluntary. A permission letter was obtained from the company which was used to grant the researcher entry into the establishments but access was dependent on permission being given by the owners of the selected establishments. Data obtained from this questionnaire was captured on a

Microsoft Excel® Spreadsheet and analysed for descriptive statistics using the Statistical Package for the Social Sciences (SPSS), version 24.

The majority of the workforce was made up of females at both management and food handler level (75.0%; n=12 and 74.8%; n=175 respectively). The study group was predominately aged 30 years and older with the majority having grade 12 as the highest level of education. Noticeably, not all of the managers and FHs were trained upon appointment although the company has a solid food safety induction resource programme that is made available and distributed to each establishment. The food safety training module focuses on all aspects of food safety but since not all the respondents were trained on all the 12 modules, they displayed greater knowledge in selected areas and less in others; for instance, greater knowledge was shared about personal hygiene compared to record keeping, temperature recording and pest control, which are critical elements in ensuring food safety. To support this finding, unexpectedly 25.0% (n=4) of Mngrs/Sups and 47.0% (n=110) of the FHs stated that according to their knowledge thawing frozen food on the counter at room temperature was acceptable. This demonstrated that almost half of the FHs did not know that it is important to prevent bacteria present in food from multiplying in order to eliminate food poisoning. Additionally, the practice of thawing/defrosting food at room temperature was observed at most of the establishments but mostly at the Hyper stores. Furthermore, the vast majority of FHs knew that food should not be handled when they are suffering from any type of health problem, but 7.3% (n=17) stated that when they are suffering from the flu, and are coughing and sneezing, they are still permitted to handle food which assumes that it does not pose a risk to food safety whereas all the Mngrs/Sups knew that illness should not be permitted in the food production areas. Some FHs even stated that they would come to work sick otherwise they would not be paid.

Almost all (n=15; 93.8%) of the Mngrs/Sups correctly stated that wiping cloths spread microorganisms but not all of the Mngrs/Sups knew that wiping cloths should be placed in a sanitizer bucket in-between use. This indicates a lack of knowledge with regard to food safety hazard preventative measures. Some of the FHs did not know that not all chemical cleaning products are graded as being effective in a food production/preparation environment and that general cleaning removes dirt only while sanitizing surfaces also kills bacteria. More than half of the FHs incorrectly stated that it was acceptable to leave mops and brushes in a bucket of dirty water in-between use which was an unacceptable practice prevalent in most of the establishments. The vast majority (93.8%; n=15 Mngrs/Sups, 93.2%; n=218 FHs) of the respondents agreed that food that has reached its expiry date should be thrown away but the researcher found during the observations that some of the establishments had expired stock that was being used in food preparation, and this was mostly evident at the Hyper stores (80.0%; n=4); however, at the Mini stores the expired stock was still on the shelves for sale.

A shortage of utilities, resources and facilities in the various establishments was highlighted as a stumbling block to obtaining and achieving the desired food safety standards. Some establishments were under new ownership and were still establishing food safety structures. The outcomes of the study will be made available to the management of the food retail stores in the hope that the standards of

food safety in each establishment will be improved as an unfortunate food incident will tarnish the brand image of the organization and not just the particular establishment.

Keywords: Food Handlers, food safety, food safety standards, knowledge, food hygiene, food handling practices, food-borne diseases, food supply chain, food establishment, food retail.

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LIST OF ABBREVIATIONS

CAC	Codex Alimentarius Commission
CAC/RCP1	Codex Alimentarius Commission Recommended International Code of Practice: general principles of food hygiene
CCHF	Crimean Congo Haemorrhagic Fever
CCP	Critical Control Point
CCPs	Critical Control Points
CDC	Centers for Disease Control
CFIA	Canadian Food Inspection Agency
ch	Chapter
COA	Certificate of Acceptability
CODEX STAN 1	Codex General Standard for labelling of Prepackaged Foods
DAFF	Department of Agriculture, Forestry and Fisheries
DOE	Department of Education
DoH	Department of Health
DTI	Department of Trade and Industry
DUT	Durban University of Technology
DVD	Digital Versatile Disc
EFSA	European Food Safety Authority
EMA	Economically Motivated Adulteration
FAO	Food and Agriculture Organization
FDA	Food and Drug Administration
FH	Food Handler
FHs	Food Handlers
FIFO	First In First Out
GHPs	Good Hygienic Practices

GMPs	Good Manufacturing Practices
HACCP	Hazard Analysis Critical Control Point
HFMD	Hand, Foot and Mouth Disease
HSRC	Human Science Research Council
IQF	Institute of Quality Training
IREC	Institutional Research Ethics Committee
ISO	International Organization for Standardization
KZN	KwaZulu- Natal
Mngrs/Sups	Managers/ Supervisors
NICD	National Institute for Communicable
NHLS	National Health Laboratory Service
No.	Number
Pg.	Page
PPE	Personal Protective Equipment
PRP	Pre-Requisite Programme
Rev.	Revision
SA	South Africa
SAAFoST	South African Association of Food Science and Technology
SABS	South African Bureau of Standards
SPSS	Statistical Package for the Social Sciences
StatsSA	Statistics South Africa
TVC	Total Viral Count
UK	United Kingdom
UN	United Nations
USA	United States of America
US	United States

Vol	Volume
WHO	World Health Organization

LIST OF SYMBOLS

%	Percent
pH	Acidity or Alkalinity of a solution
	International irradiated ingredients logo
n	Sample size number
/	Or
-	Minus
>	Greater than
<	Less than
+	Plus
ºC	Degrees Celsius

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CHAPTER 1

INTRODUCTION AND STATEMENT OF THE PROBLEM

1.1 Introduction

The Codex Alimentarius (2010: 18) explains that food hygiene exists when good hygienic conditions and measures exist throughout the food cycle (from manufacturing to distribution) that will provide food that is safe for consumption. According to Kwasek (2012: 703), food safety is the assurance that the food procured and consumed will not cause any harm to the health and wellbeing of the consumer provided that the food is prepared and consumed in accordance with the food's intended use and purpose, which would be stipulated on the product. Food safety is therefore not assured if a product is used for purposes other than those intended and recommended by the manufacturer.

McIntyre, Vallaster, Wilcott, Henderson and Kosatsky (2013: 150) state that recent research reveals that the reported high numbers of food-borne illnesses are due to poor food handling practices which involve Food Handlers. There was enough evidence to enable investigators to conclude that the root cause of a number of food-borne illness cases was poor food handling (Grieg, Todd, Bartleson and Michaels 2007: 1752).

McIntyre *et al.* (2013: 150) reports that food poisoning outbreaks over a period of five years were directly linked to food mishandling. The evidence revealed that cross-contamination, poor temperature control and poor food hygiene were some of the causes of the incidents. The World Health Organization (WHO) (2007: 2) reports that contaminated maize in Kenya resulted in 317 food poisoning cases of which 125 resulted in fatalities. Further data from the WHO (2007) reveals that due to the lack of food safety, Tanzania suffered a financial loss of millions in exports due to a cholera outbreak that affected the fish industry. Leach (2010: 163) echoes that a poor food safety structure is the main contributor to outbreaks of food poisoning. According to Egan, Raats, Grubb, Eves, Lumbers, Dean and Adams (2007: 1180) a significant 97% of food-borne illness cases are due to improper food handling and are most evident in catering establishments.

The WHO Africa (2013) reports that food-borne illness outbreaks are a danger to the health and economic position of any country. Moreover, globally 70% of diarrhoea cases annually are traced back to contamination of food. With reported estimates of billions of dollars spent annually on health care costs and loss of productivity due to food-borne illness in food retail establishments in the United States of America (USA), the United States of America (USA) Food and Drug Administration (FDA) in 2006 suggested that poor hygiene, cross-contamination and inadequate time/temperature control are the three main contributors to the food-borne illness cases.

The WHO (2013) states that with the predicted population growth in Africa, the concern about the growing need for food remains urgent and with the growth of the informal food trade the hope of eliminating unsafe food practices in any country is going to need government intervention.

According to Egan *et al.* (2013: 1180) adequate training for Food Handlers remains under scrutiny as researchers examine the effectiveness of food safety training that is given to Food Handlers; the concern is mainly about the knowledge of food safety being applied to food handling practice.

The topic of food safety and the concern around it is a relevant topic that has been highlighted in a number of studies. However, there is limited information available as a result of studies done on Food Handlers knowledge of food hygiene, food safety and food handling practices in food retail companies in South Africa (SA). The evidence from the USA is substantial but has limited or no relevance for SA. Understanding the gaps that exist in our own country may help reduce and possibly eliminate the factors that promote food illness related incidents.

This study aims to investigate the food hygiene, food safety, food handling and knowledge standards that exist in a food retail company in Durban, KwaZulu-Natal, South Africa and aims to draw a comparison between the food hygiene and food safety knowledge that exists and the actual food handling practices and food hygiene and safety standards that are prevalent in the company.

1.2 Background to the problem: A Global perspective

With the rapid increase in the global population it has become very challenging to ensure that all people at all times have access to safe and sufficient food and this has become difficult for governments, companies and individuals (Fukuda 2015: 212).

The WHO health topic for 2015 was Food Safety. The motivation behind this was that the WHO recognizes that food safety is a global problem and therefore requires global attention and global action. The WHO collaborated with the United Nations (UN) and the Food and Agriculture Organization (FAO) in order to establish strong food systems with the use of the Codex Alimentarium Commission as it directs food safety globally. Newell, Koopmans, Verhoef, Duizer, Aidara-Kane, Sprong, Opsteegh, Langelaar, Threfall, Scheutz, Van de Giessen and Kruse (2010: S4) explain that in the past 20 years it has become evident that food safety has become a public concern, but as important as that may be, the SA public health department's agenda has directed its efforts to the most occurring food-borne diseases in the food chain. This approach neglects the less occurring food-borne diseases and the associated microorganisms that cause the disease and furthermore, new food-borne diseases and food-borne disease-causing agencies are only addressed once a food safety incident occurs; thus the public agenda is reactive instead of proactive. Griffiths (2006: 6) states that food is important for life and if contamination occurs it can result in illness and death but cases associated with deaths are minimal from a global perspective. The increase in

consumers' demand for food variety has caused stress on an already complex food chain. The extensive processing of food "from farm to fork" has resulted in a prolonged period of food handling. The demand for food variety means that foods originating in different countries are now being globally exchanged and shared, making food vulnerable to contamination that can affect multitudes (Fukuda 2015: 212). In addition, Griffiths (2006: 6) reveals that some foods are poisonous and/or toxic in nature whereas other foods become susceptible to contamination because of the extensive processes that take place within the food chain. Gordon-Davis (2011: 3) states that food hygiene standards, which dictate how food should be handled, are important as food safety affects all humankind in every stage of consumption; furthermore, to prevent outbreaks of food poisoning it is imperative that the levels of food hygiene, food handling and personal hygiene are of the highest standard. Good food hygiene and handling is important both to those who prepare the food and those who consume it. As publicized by Griffiths (2006: 11), the root cause of 97% of cases of food poisoning (that is, food-borne illness) is poor food handling both in food service establishments and in the home.

According to Newell *et al.* (2010: S4) historical data shows that 1.8 million diarrhoeal disease deaths in 2005 were caused by food and water contamination and Fukuda (2015: 212) particularizes that two million deaths caused by food and water contamination occur on a yearly basis and target children in developing countries. Newell *et al.* (2010: S4) estimates that in the USA about 5000 people will die from food-borne diseases and illnesses and over 300 000 people will be hospitalized; this prediction is based on the estimate that food-borne illnesses have already accounted for 76 million cases. There is still a data gap on the impact of food-borne diseases in the world but the WHO aims to collect data that will assist in drawing estimates that are more accurate. In 2015 the WHO reported that uncooked foods of animal origin and fruits and vegetables that are contaminated with faeces are examples of unsafe foods that carry harmful bacteria, viruses, parasites or chemical substances which cause 200 diseases that range from diarrhoea to cancer (Fukuda 2015: 212).

Griffiths (2006: 12) reveals that in the United Kingdom (UK) four percent of Food Handlers do not practise 100% food safety principles. Furthermore, a study done by Clayton and Griffiths in 2004 revealed that most of the time Food Handlers do not practise all the food safety principles needed to keep food safe. Sani and Siow (2014: 210) state that in Malaysia the source of the 48.7% incidents of food-borne diseases was unhygienic food service or the catering establishment itself as revealed by the European Food Safety Authority (EFSA) report in 2010. The root cause of the cases was septic food handling procedures, insufficient clean water and unhygienic working environments. Additionally, it is evident that there was an increase in food-borne illness cases, specifically food poisoning, and these cases had doubled in a period of one year causing the shut-down of 3625 food establishments in that year due to noncompliance with the Food Regulations [Act] of 1983.

According to the WHO (2015), in 2008 there was a case of melamine contamination that was found in infant formula that affected 300 000 infants and children leading to six reported deaths in China. There was also

an e-coli outbreak in Germany, which affected eight countries in Europe and North America and claimed 53 lives. The WHO (2015) reported that on a global scale, one in 10 people fall ill after consuming contaminated food and 420 000 people die annually. Children under five years are most susceptible leading to 125 000 deaths yearly. Diarrhoeal disease has been identified as the most common illness associated with contaminated food consumption causing 550 million illness cases and 230 000 deaths per year. Not only is unsafe food a health concern, it also threatens the economy on a global scale. The e-coli outbreak in Germany led to 1.3 billion US dollar losses for farmers and organizations and accounted for 236 million US dollars in emergency aid payments (WHO 2015).

A study done in Malaysia by Sani *et al.* (2014: 215) revealed that although the majority of Food Handlers had a basic level of knowledge about food safety and handling of food they did not know about storage and holding temperatures which lead to bacterial growth and food contamination (Sani *et al.* 2014: 215-216). Gordon-Davis (2011: 3) suggests that food hygiene is endorsed by knowledge; hygiene is evident in cleanliness and the absence of such results in food poisoning as it promotes bacterial growth. It remains important that Food Handlers maintain good food hygiene practices and behaviour so as to produce, store and serve safe food. Griffiths (2006: 10) refers to the fact that it is evident that there is an increase in food safety cases both in developed and developing countries because of the increase in the number of new pathogens and this should trigger new approaches to food safety through utilizing technology, advances in microbiology techniques, HACCP and global strategies to combat this issue. Additionally, a globally legislated approach should be established which should also incorporate a food safety organizational culture that focuses on Food Handlers' knowledge, attitudes and practices in relation to the organizational standard.

1.3 Background to the problem: The African perspective

The WHO (2015) has called on African governments to address food safety as a main concern by ensuring that agricultural policies are aligned with trade, health and education and that financial resources are available to ensure that food is safe for consumption. It is also very important that governments invest in building proactive food safety systems that are aligned with the Codex standard for early detection of contamination and to control food safety. Griffiths (2006: 10) reports that there is evidence of increased food safety cases in both developed and developing countries but there is evidence of under-reporting in developing countries; nonetheless, available data shows a huge increase of cases in Africa. Griffiths' (2006: 10) statement is supported by the record of reports available for Egypt where three cases per 100 000 population were reported whereas studies done in Egypt show that the number of visitors reported to have had stomach upsets was at a record high. Developed countries like Sweden reported 5770 cases for the same population size due to better data collection.

According to the WHO (2015), women-owned/managed small and medium enterprises are the main drivers of the food chain in Africa thus it remains important that the public health agenda prioritizes food safety by securing the management of the businesses and improving the enterprises financially. Griffiths (2006: 10) further explains that some of the elements that are behind the extreme increase in food poisoning cases in developing countries that may lead to food-borne illness cases are the changing patterns in food consumption where more people are eating away from home and the improper use of cooking equipment. A study done by Chukuezi (2010: 50) in Nigeria shows that the change in eating patterns has actually been caused by a demand for cheaper food so as to survive the economic downturn. Chukuezi further explains that there is a great need for resources and education because it was evident that a large number of the food stalls investigated did not have proper cooking equipment or storage facilities ─ as some food service providers were using wheelbarrows as storage facilities ─ so that food service providers can ensure that consumers get safe food.

Dagnew, Tiruneh, Moges and Tekeste (2012: 837) explain that an estimated over two million fatalities are assumed for developing countries on an annual basis due to lack of food safety. The reason for the increased spread of food-borne diseases is mainly due to poor food preparation and storage practices on the part of Food Handlers because most of the diseases are infectious and caused by microorganisms, which are carried in unsafe food. Smith, Fowora, Goodluck, Nwaokorie, Aboaba and Opere (2011: 73) report that poor sanitary conditions are the cause of the spread of unsafe food in developing countries and that in a population of 427 million people, 4.36 million cases of food-borne illness occur in Africa. A study done in Nigeria found that Food Handlers who were perceived to be healthy were in fact the carriers of food-borne disease bacteria, which was the cause of six percent of the reported cases. Dagnew *et al.* (2012: 837) agrees, stating that poor personal hygiene among Food Handlers who work in food service establishments are the source of food-borne diseases. In Nigeria, as a coping strategy to access food in Nigeria, most households opted for low-cost foods but the hygiene conditions under which these foods were prepared remain questionable (Smith *et al.* 2011: 73). Poor food-handling results in food-borne illnesses as seen in a study done in Ethiopia where the Food Handlers were the source of food-borne diseases, as disease-causing bacteria was found during tests that were conducted as part of the study. Food Handlers tested positive for a non-food pathogen but this pathogen indicated inadequate personal hygiene in Food Handlers. Diarrhoea associated pathogens were also discovered only to find that some of the Food Handlers in the study were suffering from diarrhoea (Dagnew *et al.* 2012: 842).

Abera, Biadegelgen and Bezabih (2010: 46) state that in developing countries intestinal parasitic infections are a major concern; intestinal infections are caused by poor personal hygiene and bacteria that are transferred to individuals through food. Likewise Dagnew *et al.* (2012: 837) reveals that an organism called Staphylococcus Aureus was the cause of food poisoning. In his study in Northwest Ethiopia it was found that 20.5% of Food Handlers tested positive for Staphylococcus Aureus. This bacteria can live in the nose and skin and can be transferred directly to food, making it poisonous immediately ─ especially foods that

are not stored at the correct temperature throughout the food chain. A pathogen called S. typhi was found to be the cause of food- and waterborne gastroenteritis in human beings and a study showed that Food Handlers had this pathogen (Abera *et al.* 2010: 46). Furthermore, Abera *et al*. (2010: 48) conducted a study on Food Handlers in Ethiopia and found that 41.1% of the Food Handlers had intestinal parasites, which are caused by poor personal hygiene and poor environmental sanitation. In addition 6.5% of the Food Handlers were suffering from diarrhoea and were found to have pathogens that can be transmitted to food and that do not require environmental maturation meaning they can cause illness immediately.

According to Chukuezi (2010: 55), food can be contaminated either before or after cooking by the food handler. A study done by Chukuezi in 2010 in Nigeria showed that a lack of formal training in food safety was evident and unhygienic conditions were found in all the food service departments. Personal hygiene is important; Food Handlers are the biggest source of contamination of food as they are the drivers of cross-contamination.

1.4 Background to the problem: The South African perspective

Gordon-Davis (2011: 2) reveals that every year thousands of consumers in South Africa experience vomiting, stomach cramps and severe diarrhoea due to consuming unsafe food. Due to the lack of knowledge with regard to food safety and food hygiene, thousands of food poisoning cases go unreported unless they are severe enough to require treatment. It is evident that the general South African community is uninformed and even somewhat ignorant about food safety principles, policies and standards and an even greater lack of knowledge about food safety laws associated with food handling, food transportation and food storage is evident. This is testament to the statement revealed by Sani and Siow (2014: 210) that in developing countries more than one third of the population will suffer from food-borne illnesses annually but as explained by Griffiths (2006: 10) underreporting paralyses accurate data collection which makes it difficult to accurately diagnose the problem.

The lack of personal hygiene ranks as the most common faulty practice linked to food-borne illness cases amongst Food Handlers. Unhygienic working environments, which include the working surfaces and poor hand hygiene are also some factors that add to the phenomenon. The hands are a vehicle of cross-contamination and when unhygienic have the ability to cause food-borne illness and disease (Lues and Van Tonder; 2007: 326). A study done in Eastern Cape Province in SA by Nyenje, Odjadare, Tanih, Green and Ndip (2012: 2610) revealed that there was evidence of different bacterial load counts for foods tested from both hygienic and unhygienic food service establishments, with the unhygienic food service establishments tallying the highest bacterial count and making the food served a potential hazard to the consumer.

Vegetables were recorded to have the highest bacterial count as they undergo minimal or no cooking throughout the food chain, and data suggests that vegetables can be contaminated at the farm and bacterial

growth can multiply throughout processing especially when Food Handlers and food safety standards within food service establishments are suspect. The lack of resources can perpetuate the level of bacterial count recorded in a food establishment, and Nyenje *et al.* (2012: 2610) further explains that the lack of clean running water, storage conditions, correct temperature control and personal hygiene of the Food Handlers remains a great contributor to the food safety issue.

Data from the study done by Lues *et al.* (2007: 328) reports that a higher bacterial count was found on the Food Handlers hands as opposed to their aprons, validating the assumption that the hands are the main vehicle for contamination. A number of food-borne illness-causing bacteria were tested as part of Lues' *et al.* (2007) study, which was conducted in SA in the delicatessen section of a prominent food retail group. Data from the study shows that staphylococcus aureus, which is the cause of food poisoning, was detected on three Food Handlers and one food handler had e-coli, making the occurrence of food contamination unavoidable.

Temperature control remains at the heart of food safety concerning bacterial growth in food. In SA, more disciplined hygiene standards are important, as the country's climate is relatively warm; this is because harmful bacteria in food thrive in warm climates (Gordon-Davis 2011: 3). The lack of knowledge about how bacteria multiply in food and how cross-contamination occurs in food is the underlying cause of food poisoning. The manufacturer alone is not responsible for food safety but the government and the actual consumer both have an important role to play (Griffiths 2006: 7). An incident reported by the Department of Health (2004: 1) revealed that in Gauteng, a product recall was done after a food safety alert was investigated on tinned pilchards in tomato sauce. The product had been reported to cause severe illness in two children. The investigation revealed, however, that the product was actually donated food and that the tin was rusted hence the product became poisonous to the family. In this case, it was evident that greater measures should have been taken within the food control system of the country and that all parties involved in the food chain needed to take accountability and responsibility.

Lues *et al.* (2007: 326) state that although Food Handlers are being trained, food safety incidents have not decreased because faulty food handling practices are still evident. Griffiths (2006: 13) states that training should be aimed at improving Food Handlers behaviour towards food safety because generic approaches do not work and that food safety management systems need to take into account the organizational structure. Griffiths (2006: 11) states that the food safety organizational culture is concerned about the Food Handlers knowledge, attitudes and practices in relation to the organizational standard (management policies and standards). This could be influenced by handwashing facilities (which would promote personal hygiene and good hygiene standards) and organizational time dedicated to food safety activities. However, Griffiths (2006: 11), acknowledges that the success of a healthy food safety management system that is integrated with the organizational culture could be constrained with the type of business each establishment may be conducting, especially in a food service establishment where food is made to order.

1.5 Rationale and motivation

The Center for Disease Control and Prevention (2011) states that food safety is a public health concern; an estimated 48 million illnesses, 128 thousand hospitalizations and three thousand deaths were credited to food-borne illnesses in the USA. The National Restaurants Association (2013) reveals that in the USA the majority of the population procures food from food retail establishments, which are the source of outbreaks of food-borne illnesses; the lack of food safety thus accounts for the high rate at which food-borne illnesses occur.

Consumers have a right to expect and procure food that is of good quality and safe for consumption (Seaman and Eves 2010: 1040; Trienekens and Zuurbier 2008: 107). The number of product recalls has caused the lack of assurance about food safety; consumers have lost trust in food manufacturers and government (Marucheck, Gries, Mena and Cai 2011: 707). During a product recall, it is important how the communication of such is conveyed. According to Hutter and Jones (2007: 30), the aim during a recall is to restore the assurance of food safety to the consumer. The media, however, becomes excessively excited and pronounces on exaggerated facts that implicate either the company in question or the particular food product, which then affects the whole food industry, regardless of whether the product recall had harmed any person. With the accelerated growing rate of globalization, it has become of paramount importance that the food service industry makes food safety a priority. The estimated global population growth will be over nine billion by 2050, which will put strain on food demand. To cater for the growing population, the emerging and sophisticated supply chain has put logistic plans in place to address the growing demand for food but in so doing they have compromised product safety and security (Kwasek 2012: 704). Marucheck *et al.* (2011: 708-709) elaborates by defining the supply chain's responsibility with regard to product safety, which is ensuring that food consumed will not cause harm upon consumption and product security is the assurance that the product has not been tampered with in transit. The supply chain's strategy to outsource contract packers has demanded more attention about addressing security breaches and even possible sabotage. The manufacturing company that sells the product to the consumer still remains responsible and accountable to ensure that the food procured and consumed will not cause harm and is safe to consume even if contract packers do the packing. It is then crucial, as the ISO 2200; (2005: 19) standard suggests, that internal audits are done in order to ensure food safety.

The rapid population growth in the world's population has made a large number of people poverty stricken (WHO 2013) and the informal food trade (street food) has found a ready market in which to operate. The availability of money will determine a person's access to food (Kwasek 2012: 701). The informal food trade makes cheap food available and caters for a substantial number of households; informal food markets are self-governed and may have little or no food safety assurance. Data revealed by the WHO (2013) suggests that there are a number of food-borne illness outbreak cases that are accredited to street food; street food is a breeding ground for illness as there are limited or even no control measures regarding storage,

temperature control, clean water and waste disposal. In an effort to alleviate food insecurity, the informal food trade needs to be improved with the help of urgent support and interventions (WHO 2013).

Furthermore, with government's efforts to eradicate food insecurity and the rate at which globalization is happening, food safety should be urgently addressed and should not be compromised (Kwasek 2012: 702 and Marucheck *et al.* 2011: 707). Kwasek (2012: 702) continues to emphasize that in order for food security to be deemed to have been achieved, food safety remains an important aspect. Consumers strongly consider food quality and food safety to be an important driver for procuring food at a particular establishment. The Human Science Research Council (HSRC) (2009: 9) defines food security as the individual's ability to get enough food to meet their needs. In addition, food security is the accessibility of safe and nutritious food without having to consider other strategies. Furthermore, Barrette (2010: 825) clarifies this definition by stating that food security is when all individuals at all times have access to enough food which is physically, socially and economically accessible; this food should be safe for consumption and nutritious thus meeting the individual's dietary needs and preferences in order to achieve a healthy lifestyle. Food security is thus determined by availability, accessibility and usage. It is therefore accurate to conclude that the absence of some or all of the above-mentioned factors will imply the existence of food insecurity.

Food availability does not guarantee that the food is safe for consumption, nutritious and/or sufficient to meet dietary requirements. Therefore, the WHO (2007) stipulates that in its attempt to achieve food security on the African continent, food safety, which guarantees that food is free from any chemical, physical or microbial hazard throughout the process of manufacturing to consumption, is made available to people at an affordable price. In addition, the informal food trade needs to be legislated as it has become widely used in order to cope with food insecurity among the urban poor (WHO 2013).

In order to avert food-borne illness outbreaks caused by food mishandling Medeiros *et al.* (2011: 1136) suggest that hygienic conditions need to exist in the process of food preparation, thus the WHO (2013) stated that personal hygiene is imperative and therefore hand washing remains the cheapest deterrent against food-borne illnesses. Leach (2010: 163) shares the same sentiment and explains that the disregard for food safety in the organizational culture is a contributor to food-borne illness outbreaks, and that the main priority of companies is to make money and they thus tend to ignore food hygiene and safety. Data has shown that 80% of consumers will not return to an establishment that was unhygienic and this was concluded based on data showing that the standard of hygiene is more important to consumers than price. It is now evident that although implementing and maintaining food safety in an establishment requires finances, having good food hygiene and safety standards will attract consumers (Leach 2010: 163-164). Medeiros *et al.* (2011: 1136) highlights that it becomes crucial that the food handler in direct contact with the food is trained on the appropriate safety procedures and steps that are involved in the food cycle.

Seaman *et al.* (2010: 1037) states that the exposed unhygienic conditions that would exist in any food establishment are based on kitchen culture; thus in an effort to assure desirable food hygiene conditions, it is important to address the approach that food hygiene training programmes use. Seaman (2010: 382) recommends that training should be relevant and specific, and actioned to lay a foundation of food safety knowledge thus enabling the food handler to make informed decisions regarding food safety. Leach (2010: 163-164) explains that the ignorant behaviour and mindset of establishments with regard to food hygiene needs to change, as food hygiene is not only law-based but is concerned with the health and safety of the end user. Egan *et al.* (2007:1180) believes that proper training would remedy the occurrence of food-borne illnesses and benefit the food industry. In addition, evidence shows that it is crucial that food service managers and supervisors are trained on food hygiene so as to be able to lead by example and assign appropriate training for Food Handlers and offer continuous support (Egan *et al.* 2007: 1181).

According to the ISO 2200 standard, food safety is everyone's responsibility within the food chain and all personnel are responsible for maintaining food safety within each area of work. Egan *et al.* (2007: 1181) further explains that the food safety management system includes everyone but it remains the manager's responsibility to maintain; thus food safety knowledge and practice becomes imperative for all managers and supervisors. In order for any food law and food safety plan to be effective, the Food Handlers who are responsible for maintaining good food hygiene need to be trained, monitored and coached thereafter by trained managers who deem food safety important. It is critical that management also provides pre- and post-training support by making the required equipment and procedures available. Food hygiene and safety training programmes from the past have focused heavily on information but recent research has revealed that knowledge does not guarantee correct behaviour. McIntyre, Vallaster, Wilcott, Henderson and Kosatsky (2013: 154-155) showed that trained Food Handlers had better food safety scores with regard to food handling behaviour which, however, decreases with time.

Research suggests that behaviour could be influenced by other factors that need to be addressed. It is therefore advised that changing bad behaviour will change food-handling practice and reduce food-borne illness outbreaks and therefore the implementation of reliable food safety standards like Codex Alimentarius, HACCP systems and ISO standards in any food establishment, and the monitoring and maintenance of such will ensure food safety throughout the food cycle. In addition relevant, job specific, practical training programmes are essential (Egan *et al.* 2007: 1181-1182; WHO 2013; Leach 2010: 163-164; Medeiros *et al.* 2011: 1136,1142-1143; McIntyre, Vallaster, Wilcott, Henderson & Kosatsky 2013: 154-155; Jianu & Chris 2012: 151-156 and Trienekens *et al.* 2008: 111-112).

1.6 Research aims

The purpose of the study is to compare the food hygiene, food safety, food handling practices and knowledge of Food Handlers in a food retail company in Durban, in order to inform management of the

standards of food hygiene, food safety, food handling and knowledge that exist in the different establishments within the company outside of audit results and scores that could be manipulated.

In gathering this information, it is important to investigate the gaps that exist in the food industry with regard to food hygiene and food safety, training, management involvement, food handling practice, food hygiene and food safety knowledge, attitudes and behaviour gathered by observation.

1.6.1 Specific objectives

- To determine the food hygiene, food safety, food handling practice and knowledge of the Food Handlers by using a Food Handlers questionnaire.
- To determine the food hygiene, food safety, food handling practice and knowledge of the food manager/supervisors by using a managers/supervisors questionnaire.
- To determine the food hygiene, food safety, food handling practice standards of the Food Handlers by using an observation checklist.
- To compare the observed food hygiene, food safety and food handling practice standards against the standards set by the company.

1.6.2 Plan of research activities

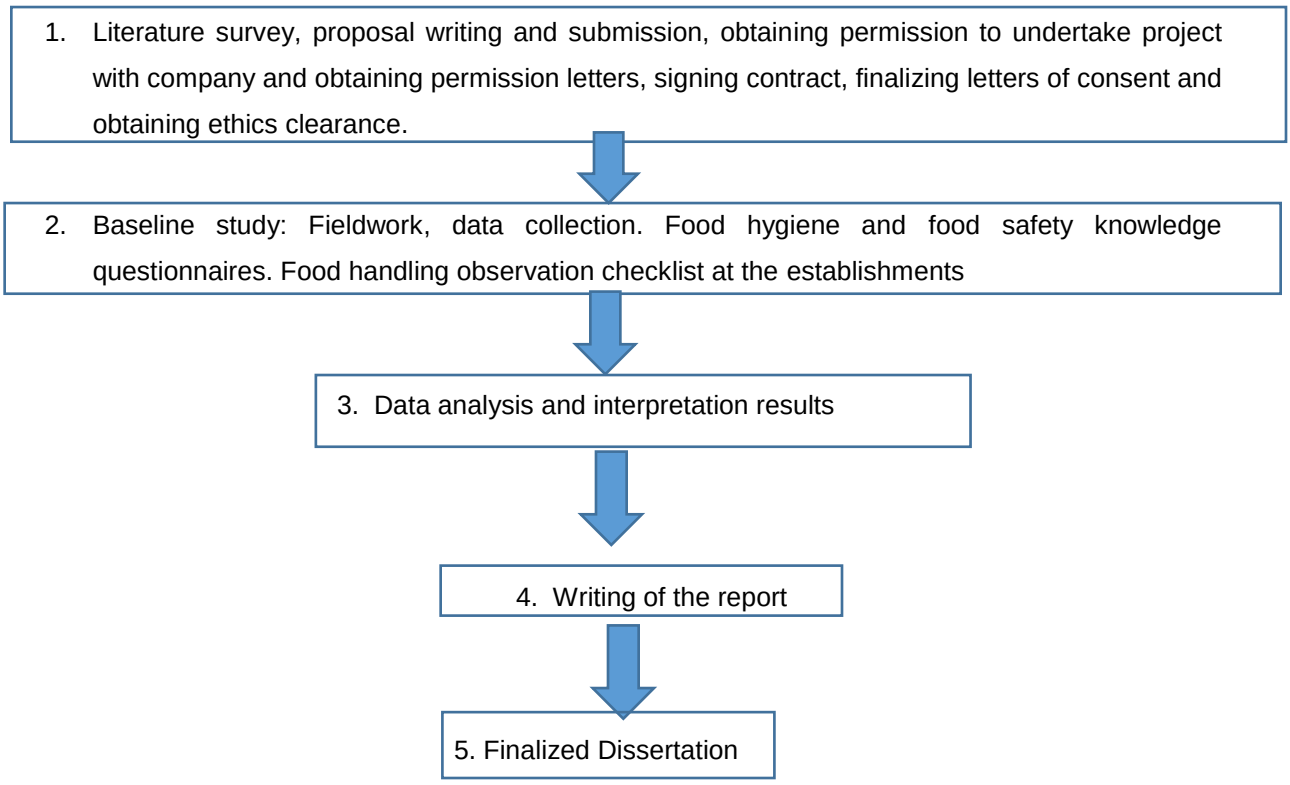

Figure 1.1: Plan of research activities

1.7 Structure of the dissertation

Chapter 1: Introduction and motivation for the study

Chapter 2: Literature Review

- Views and studies conducted by other researchers

Chapter 3: Methodology

- Method of work and tools to be used

Chapter 4: Results

- Data captured and illustrated on tables and graphs for discussion

Chapter 5: Conclusions and Recommendations

- Suggestions for further development and investigation on study

1.8 Conclusion

According to Gordon-Davis (2011: 4) any food poisoning case against an establishment that is linked to poor food safety practices could result in an establishment closing down. It is said that amongst a number of attributes that a consumer considers before making a return purchase, food safety is considered to be of great importance and could determine the reputation the establishment gains.

The WHO promotes that countries should work together in order to address food safety through the established global food-borne infections network that focus on laboratory surveillance (Fukuda 2015: 212). There is a need for proper preventative communication and commitment related to food safety that needs to be shared globally. Accurate data collection regarding food-borne illness cases and effective solutions to eliminate such cases needs to be implemented. Food safety is a public health concern and needs to be treated as such with urgency. Government involvement should not be limited to policy setting but also include a greater responsibility on the selection of food producers and suppliers within the established food safety system on a national scale (Fukuda 2015: 212).

CHAPTER 2

REVIEW OF THE RELATED LITERATURE

2.1 Introduction

This chapter will review the literature on the history of food safety, international and national food laws and food safety control systems, food-borne diseases, food fraud, globalization and its impact on food safety, and climate change and its impact on food safety and food security. Relevant literature from multiple authors will be discussed and findings from previous research related to food safety will be presented.

2.2 The history of food safety

The earliest form of food safety from a historical perspective was concerned with the direct avoidance of toxic foods and food preservation. Although the term food safety was unknown, food preservation was in the form of salting, drying and fermenting food, which made the food safer to consume. According to Griffiths (2006: 7), in biblical times Moses established laws that are now known as food safety measures to protect people from harm, and these measures were in the form of personal hygiene post sacrificial services. The Israelites had laws concerning food preparation and personal hygiene that also included foods to be avoided. In Genesis (9 verse 4) it states that the Israelites were prohibited from eating raw meat that still had blood in it. Additionally, Leviticus (11 verses 1-47) notes that raw and cooked food must be separated and the mixing of such was viewed as unclean practice whilst in the book of Deuteronomy (14 verse 21) the Israelites were told not to eat animals that were found already dead. With regards to cross contamination, in Leviticus (7 verse 19) it states that, if clean food touches unclean food the 'clean' food must not be eaten. The prohibition on eating dead animals was also recorded in Ezekiel (4 verse 14). Exodus (16 verses 19 and 20) states that manna had to be eaten on the day it was baked because it would not be safe to eat the following day. Those who kept the manna overnight found it had maggots and it had a bad odour. Deuteronomy (23 verses12 and 13) states that when encamped, places outside the camp must be designated 'for squatting' and that bodily waste must be buried. In the book of Leviticus (16 verses, 4 and 23 to 24) there are instructions about personal hygiene and clothing before and after sacrificial slaughtering; it states that the high priest must remove his clothing and destroy it then bath in order to be clean after the service of slaughtering. The above references describe a number of food safety disciplines.

In 1676 Antionie van Leeuwenhoek's first attempts at reporting on the origins of micro-organisms had little effect on food safety; the process of food preservation was only invented between 1760 and 1830. In 1810 commercial heat processing was introduced `and 1880 saw the beginning of the golden age of food microbiology with the advances in medicine. The work of Nicholas Appert and Louis Pasteur remains relevant to this day. Throughout history, early food microbiology was focused on dairy products, food processing and shelf life instead of food safety. The first textbook published in 1944 on food microbiology

lacked information on food safety but a later version in 1956 contained food safety information, which covered food poisoning and infections, investigation of food-borne disease outbreaks and the microbiology of food plant and sanitation. It had been recognized that microbiology plays an important role in food safety (Griffith 2006: 8). In the 1920s a new strategy on food safety was introduced; this was a preventative approach to food safety; however, it was documented that the approach failed and in the 1930s the strategy was revised. It was only in the 1970s that the preventative strategies in food safety were seriously considered thus giving birth to the Hazard Analysis Critical Control Points (HACCP) strategy; this strategy was the food safety management approach which aimed at producing microbiologically safe quality food with the use of the Pre-Requisite Programmes (PRP) (Griffith 2006: 11).

Gordon-Davis (2011: 22) elucidates that HACCP was developed in the USA in 1960s and that it was implemented to maximise food safety for food that was sent to astronauts as the risk of food poisoning had to be eliminated. It was only in 1990 that the Food Safety Act was published and in 1995 the Food Safety Regulations (general food hygiene regulations) were published (Griffith 2006: 8).

2.3 Food safety regulations

Food safety is very important in the global food chain. The expectation on food manufacturers is to minimize the risk of food safety hazards (Macheka, Manditsera, Ngadze, Mubaiwa and Nyanga 2013: 126). There are various national and international food safety systems available in order to achieve food safety. With the growing need for and practice of food imports and exports, many countries have been compelled to ensure food safety at a global level by means of the implementation of international standards at a national level (Gauthier and Mahabir 2013: 1).Summarised International and National Food safety standards will be presented and discussed to indicate what is expected in the food environment.

2.3.1 International standards

2.3.1.1 Codex Alimentarius standard

The internationally accepted food safety standard is the Codex Alimentarius, which encompasses food safety laws that guide food manufacturers, taking into account all foods in whichever format the consumer may procure them. The Codex Alimentarius addresses topics such as all aspects of internationally recognized essential hygiene requirements, establishment design and facilities, best practice manufacturing standards, food transportation, product quality, consumer awareness and training and encourages the use of HACCP. In addition it includes the code of ethics for International trade. The Codex Alimentarius standard sets objectives and explains the reasoning behind the objectives; it takes into account the full food chain and includes all food items up to final consumption by the consumer – 'from farm to fork' (Gauthier *et al.* 2013: 1).

Codex Alimentarius is Latin for ‘food code’ and has been adopted by the Codex Alimentarius Commission referred to as the CAC. Its purpose is to ensure that food is safe for every individual everywhere in the world. Furthermore, it seeks to ensure that food is of good quality and that the food trade is fair. In addition, its aim is that the consumer can trust the food procured, whether it is of national or international origin and that the food manufacturers and sellers trust the food commodities imported and exported (FAO 2013).

For the purpose of this chapter, the Recommended International Code of Practice: general principles of food hygiene in the Codex Alimentarius Commission (CAC/RCP1-1969, Rev.4 -2003) will be discussed.

It is a consumer’s right to have access to food that is appropriate for consumption and that is clean and safe. When a food-borne illness outbreak occurs the most detrimental result is death but other injurious effects are loss of employment, damaged trade and tourism, loss of business and costly legal action that can cripple the economy of a country. The food hygiene general guidelines therefore serve as a baseline to achieve food hygiene (CAC/RCP1 2003: 3).

It is the responsibility of any government to safeguard its consumers and food industries from the traded food by establishing and enforcing strict food policies that ensure that food is suitable for consumption thus protecting consumers from illness and disease. The expectation on government is to educate consumers and the food industry on food laws. The role of the food industry is to ensure consumers are sold safe food and that consumers are provided with product information that stipulates the necessary instructions on product usage, storage and handling by the use of clear labelling methods. It remains the seller’s responsibility to ensure that the food purchased from raw material suppliers complies with approved food safety standards. The consumer, however, is likewise responsible for using the food as instructed and maintaining hygienic standards (CAC/RCP1 2003: 3-4). The producers (primary production stage) are expected to ensure that food is produced in hygienic conditions by avoiding hazardous working environments; they are entrusted to control and eliminate contaminants that could be introduced at the primary stage and which could pose a threat throughout the entire food chain (CAC/RCP1 2003: 5-6).

Food establishments must not be located near environmentally polluted areas and swamp lands that are prone to flooding, areas that are subject and susceptible to pest infestation and areas where waste cannot be removed. The design and layout of the establishment should promote good food hygiene practice and should not expose food to cross-contamination. The building material must be of a durable nature that is easy to clean and disinfect. The following regulations must be complied with:

- The walls and doors must have a smooth surface and be easy to clean.
- The floor design should permit easy cleaning and adequate drainage.
- The ceiling construction must be designed and finished to eliminate dirt build-up and condensation.
- Windows must be easy to clean and be fitted with insect-proof screens.

- Working surfaces that are in contact with food must be durable, easy to clean, non-absorbent and non-reactive to cleaning chemicals.

Equipment and containers used for food must be designed to allow for easy cleaning, made of non-toxic material, easy to disassemble, maintain and disinfect. Containers used for waste and or dangerous substances must be identifiable and clearly marked to avoid accidental food contamination (CAC/RCP1 2003: 8-9).

Facilities guidelines:

- Potable water (drinking water) must be available and kept separate from non-potable water.
- Waste and drainage systems must be provided and designed so as not to contaminate the potable water supply.
- Cleaning equipment for food and non-food items must be provided together with hot and cold water.
- Personal hygiene facilities should have wash-hand basins with running hot and cold water, a hand-drying mechanism and changing facilities for staff with adequate toilets of hygienic design.
- Artificial mechanical ventilation must be provided in order to reduce air-borne contamination, and control odours and humidity. The design of the ventilation system must be such that it does not allow contaminated air to flow back into the clean areas but must work according to an extraction method.
- Natural and artificial light should be provided by means of light fittings that are protected thus protecting the food from light fitting breakages.
- Storage areas must be provided, secured and designed to facilitate storage of food and non-food items separately. Areas must be designed to keep pests out and protected so that food is not contaminated. Desired temperature/humidity should be controlled so that items do not deteriorate (CAC/RCP1 2003: 10).

In order to have control over food hygiene throughout the product life cycle, preventative measures need to be established thus assuring the safety of food produced throughout the food chain. The HACCP system is a tool that assists in controlling food hazards throughout operations and the product shelf life by:

- Identifying the critical steps in production that are crucial to food safety
- Implementing critical control measures at those steps
- Monitoring the effectiveness of these control measures
- Reviewing control measures periodically and when changes are made to operations.

There are five critical elements that need to be controlled to achieve and maintain an effective hygienic control system:

i. Time and temperature

Food spoilage is commonly caused by uncontrolled temperature. Temperature needs to be controlled during cooking, cooling, processing and storage. Control of temperature is linked to time and therefore when controlling temperature the time at which that temperature is achieved and maintained must be taken into account.

ii. Processing steps

Processing steps include the chilling, drying and chemical preservation of food.

iii. Microbiological and other specifications

An HACCP approach is most effective in controlling this element, as a sound scientific method is vital.

iv. Microbiological cross-contamination

Agents of contamination are transferable, therefore raw food and cooked food/ ready-to-eat food must be kept separate. Access to processing areas should be restricted, and high risk areas need to be controlled by the washing of hands and wearing of protective clothing before entering.

v. Physical and chemical contamination

Food must be protected from glass, metals, dust and other foreign objects. Control measures like screening devices should be in place as needed (CAC/RCP1 2003: 11-12).

According to the Codex standards (CAC/RCP1 2003: 13), all raw materials should have set hygiene parameters and be tested before use. All raw materials should be free from harmful substances that include pesticides, chemicals and toxins as the producer is responsible for ensuring that all substances are reduced to an acceptable level during sorting.

Appointed managers and supervisors should be trained, be knowledgeable about food hygiene and capable of executing food hygiene principles and practice. They should also be skilled to identify hazards, implement control measures and monitor critical control points (CAC/RCP1 2003: 13).

It is important that processing, production and distribution records are kept and are accessible in respect of the shelf life of the product as records validate the reliability of the control systems in place. When a manufactured product is withdrawn from the shelves because of a suspected or valid food safety risk this is known as a product recall, and food manufacturers are therefore expected to have procedures in place that will enable quick and accurate product recall of any suspect product. Record keeping should be able to facilitate the prompt execution of a product recall (CAC/RCP1 2003: 14) hence documentation and record keeping is deemed important for any effective food control system.

Cleaning chemicals should be kept separate from food and be used and stored as instructed on the manufacturer's label of instructions and labelled clearly to avoid accidental contamination of food. Cleaning should remove any sources of contamination such as food residue and dirt. Cleaning can be achieved by

the use of water and cleaning agents, or by using other methods such as heat, vacuum and turbulent flow systems that exclude water together with the use of detergents, alkalis and acids. Cleaning should be carried out throughout the establishment and cleaning programmes should be monitored for effectiveness. Cleaning programmes should be documented as part of standard operation procedure and should include (CAC/RCP1 2003: 14-15):

- The items of equipment that need to be cleaned
- Persons responsible for specific cleaning tasks and actual responsibilities
- The method and frequency of cleaning
- Monitoring procedures.

Effective cleaning and monitoring procedures together with inspection of incoming material can limit pest activity. Pests can infest areas that have a food supply and that encourage infestation and breeding, hence established good hygiene procedures can destroy environments that encourage pest infestation.

The foundation for an effective pest control system includes:

Preventing access

- Holes in walls, drains, hollow gaps and spaces act as pest access points therefore buildings need to in a good state of repair and potential access points need to be sealed. Wire mesh screens installed on opened windows and ventilators will prevent the entry of pests. Animals should not be allowed on factory and food plant premises.

Harbourage and infestation

- Food and water act as a catalyst for pest infestation thus food should be stored in airtight containers and away from the floor and walls. Food establishments need to be clean inside and outside with prompt waste removable practices. The refuse bins need to be covered and kept away from production areas. Waste areas must be kept clean and waste must not be allowed to accumulate.

Monitoring and detection

- Food establishments need to have routine surveillance of pest activities and should be examined for potential evidence of pests.

Eradication

- Pest activity and infestation activity should be immediately addressed by chemical, physical or biological treatment agents that will not adversely affect the safety of food.

The effectiveness of a sanitation system should be monitored periodically by means of audits, pre-operational inspections and microbiological activities. The examination should include the sanitation system environment and food contact surfaces (CAC/RCP1 2003: 16).

The health status of Food Handlers is vital to the safety of food; persons that have any illness or disease that could be transmitted to and through food should be prohibited from handling food and accessing food areas. Jaundice, diarrhoea, vomiting, fever, sore throat, skin infections and lesions, and discharge from the

ears, eyes and nose are conditions that should be immediately reported to management and should lead to exclusion of the food handler after medical examination where possible. Medical examination of Food Handlers should be carried out periodically.
Personal cleanliness should be a vital priority for Food Handlers. Protective clothing, head covering and footwear should be provided and used. Permitted minor cuts and wounds should be covered with waterproof dressings.

Food Handlers should wash their hands in all circumstances such as after using the toilet, after handling raw food and at the start of any food handling activities that could pose a threat to food safety. Food Handlers should desist from behaviour such as smoking, spitting, chewing or eating, sneezing and coughing, as well as wearing jewellery and wrist watches as this poses a threat to food safety. Visitors are to adhere to the same hygiene practices when entering the food areas (CAC/RCP1 2003: 17-18).

Food transportation hygiene principles indicate that during transportation food that was previously safe may become contaminated unless strict hygiene control measures are taken. Food storage containers must be designed for purpose and must not contaminate food, must be easy to clean and disinfect, and must provide protection for food from dust and other contaminants; they must also be able to maintain the desired temperature/humidity for the particular food item and allow for temperature and humidity testing. The containers that are used for transporting food must be kept clean and in good condition. Food containers must be designated as such but in the event that the food containers are also used to transport non-food items, disinfection and effective cleaning must take place in-between loads (CAC/RCP1 2003: 18).

Products must contain all the information that will enable the next person in the food chain to handle, store, process, prepare and display the item accordingly. Product information is paramount and facilitates accurate stock rotation and prompt product recall. The consumers' responsibility is to understand and follow the instructions stipulated to prevent mishandling that could encourage the growth or survival of food-borne pathogens that cause illness, disease and death. Products should be labelled to include the information as stipulated by the Codex General Standard for the Labelling of Prepackaged Foods (CODEX STAN 1-1985, Rev. 1(1991)); the relevant information should include (CODEX STAN 1 1991: 3-12):

- The specific name of the food and
- The list of ingredients.

The section of the label designed to communicate the list of ingredients should have a heading entitled 'Ingredients' and all ingredients should be listed in descending weight order as added in the formulation. When an ingredient weight contributes less than five percent to the formulation of the product, unless it is an additive, omission from the list of ingredients is permitted. Where irradiated ingredients are used the label shall declare such and may use the international symbol 

- The net weight and drained weight
- Weight should be indicated as follows: liquid foods by volume; solid foods by weight and semi-solid/viscous foods by weight or volume. Additionally, solid product packed in a watery solution should declare the drained weight.

- Name and address of the manufacturer, packer, distributor, importer and exporter.
- Country of origin

Where a product undergoes processing in a secondary country where the nature of the product is changed, the second country is considered the country of origin.

- Lot identification that communicates the producing factory and batch number.
- Date marking and storage instructions

The date shall be declared "Best before..." or "Best before end…" and be in day, month and year format. Storage conditions for the product shall be declared especially if the storage conditions influence the declared shelf life.

- Instructions for use.

Food hygiene training is fundamentally important for the success of any food control system. All Food Handlers should be trained in food hygiene, as every person entrusted with handling food is a potential threat to food safety. The Food Handlers' responsibility to protect food from contamination can only be achieved once knowledge and skill on food hygiene has been imparted. Training programmes should be designed to address the nature of the food and its ability to spoil, the likelihood of contamination and the method of food handling, the extent of processing and food storage conditions. Management should periodically do an assessment of the effectiveness of training provided by assessing the demonstrated practice of Food Handlers. Furthermore, training material should be reviewed and updated regularly to ensure that Food Handlers are conforming to the established food safety procedures in order to keep food safe (CAC/RCP1 2003: 20).

2.3.1.2 Hazard Analysis and Critical Control Point (HACCP) system

The HACCP system is a science-based and methodical tool. The approach is to identify hazards and implement control measures in order to ensure the safety of food. The HACCP tool uses a preventative approach rather than a reactive approach, as it assesses hazards for their potential to create food safety risks and establishes control systems to manage them. Having a HACCP compliant system increases confidence, heightens food safety and can be used throughout the food chain.

The HACCP system makes up part of the quality management system and is recommended by the Codex Alimentarius Commission as the preferred approach to achieve food quality (CAC/RCP1 2003: 21). Cusato, Tavolaro and de-Oliveira (2012: 21) reiterates that the HACCP system is most capable of ensuring food safety due to its preventative approach. It encourages anticipation of a food safety risk within the process and the implementation of preventative control measures to prohibit the hazard from occurring. It foresees potential hazards that could arise from material, process, machinery, people, water and waste (looks at the whole production step by step) and forces the identification of relevant control measures to mitigate the risk the hazard poses. Additionally, HACCP is held in high esteem by the WHO, the International Commission on Microbiological Specifications for Foods, the Codex Alimentarius and numerous other food safety regulatory departments (CAC/RCP1 2003: 21 and Cusato *et al.* 2012: 21). The effectiveness of HACCP in reducing, eliminating and preventing food-borne illness and identifying and controlling critical control points (CCPs) within the process of food is dependent on the correct implementation as communicated by Sampers, Toyofuku, Luning, Uyttendaele and Jacxsens (2012: 227), and Cusato *et al.* (2012: 22) adds that the success of the HACCP system is dependent on understanding and accurate implementation.

Prior to HACCP application, the establishment should have well established, operational and verified PRPs in place, as solid PRPs promote an effective HACCP system. A good foundation of Good Hygienic Practices (GHPs) as prescribed by the Codex General Principles of Food Hygiene, Good Manufacturing Practices (GMPs), local food safety requirements and training are essential PRPs for the application of a HACCP system (Cusato *et al.* 2012: 23; Sampers *et al.* 2012: 227 and CAC/RCP1 2003: 24). Karaman, Cobanoglu, Tunalioglu and Ova (2012: 732) state that HACCP is only effective when used in conjunction with GMPs, GHPs and other quality management systems. Failure to have solid PRPs in place complicates the HACCP plan as it leads to more critical control points to control (Cusato *et al.* 2012: 23).

The next step in the application of HACCP is the successful implementation of the Preliminary Procedures:

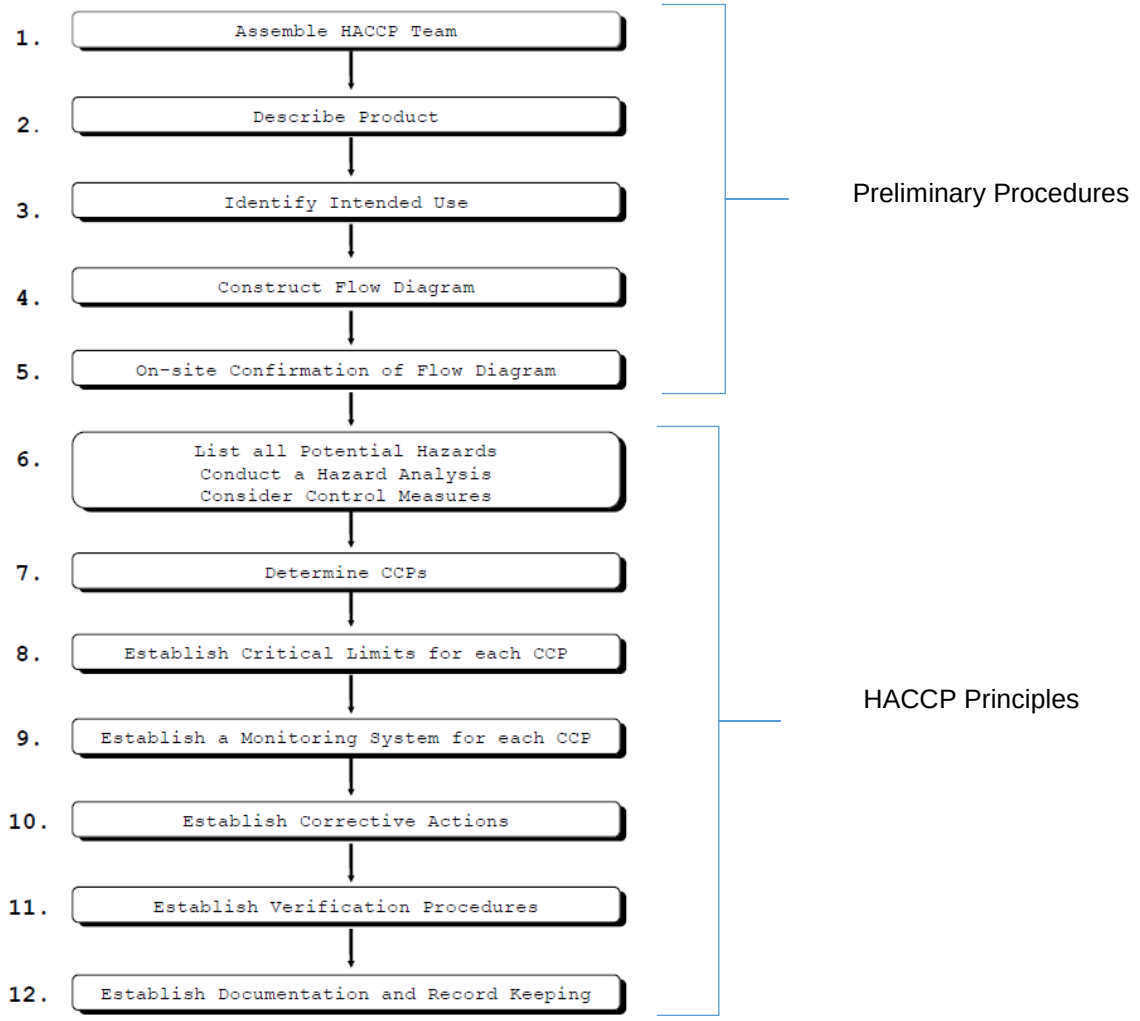

Figure 2.1: The logical sequence for the application of HACCP (CAC/RCP1 2003: 29)

The success of the HACCP system requires 100% management and employee involvement and commitment. Application requires a multidisciplinary approach, which includes experts in each stage of the food chain specific to the particular study (CAC/RCP1 2003: 21). The HACCP team should be a multidisciplinary team of experts with specific product knowledge. Where there is a lack of expertise, the operation should obtain expert advice from other sources (CAC/RCP1 2003: 25). According to Cusato *et al.* (2012: 29), the lack of training for both the managers and employees causes companies to rely on external experts for the implementation of HACCP, which can prove to be expensive. This was evident in a study done in Brazil where the main contributing factor that hindered the implementation of HACCP was lack of finances and knowledge. A study done by Sampers *et al.* (2012: 231) in Japan shows that 62% of

the companies had very low scores for management commitment which resulted in low performance of food safety management systems and food safety output.

Product description must include the details of the product in full; this would include the product composition, microbiological, physical and chemical aspects, specifications, retail conditions, shelf life, handling procedures, packaging and storage. A flow diagram should document in detail the steps involved in the production of the product, and this should include the equipment used in the working environment. The flow diagram must reflect the exact steps in operations as they are used to identify hazards and position control measures (Cusato *et al.* 2012: 24 and CAC/RCP1 2003: 25).

The HACCP system consists of the following seven principles (CAC/RCP1 2003: 22-23):

- Principle 1: Conduct a hazard analysis.

Using the flow diagram, the HACCP team should identify possible hazards that can occur within the system at each step of production. This analysis should cover the process from primary inputs up to consumption.

- Principle 2: Determine the Critical Control Points (CCPs).

The team must find the point at which the hazard can be eliminated/reduced/prevented. The use of a decision tree is encouraged to facilitate the process. The decision tree asks questions that direct the process of CCP identification.

- Principle 3: Establish critical limits.

Each CCP must have a critical limit, which could be based on scientific facts such as time, temperature and pH. Some critical limits can be based on literature. Here the team puts measures in place that will maintain the acceptable conditions.

- Principle 4: Establish a system to monitor control of the CCP.

Measuring procedures should be established by means of observations, measurements, analytical or visual means. Here the CCP is monitored and measured against the established critical limit.

- Principle 5: Establish the corrective action to be taken when monitoring indicates that a particular CCP is not under control.

Rapid response corrective action measures must be developed to address CCP deviations. The corrective action must normalize the CCP and the handling of the affected product must be documented for effective disposal.

- Principle 6: Establish procedures for verification to confirm that the HAACP system is working effectively.

Auditing and verification procedures must be established and random sampling and analysis must be conducted. The person who is assigned to do the audit and verifications must be a person other than the person responsible for the function under scrutiny.

- Principle 7: Establish documentation concerning all procedures and records appropriate to these principles and their application.

Record keeping for HACCP is vital; documents should include the hazard analysis, the CCP determination (decision tree) and the critical limit determination. Records should include the CCP monitoring, corrective action and verification procedures.

The Food and Drug Administration (FDA) adopted HACCP in 1972 for low-acidic canned food and currently it has been deployed for fish, poultry, beef products and foreign fruit juice producers. The US department of Agriculture and the swine exporters have been obligated by the FDA to use HACCP. In 1994 the Ministry of Health in Brazil declared HACCP mandatory for all food handling establishments. Accordingly in 1998, establishments that handle products of animal origin implemented HACCP as instructed by the Ministry of Agriculture. In 1993 the quality management system was introduced in Canada (Cusato *et al.* 2012: 27-28). In 1998 Japan revised the country's food sanitation law (Law number 233, 1947) by introducing HACCP and GHPs on a voluntary basis for all food manufacturers, which included the milk and milk product industry (Sampers *et al.* 2012: 228). Milk and milk products are regarded as high-risk foods and become hazardous when produced in unsafe conditions. Every step in dairy production is a potential source of contamination and in order to minimize risk, manufacturers have developed procedures such as HACCP in order to maintain the highest levels of food safety (Karaman *et al.* 2012: 732). Evidently, a study done in Japan by Sampers *et al.* (2012: 231) showed that all the establishments had favourable scores for food control systems as well as excellent levels of documentation and record keeping; this was because the hygiene legislation in Japan is strictly followed and enforced for food manufacturers.

HACCP is mandatory in Turkey as revealed by Karaman *et al.* (2012: 738). The study showed that managers believed that having HACCP increases consumer confidence in a product but does not necessarily increase market share. Management is motivated to implement HACCP as it reduces product re-calls, which saves costs and improves the business margins. Managers believed that having quality controls on materials and maintaining established controls together with basic hygiene procedures is more important than implementing HACCP in order to achieve food safety. Moreover, a majority of the managers stated that the implementation of food safety management systems would aid in food legislation compliance and increased product quality; however, only half believed that a HACCP based approach can help in achieving such (Karaman *et al.* 2012: 735).

Milios, Drosinos and Zoiopoulos (2012: 284) state that the proper application of HACCP produces great benefits to food safety. Constraints in implementing and maintaining HACCP are lack of training and management involvement. Additionally, there is: no perceived benefit to food safety, evident lack of knowledge, variability in processing methods, changes in consumer demand and the cost of development of the system. A study done in Greece showed that the highest cost in implementing HACCP was training and equipment, whereas for operations it was product testing and management time. The data revealed that the perceived cost for implementation and operations was actually higher than the real cost (Milios *et al.* 2012: 285).

According to Cusato *et al.* (2012: 28), implementing and maintaining the HACCP system requires finances and a skilled and knowledgeable workforce as the lack of such hinders the effectiveness of HACCP especially for smaller sized companies who achieve small profit margins. Sampers *et al.* (2012: 230), in a study of milk-processing plants in Japan showed that companies without HACCP had a lower food safety management system performance output. The data revealed that the majority of the companies were small businesses. Small to medium businesses have been documented as the source of food safety problems. According to Sampers *et al.* (2012: 231) small to medium businesses experience difficulties in adopting quality standards as they have disorganized organizational structures, and challenges such as finances, human resources, skills level, training and motivation are obstacles. The minimal food safety knowledge that exists in small to medium establishments makes it impossible to achieve consistent food safety. Data from the study done by Sampers *et al.* shows that 30% of the establishments did not have food safety procedures, which implies that decision making on food safety is left to individual interpretation. Karaman *et al.* (2012: 733) states that implementing and maintaining HACCP is difficult for big well-established organizations, which becomes even more challenging for small-medium establishments. Sampers *et al.* (2012: 231), however, highlights that the level of food safety risk is the same for any sized establishment. Alarmingly the majority of the companies investigated by Sampers *et al.* (2012: 231) had no power to influence the food safety standards and food specifications of their suppliers thus exerting pressure on the food safety system. A study done in Australia as documented by Milios *et al.* (2012: 285) shows that cost barriers were more evident in small to medium companies as implementing the HACCP system meant a change in infrastructure and facilities that were already constrained. In contrast a study done by Kafetzopoulus, Psomas and Kafetzopoulus (2013: 508) focused on small to medium companies which showed that in 83% of the companies that had been practicing HACCP for more than three years the workforce had obtained higher education contradicts previous literature.

Generally, the challenges in applying HACCP are lack of knowledge, lack of training, lack of management commitment and involvement, rapid staff turnover, complex food handling processes, variation of products, demand changes, high cost of implementation, high level of casual workers, lack of technology, lack of equipment and physical conditions, lack of government support and implementation of HACCP without

PRPs in place. The perspective is that the cost of HACCP outweighs the benefits and that the cost is absorbed as overheads as HACCP costs cannot be charged to the consumer (Milios *et al.* 2012: 285 and Karaman *et al.* 2012: 738).

2.3.2 National standards

Food safety standards, through legislation, have been set for the food industry in order to dictate the process of food throughout the food supply chain to protect the public of SA from food poisoning and food-borne disease. Likewise, the food safety standards protect manufacturers and producers from legal action. The benefit of adhering to the set rules of food safety standards is the reduction and or elimination of hazards that may lead to illness and legal action which would lead to business loss.

In South Africa, there are a number of food control authorities, namely the Department of Health (DoH), the Department of Agriculture, Forestry and Fisheries (DAFF), the Department of Trade and Industry (DTI) and the South African Bureau of Standards (SABS) (Gordon-Davis 2011: 8-9).

Jointly, the departmental authorities aim to:

- Protect the public by reducing food-borne disease incidences.
- Protect consumers from food that is contaminated, harmful, mislabelled, unclean and adulterated.
- Support economic development by maintaining consumer confidence in the food system.
- Provide a good regulatory basis for national and international trade of food (Gordon-Davis 2011: 8-9).

According to Gordon-Davis (2011: 10), the DAFF, through the Disease Act, has introduced laws affecting the animal and agricultural industry to ensure that animal and agricultural products are safe. By controlling the import of products, the Act is able to limit the likelihood of public health threats such as Food and Mouth Disease and Bird flu, which could be introduced to the public through an unprotected food import and export system (Gordon-Davis 2011: 9). The DoH, through the Food Stuffs, Cosmetics and Disinfectants Act (Act 54 of 1972), established food regulations that control food imports and the manufacturing and sale of food. Through district municipalities, the DoH enforces Regulation R918: Regulations Governing the Hygiene Requirements for Food Premises and the Transport of Food at district and local level. The environmental health officers that are employed at district level are qualified to assist with food control issues, transport of food and the application and issuing of Certificates of Acceptability for food establishments as dictated by the Hygiene Regulation R918 (Gordon-Davis 2011: 11-12).

2.3.2.1 Foodstuffs, cosmetics and disinfectants act: regulation r918 of 30 July 1999: regulation governing hygiene requirements for food premises and the transport of food

2.3.2.1.1 Certificate of Acceptance (CoA) for food premises

According to the DoH (2015: 6-9) no food should be handled on premises that do not have valid Certificates of Acceptability (CoA). The process of obtaining the CoA is as follows:

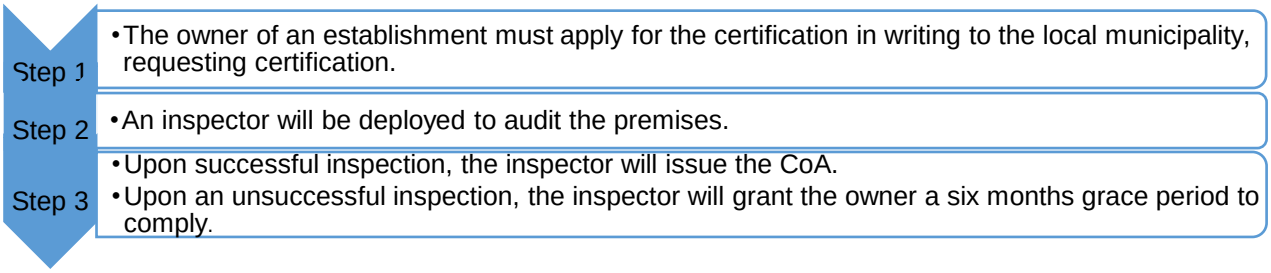

Figure 2.2: Process steps for obtaining CoA for food premises

Once the certificate has been issued, no changes to the premises must be made; when changes are made the owner is to report this to the municipality so that the extent of the changes can be examined. When an establishment has a CoA, it indicates that the premises have been certified as compliant with all regulatory requirements (Gordon-Davis 2011: 13). The certificate should be displayed in a noticeable place for public knowledge. The certificate is issued in the owner's name; consequently a change in ownership would require new certification. Furthermore, the certificate is not transferable and is only valid for the premises on which the inspection was carried out (DoH 2015: 8). In the event that the food premises is suspected of being a health hazard, withdrawal of the certificate is explored by re-inspection and if the suspicions are valid, the certificate is removed and the owner is penalized (Gordon-Davis 2011: 14).

2.3.2.1.2 Standards and requirements for food premises in South Africa

According to the DoH (2015: 10-12), food establishments must be located, designed and built without generating a health hazard. The design of the establishment should facilitate hygienic handling of food thus preventing food contamination. The construction of walls, floors and ceilings must not contaminate food and must be easy to clean. Adequate natural or artificial ventilation and lighting must be provided.

Food establishments must:

- Have washing facilities installed with hot and cold water for cleaning purposes.
- Have an effective pest control method resulting in a pest-free establishment.

- Have effective control measures that hinder the entry of flies and other insects in food preparation areas.
- Have a municipal approved wastewater removal system.
- Have handwashing basins installed with running cold and hot water for staff and visitors.
- Have changing areas with designated areas for storing clothes.
- Have waste bins designed with closable lids and made of easy-to-clean waterproof material.
- Have adequate storage space to facilitate the separate storage of food, chemicals, equipment and waste removal.
- Have adequate water facilities (portable water and taps).
- Be protected from environments that introduce gases, odours and vapours that can contaminate food. Sanitary and waste areas must not have direct access points that lead into food preparation areas, unless installed with self-sealing doors and effective aeration.
- Have enough sanitary facilities for the population of staff in accordance to Regulation 5(3) (d) (i): sanitary convenience that stipulates the acceptable number of sanitary facilities for the population occupying the establishment.

Table 2.1: Regulation 5(3) (d) (i): Sanitary conveniences (adapted from DoH 2015: 30)

Population: The number of staff members and the maximum number of customers for whom provision is made to consume food on any premises at any one time	**Number of sanitary conveniences to be installed in relation to the population as given in the first column**				
	Men			**Women**	
For population up to	**Toilets**	**Urinals**	**Hand washbasins**	**Toilets**	**Hand washbasins**
15	1	1	1	2	1
30	1	2	2	3	2
60	2	3	3	5	3
90	3	5	4	7	4
120	3	6	5	9	5
	For a population in excess of 120 add 1 toilet, 1 urinal and 1 hand washbasin for every 100 persons.			For a population in excess of 120 add 1 toilet, for every 50 persons.	For a population in excess of 120 add 1 hand washbasin, for every 100 persons.

2.3.2.1.3 Standards and requirements for facilities on food premises

Working surfaces and utensils that are in direct contact with food must be made of smooth, non-poisonous material that is resistant to corrosion and rust and additionally, wooden surfaces and utensils are not permitted in food establishments. Broken, dented, cracked and chipped food preparation equipment must not be used. All surfaces must be cleaned before the start of work and in-between food preparation. Temperature controlled storage areas must be installed with thermometers inside to indicate the achieved temperature (DoH 2015: 13-14).

2.3.2.1.4 Standards and requirements for food containers

Damaged and suspect canned food must be destroyed and not sold to consumers. Food containers must be kept clean and packaging material for food must be waterproof. Prepacked food must be sealed with a wrapper damage indicator mechanism to protect the food (DoH 2015: 14).

2.3.2.1.5 Standards and requirements for the display, storage and temperature of food

According to the DoH (2015: 16-17), food must not be stored on the floor. Storage shelves must be clean. Display units must be covered and food must be kept at the correct temperature throughout production as depicted below:

Table 2.2: Regulation 8(4) (a): Food temperatures (Adapted from DoH 2015: 30)

FOOD TEMPERATURES		
Category	**Type of food**	**Required core temperature of food products that are stored, transported or displayed for sale**
Frozen products	Ice cream and sorbets (excluding soft serve sorbets)	-18ºC
	Any food marked frozen	-12ºC
Chilled products	Raw and unpreserved fish, mollusks, crustaceans, edible offal, poultry, meat and milk	+4ºC
	All perishable food that must be kept chilled in order to prevent spoilage	+5ºC
Heated products	Perishable food not kept frozen or chilled	>/+60ºC

2.3.2.1.6 Standards and requirements for protective clothing

Protective clothing is head covering, appropriate body clothing suitable for function and footwear. It must be worn by all persons handling food before entering food preparation areas. Protective clothing must be kept clean, designated and made of material that will not contaminate food and must be designed and fitted to prohibit body contact with food except for the hands (DoH 2015: 17).

2.3.2.1.7 Standards and requirements for transport of food

Transport vehicles must be clean and pest free. The area where food is kept while in transit must be dust-proof and clean. Food must be kept safe in storage containers and not stored in direct contact with the floor. Food must not be transported with waste and/ or chemicals (DoH 2015: 22).

2.3.2.1.8 Duties of the person in charge of the food premises and the duties of the food handler

The responsibility of compliance is bestowed upon the owner of the establishment to ensure that the below listed are in place. The food handler on the other hand is responsible for protecting the food from contamination and ensuring that demonstrated food handling practice does not create risks that could make food unsafe for consumption. Food handlers are to minimize risk and control food hazards (Gordon-Davis 2011: 17).

Table 2.3: Duties of the person in charge of the premises and the duties of the food handler (DoH 2015: 18-21).

Duties of the person in charge of the food premises	Duties of the Food handler
All Food Handlers are trained on food hygiene	Practice good personal hygiene behaviour by keeping finger nails short, hands clean and wearing clean clothes, regularly washing hands with water and soap at the beginning of each task and in-between tasks, after using the toilet, after touching the face and other parts of the body, after cleaning duties, after handling money, etc...
Effective pest control system in place	
Designated and hygienic waste storage areas with clean and disinfected waste bins and regular and frequent waste collection schedules	
Effective waste water removal	Not handling food when suffering from any illness

Duties of the person in charge of the food premises	Duties of the Food handler
Overall cleanliness of the establishment	Refraining from smoking, spitting, blowing air into equipment or food, coughing, sneezing, sleeping and sitting on food and using the hand wash basin for purposes other than for washing hands
Responsible for the standard of personal hygiene practice demonstrated by Food Handlers	
Establishment's compliance with all food regulation requirements	

2.3.2.1.9 Municipal bylaws

According to Gordon-Davis (2011: 20), in order to address area specific food safety hazards, the municipality is allowed to set bylaws and is expected to enforce them within their area of authority. Bylaws are implemented to address area specific issues such as establishments that are located in a farming area, as animal farming introduces the risk of flies and therefore extra precaution needs to be taken which may not be covered in the national regulation.

2.3.2.1.10 ISO 22000:2005, SABS standard and HACCP in South Africa

The International Organization for Standardization (ISO) 22000: 2005 is a global standard that has global requirements for every sector within the food chain process. The ISO 22000:2005 standard is aligned with the Codex Alimentarius Commission and allows for hazard control systems to be established, thus ensuring that food is safe for consumption. Additionally, it makes it easier for organizations to implement HACCP. With the ISO 22000: 2005 standard an organization is not subjected to a standardized approach to meet compliance, as it allows the organization to set a food safety management system specific to its suppliers and customers (Gordon-Davis 2011: 21). The food safety management system demonstrates planned and implemented food safety activities (Kafetzopoulus 2013: 505).

The South African Bureau of Standards (SABS) Code of Practice: although SABS standards are not legislated they are important guidelines that help achieve good food handling and food storage practices which are applicable to the food industry and any establishment that seeks SABS certification: namely the Code of Practice for Food Hygiene Management, South African Bureau of Standards SABS No 10049:2001, which covers the hygienic handling of food and drink. The Code of Practice for the Handling of Chilled and Frozen Foods, South African Bureau of Standards SABS No. 10156: 2007 comprises of recommendations for the hygienic manufacturing, storage and transportation of chilled and frozen foods. It is also focused on retail and catering establishments (Gordon-Davis 2011: 21-22).

Hazard Analysis Critical Control Points (HACCP) system. According to Gordon-Davis (2011: 22), in order to accomplish a hygiene control system, countries including South Africa have implemented a HACCP

system even though it is not yet mandatory. Due to the globalized supply chain, some food service organizations have adopted the system. The food industry's target market locally and internationally requires certification. Cusato *et al.* (2012: 28) reports that the methodology of HACCP is used even in countries where HACCP is not mandatory as the legal requirement; the motivation is the need manufactures have to enter the global market so, as a means to comply with global standards, HACCP becomes compulsory.

2.3.3 The retail company's food safety standards

The food company under investigation for the current study has set food safety rules and policies that have been carefully documented and filed for all establishment owners. The organization has food policies that are derived from and comply with the Regulation Governing Hygiene Requirements for Food Premises and the Transport of Food. The objective is for the file, together with the DVD, to be used as reference in order to ensure that each establishment is aligned with food safety requirements. The file makes provision for checklists and important documents for accurate record keeping and documentation. The safe store file also includes training material that the organization makes available to all its members and encourages that it be utilized as training induction material for new employees.

The file provides pictures that better illustrate the desired requirement together with methodology to complement the message. The safe store file comprises of 14 modules that include a recommended supplier list, and cover purchasing practice, personal hygiene, food receiving, food storage and food preparation. It looks at food allergens, pest control, merchandising, labelling and building requirements. In order to ensure food safety of raw materials for direct sale and processing, the organization has a list of quality approved and trusted suppliers, which the organization encourages all establishment owners to solely use but because the organization operates in voluntary trading, owners are permitted to procure their ingredients and products from whichever supplier they see fit. The organization, however, does stipulate that additional suppliers need to have proven food safety compliance. The recommended supplier list has suppliers for virtually everything, from paper towel suppliers to chemical suppliers, from oil removal agencies to refrigeration and food equipment vendors.

The organization has set external auditors trained to inspect premises in respect of hygiene standards. Included in the inspection is micro testing of surface areas and hands in the form of swab testing in order to evaluate the effectiveness of cleaning and hand washing. Food samples are also taken for relevant laboratory testing. The organization encourages owners to conduct periodic internal audits prior to the scheduled external audit and other national audits such as audits conducted by government departments for regulation compliance. The auditors use the guidelines stipulated by the Regulation Governing Hygiene Requirements for Food Premises and the Transport of Food when auditing the establishments and the

results of each audit are given to the owners at the end of each audit (safe store 2008: 1-5). The specific guidelines will be discussed in more detail in chapter 4.

2.4 Food-borne diseases

Food safety laws have been established in order to create the safest environment possible to protect food from causing disease and illness. The modern yet complex food supply chain has made food more susceptible to contamination thus making it difficult to prevent food-borne disease. Food-borne disease as defined by the WHO is a disease or illness that has been caused by or is believed to have been caused by infectious or poisonous food and or water (Bogdanovičová, Necidová, Haruštiaková and Janštová 2017: 2; Soon, Singh and Baines 2011: 823-824). When food contains harmful substances that harm the health of the consumer it is considered unsafe. Harmful substances are known as hazards that could be biological, chemical or physical. Ijabadeniyi (2013: 679) further says that biological hazards are the type that easily cause food-borne diseases.

Abera *et al.* (2010: 46) and Mudey, Kesharwani, Mudey, Goyal, Dawale and Wagh (2010: 199) state that food-borne diseases are a global burden affecting both developed and developing countries, affecting 30% of the population in developed countries and causing an estimated two million deaths in developing countries.

Likewise Newell *et al.* (2010: S4) shares that in 2005, 1.8 million people died from food-borne diseases caused by contaminated food and drinking water. The National Institute for Communicable Disease (NICD: 2016) in 2016 reported that 23 454 Hand, Foot and Mouth Disease (HFMD) cases were reported throughout Malaysia. Nebehay (2015) shared that the WHO indicated that 600 million people globally (one in every 10) fall ill from food-borne diseases and 420 000 die per annum. Between 1998 and 2002 an average of 1329 food-borne outbreaks were reported to the Centre of Disease Control (CDC) annually and at the same time the Oregon Public Health Division reported 62 outbreaks (Mudey *et al.* 2010: 199). Later, in 2008 the milk powder melamine contamination outbreak in China claimed 6 infants' lives and 52 000 were hospitalized. Additionally 250 000 children were reported to have suffered mild kidney and urinary problems and the cost of the outbreak was estimated at 58 million euro (Pei, Tandon, Alldrick, Giorgi, Huang and Yang 2011: 413). In conclusion, Mensah and Julien (2011: 1216) believe that the escalated rate of food-borne disease outbreak cases associated with biological hazards in the UK, Europe and America have compelled the food industry to focus on food safety more than tariffs and shares. Although disease-causing bacteria are known, it remains difficult to stop the burden of food-borne diseases (Bogdanovičová *et al*. 2017: 6; Mudey 2010: 199).

2.4.1 Causes of food-borne diseases

The real burden of food-borne diseases is unknown on the global scale as stated by Newell *et al.* (2010: S4) due to factors like underreporting. Moreover, there are over 200 bacterial, chemical and physical food-borne disease-causing agents; however, Ijabadeniyi (2013: 679) stresses that there are 16 major biological organisms that can threaten the lives of people. Newell *et al.* (2010: S4) further explains that besides the biological, chemical and physical perpetrators, other factors are contributing to the burden of food-borne diseases such as the rapid population growth, the increase in global markets, the changed eating habits of consumers, changed farming practices and climate change. Ijabadeniyi (2016) adds that there are a number of emerging food safety risks, namely the unintended effects of new technology, genetic modification and nanotechnology, together with veterinary drug residue in animals, risky consumer behaviour, plant disease, pesticides and other factors that contribute to the burden of disease.

Aung and Chang (2014: 178) mentioned that food-borne disease outbreaks can occur from natural, accidental or deliberate contamination of food, highlighting the potential of food being intentionally contaminated because of bioterrorism. As discussed by Nyenje *et al.* (2012: 2609), food-borne disease can be caused by bacteria, viruses, parasites and chemical contamination of food. Furthermore, virus contamination accounts for half of the food-borne disease outbreaks but bacteria contamination cases land victims in hospital and the grave. Nebehay (2015) expands that food-borne diseases can be caused by bacteria, viruses, parasites, toxins and chemicals. Nebehay, however, blames the food trade and the global food market where one country's contaminated food affects the whole world.

Natural bacteria from one food can be toxic to another food thus contaminating it. Contaminated food causes food poisoning which occurs when bacteria in the food multiply and produce poisonous waste material that is toxic to humans and thus causes illness. There are three main sources of contamination: (i) people, (ii) surfaces and food contact areas and (iii) other foods (Gordon-Davis 2011: 62) but Sani *et al*. (2014: 210) believes that food from unsafe sources, inadequate cooking, contaminated people and equipment together with poor personal hygiene and incorrect holding time and temperature are the causes of food-borne illnesses. On the other hand, Mudey *et al*. (2010: 199) mentions that food contamination can occur at any stage of the food chain and identifies contaminated raw ingredients and food together with poor personal hygiene of Food Handlers as the main contributors to food-borne diseases. Food poisoning can occur in two ways, either as infective or toxic food poisoning. When the bacteria in the food multiply after ingestion and cause illness from the intestines it is considered infective food poisoning but when bacteria in the food multiply before ingestion and the food is then consumed, the toxins from the waste material react with the stomach and cause immediate illness (Gordon-Davis 2011: 34). Food can also be unsafe to eat due to spoilage resulting from damage during its life cycle in the food chain. Factors like

bruising, insect and rodent activity, colour change, texture change and bad odour are proof of food spoilage as well as mould, sliminess, rot and fermentation (Gordon-Davis 2011: 59-60).

2.4.1.1 People

The major vehicle for food-borne disease-causing organisms is unwashed hands, as hands are the faecal-oral route (WHO 2001). Nebehay (2015) suggests that unsafe food handling at any stage of the food chain makes food dangerous to health. The natural bacteria from one food which may be toxic to another food is transferred through the mishandling of food by people (cross-contamination), therefore food must be handled separately and safely with proper cleaning in-between (Gordon-Davis 2011: 62). Lues *et al.* (2007: 330) mentioned that cross-contamination results in 39% of food-borne disease outbreak cases in the UK. Gordon-Davis (2011: 29) adds that the amount of bacteria in food can communicate whether the food was handled safely throughout production or not; the trick to safe food is to prevent the growth of bacteria and/ or destroy bacteria growth altogether. Sani *et al.* (2014: 210) goes further to say that Food Handlers are the gatekeepers to food safety, as they are the last prevention of food-borne diseases. Their task is to reduce, eliminate, prevent and protect food from disease.

Mudey *et al.* (2010: 198) highlights that the health status of Food Handlers together with their good food hygiene behaviour and practice determines the level of food safety. Disturbingly the majority of Food Handlers are employed without being subjected to proper medical examinations and with a lack of food safety experience/training. A study done by Dagnew (2012: 3) is testament to this as only six out of 200 Food Handlers were found to be certified to handle food and although the great majority washed their hands after using the toilet, fewer used soap and water and even fewer washed their hands after touching their nose. Subsequently 20.5% of the Food Handlers tested positive for the disease-causing bacteria Staphylococcus aureus (S. aureus) that was found in their nasal passages. Lues *et al.* (2007: 330) reveals that S. aureus was involved in food poisoning cases to a great extent and was also found in 88% of Food Handlers in the study. Sani *et al*. (2014:212) shows that there was evidence of a lack of knowledge amongst Food Handlers on food-borne disease-causing bacteria, as 71.4% of the Food Handlers did not know Staphylococcus. Mudey *et al.* (2010: 19) adds that in Malaysia up to 20% of food-borne disease cases were because of contamination by Food Handlers. Grieg *et al.* (2007: 1755) shares that on a global scale 80 682 cases and 816 outbreaks implicated the Food Handlers. Lues *et al.* (2007: 329) found that eight percent of Food Handlers tested positive for coliforms in their study and 32% had coliforms on the hands; the presence of coliforms shows a failed sanitation programme, whereas e-coli indicates faecal contamination, which was found on one food handler's hands who also had the highest count of coliforms, and another food handler had a combination of S. aureus, the highest occurrence of Total Viral Count (TVC) and the highest count of Enterobacterialeae that indicates bad toilet hygiene and poor personal hygiene. The study done by Abera *et al.* (2010: 47-48) showed that 41.1% of Food Handlers tested positive for one or more intestinal parasites,

which is alarming because 10% of the Food Handlers did not wash their hands after using the toilet and 89.8% did not wash their hands after touching dirty items and body parts. Data thus validates that Food Handlers are potential sources of contamination (Dagnew 2012: 6).

2.4.1.2 Microorganisms

Microorganisms are invisible but present everywhere. Microorganisms are found on surface areas, body parts, in the environment and in the air. Composition, interaction and reaction differs from one microorganism to the next. There are four types of microorganisms; (i) yeast, (ii) mould, (iii) viruses and (iv) bacteria. Yeast and mould are both good and bad, as the making of bread, wine, beer, cheese and antibiotics depends on yeasts and mould. Negatively, food spoilage is due to the presence of yeast and mould in foods (Gordon-Davis 2011: 27-28).

Viruses need to be living inside a host for survival; hosts are humans, plants, water and animals. Viruses do not grow on food but are carried by food. Once food is consumed, the virus is able to infect the host's cells and multiply. Viruses do not cause food poisoning but can be transmitted by food and because viruses do not infect food, it becomes difficult to test the level of concentration on food thus making it impossible to establish control measures for elimination (Betts 2016 and Gordon-Davis 2011: 29). Betts (2016) goes further to explain that Norovirus, Hepatitis A and Hepatitis E are associated with food-borne infections. Eleven percent of Norovirus cases lead to food-borne disease but Hepatitis A and Hepatitis E lead to food-borne disease to a greater extent than Norovirus. A study done in the UK on pigs showed that 93% of the pigs had previously had Hepatitis E as the presence of antibodies found in their systems indicated that the body previously had to fight off the virus. An additional seven percent were infected at the time of the study, which supplements Ijabadeniyi's (2016) statement that purchased food from unsafe sources can introduce risk. These viruses are susceptible to some disinfectants but sanitization with applied heat assists in complete killing while heating to a temperature of 71 degrees Celsius for 20 minutes makes Hepatitis E inactive.

Bacteria causes food poisoning as it produces poisons in food that results in food poisoning. Humans cannot tolerate the poison and become ill; furthermore, bacteria are responsible for the slime on fruit, making good milk sour and meat rotten but are needed for cheese making, yoghurt and some vitamins. Bacteria can inhabit different environments (water, soil, air, skin, mouth and body) (Gordon-Davis 2011: 29). Bacillus cereus, Campylobacter jejuni, Clostridium botulinum, Clostridium perfringens, Cryptosporidium, Cyclospora cayetanensis, e-coli, Listeria monocytogenes, Salmonella, Shigella, Staphylococcus aureus, Vibrio parahaemolyticus and Vibrio vulnificus have been reported as the top bacteria to cause death (Ijabadeniyi 2013: 679). Greig *et al.* (2007: 1756) reported that 280 food-borne disease outbreaks were because of Salmonella, Staphylococcus aureus and Shigella. Mudey *et al.* (2010:

201) adds that almost 60% of Food Handlers in his study tested positive for Staphylococcus and 77% tested positive for e-coli that was found in finger nail cultures plus half of the Food Handlers only used water for hand washing after using the toilet and only 26% had acceptably short nails. The most common food-borne disease globally is Staphylococcal food poisoning (Bogdanovičová *et al*. 2017: 2).

Sani *et al.* (2014: 210) mentions that ready-to-eat foods are subjected to temperature fluctuations between production and consumption thus leaving them open to bacteria growth. Ijabadeniyi (2016) makes mention that improper holding temperatures and inadequate cooking are the risk factors of food-borne outbreaks in food service operations. In addition, foods that encourage the growth of poisonous bacteria are protein foods like meat and poultry, fish, eggs, milk and dairy products and are thus considered high risk (Gordon-Davis 2011: 62) thus special care must be taken when handling these foods. The study done by Bogdanovičová *et al*. 2017: 4) in Czech Republic, Europe on milk powder revealed that milk powder that had been reconstituted and stored at the correct temperature then consumed within the recommended 48 hours had acceptable levels of S. aureus and was thus rendered safe for consumption. However, samples that were kept at higher temperatures prompted the multiplication of S. aureus thus producing enterotoxins, which are toxic and hazardous especially to infant milk. This data points out that consumers have a huge part to play in food safety and cannot be ignorant of the recommendations stipulated on food products that relate to storage and make-up instructions. The study concluded that long-term storage of reconstituted milk must be avoided and if it is impossible to avoid long storage, it should be stored at 4 degrees Celsius to prevent sickness, as the production of enterotoxins is temperature dependent.

A study on irrigation water done by Sigge *et al.* (2014) found that a high concentration of faecal indicators and high levels of e-coli were present in the irrigation water. Staphylococcus, Klebsiella, Listeria, Salmonella, intestinal Enterococcus bacteria, other aerobic and heterotrophic bacteria, and diarrhoea-causing viruses were actively present in the pre-harvest irrigation water used on produce. The results indicated that the water from these rivers was not suitable for irrigation. In addition the greater risk is that fresh produce rarely goes through further processing and thus would cause a greater risk to human health even when consumed in smaller quantities. The extent of contamination was investigated at harvest and at retail; the results showed that the produce was microbiologically unsatisfactory and unfit for sale, as it had a faecal count that exceeded the WHO acceptable levels together with e-coli, Intestinal Enterococci, Salmonella, Listeria and Staphylococcus. The WHO stipulates that fresh produce should not contain more than 200 total coliforms per gram with zero e-coli present per gram. It was found that temperature and pH had no major impact on the growth of e-coli but the increase of temperature and the availability of unstable carbon in unsterile river water encouraged the growth of e-coli and faecal coliforms. It was concluded that the presence of carbon stimulated the growth of microbial growth in the river water but research highlights that there are no food safety standards governing the acceptable levels of carbon in river water.

2.4.2 Symptoms of food-borne diseases

Nebehay (2015) points out that food-borne diseases cause minor illnesses and major illnesses such as cancer, liver and kidney failure, brain disorders, epilepsy and arthritis. In July 2016, two confirmed cases of typhoid fever in Johannesburg, Gauteng Province were reported by the Division of Public Health Surveillance and Response (NICD-NHLS 2016). Typhoid fever is caused by Salmonella enteric and is transferable from person to person by consuming contaminated food and water, and through faecal-oral contamination. A total of 74 cases had been confirmed for South Africa as of 2016 and the highest prevalence was in January and February of that year.

In 2010 the National Institute for Communicable Diseases reported that Rift valley cases caused nine deaths and the affected patients demonstrated flu-like symptoms. Indicative symptoms include fever, headache, chills, sweat, constipation and diarrhoea. Rift valley affects livestock and is transferred to people who are in direct contact with blood or tissues of infected livestock. Mosquitoes are said to be the transmission vehicle from one animal to the next (NHLS 2017).

Crimean Congo Haemorrhagic Fever (CCHF) is caused by the Norovirus and is transmitted by hard ticks that feed on livestock. Humans can contract the fever from being in contact with infected animals and/ or being bitten by an infected tick. Symptoms include rash, fever, back pain, dizziness, sore eyes and bleeding. The majority of the patients recover but 30% get very ill and some even die. This fever affects South Africa, Europe and the Middle East. To date 180 cases have been confirmed for South Africa (NICD-NHLS 2017).

Gordon-Davis (2011: 33) shares that food poisoning illnesses cause symptoms such as headaches, abdominal cramps, vomiting and diarrhoea. Depending on the type of bacteria present in the consumed food, symptoms can start manifesting immediately and severe situations may even lead to death.

Food-borne illnesses are common illnesses to humanity as discussed by Beekrum in 2008; it can be assumed that every individual either knowingly or unknowingly has suffered illness from eating “bad food”. The affected individual ignores the symptoms especially if they subside and do not lead to prolonged suffering according to Soon *et al.* (2011: 824).

2.4.3 Product recall and food-borne disease investigation

According to the Canadian Food Inspection Agency (CFIA) (2017), on the 28th of March 2017 Smucker Foods of Canada Corp. recalled Robin Hood brand All Purpose Flour Original from the market place due to possible e-coli O121 contamination. The report stressed that consumers should not consume the recalled product, and instructed consumers to check if they had the recalled products in their food cupboards and

requested that recalled products should be thrown out or returned to the store where they were purchased. Specific lot numbers made up part of the report with detailed batch numbers and dates, as they would have appeared on the actual product implicated in the incident. The recall report announced that one illness case had been reported.

Aung *et al.* (2014: 178) explains that for a food manufacturer, recalling food from the food retail shelf or consumers' homes for whatever reason is damaging to the reputation of the company. In the event of a product recall, traceability is the method used to determine the route of the product through the food supply chain in the pursuit of finding the source of contamination in order to eliminate it and prevent it from contaminating another product. The traceability method helps isolate the exact batch of the product implicated in the incident and gives perspective on how detrimental the incident is (level of contamination). Traceability is the ability to systematically access all the information related to the product, throughout the food chain cycle by documented identification (Ijabadeniyi 2016).

The challenge with traceability is the lack of information on the raw materials (as some primary producers do not batch manage their produce), complex distribution systems, and multiple sources of product (Aung *et al.* 2014: 178). Below is the product recall procedure as per the Consumer Product Safety Recall Guidelines Notice 490 of 2012 (National Consumer Commission 2012).

Once a safety hazard has been established; either by a consumer complaint, regulatory body or the manufacturer or a competitor, the company initiating the product recall has the responsibility to:

- Assemble the recall team (conduct a risk analysis of the hazard associated with the complaint)
- Stop production and distribution of the product
- Notify the regulatory body
- Remove the product from the market place
- Prepare and distribute a press release
- Facilitate the return of the product
- Store and dispose of the product
- Prepare a progress report on the incident with established root cause and remedy.

In the event of a food-borne disease outbreak, the WHO (2008) indicates that the investigation needs a multidisciplinary team. Skills that are required include clinical and laboratory medicine, food chemistry and microbiology, epidemiology, food safety and control together with risk communication and management. The following summarised actions can be followed:

- Establish whether the reported cases have the same illness.
- Conduct interviews with the patients.
- Collect clinical specimens for testing.

- Conduct a site visit to inspect the suspect establishment.
- Collect food samples at the establishment as part of the inspection.
- Initiate control measures where applicable.
- Conclude by determining whether there is a need for further investigation.
- Prepare communication channels and press releases to all relevant and possibly affected parties.
- Collect data from all individuals.
- Determine who is at risk of becoming ill.
- Calculate the attack rate.
- Conduct an in-depth inspection at the premises again, focusing on structural and operational hygiene.
- Check records and documentation of monitoring procedures practised for the suspect food item.
- Take food and environmental samples.
- Review data
- Perform analytical testing
- Compile a report
- Control the source of the outbreak
- Control the transmission at the source
- Protect the public at risk
- Communicate when the outbreak is over through the same communication channels.
- Schedule surveillance plans to assist in making recommendations to prevent recurrence.
- Share findings with public health colleagues for future awareness and learning.

According to Soon *et al.* (2011: 823), once two or more cases of food-borne disease are confirmed a food-borne disease outbreak is declared in Malaysia. Whereas Gordon-Davis (2011: 33) states that in South Africa the DoH considers food-borne disease cases to be food-borne disease outbreaks once they have affected four or more individuals at the same time.

Many a time, food-borne disease outbreaks go unnoticed since cases go unreported and are never investigated. The WHO (2008) adds that there are numerous resources available for the investigation of food-borne disease outbreaks but very few are concentrated in developing countries. Soon *et al.* (2011: 824) reckons that the reason for unreported food-borne cases is the intricate process that is followed before the incident can be logged and that some patients experience mild symptoms that go unnoticed. Additionally, a break in information gathering can lead to the case not being reported. Soon *et al.* (2011: 824) shows that estimates indicate that annually in the US, 76 million illnesses, 325 000 hospitalizations and 5000 deaths will be due to food-borne diseases. However, only 17 094 outbreaks were reported which affected only 37 0266 people.

The challenge with food-borne disease investigations is the need to obtain data quickly. Soon *et al.* (2011: 824) specifies that obtaining data from other countries or through numerous government levels delays the process of reporting, resulting in delayed communication regarding outbreaks. In addition, limited traceability and resources to perform traceability, together with a depletion of samples that are needed for testing due to fast production as ingredients have short shelf life, together with logistics are further challenges encountered.

Health workers alone are not capable of addressing the risk of food-borne diseases; it requires an effective, functioning and integrated food control system (WHO 2008).

2.5 Food fraud

Throughout history, the act of falsifying food ingredients by food buyers, consumers, manufacturers, retailers and importers has been a widespread problem for the food industry (Johnson 2014: 1). According to Johnson (2014: 5), there is no statutory definition of food fraud yet but the FDA in 2009 issued an acceptable description for food fraud or the sub-category "Economically Motivated Adulteration (EMA)" which is an intentional act of removing, diluting, adding or substituting a substance or substances in a food product for the purpose of increasing the quantity of the product for economic gain resulting in a possible health risk to consumers. The South African Association of Food Science and Technology (SAAFoST) (2017: 5) simply defines food fraud as "lies for money" and states that food fraud has been documented for over 200 years and that the methods used in food fraud have become more sophisticated (SAAFoST 2017: 1). Furthermore, Spink and Moyer (2011: R158) expand on EMA stating that it includes the dilution of quantities in a product to the point that it poses a known or possible health risk to consumers and the act of adding other substances to mask the dilution. Food fraud as expressed by Spink *et al.* (2011: R158) includes the deliberate and intentional tampering with or distorted communication of food products, food ingredients and food packaging, false labelling and product information (including non-declaration), misleading food advertisements and food claims for economic gain that could affect consumer health.

Foods like olive oil, wine, spices, dairy products, meat, fruit juices, organic foods and processed foods have all been subject to food fraud both in the past and now. In the food fraud case of the melamine contamination incident, the root cause was that the manufacturers of the infant formula added undeclared melamine quantities to the infant milk formulation so as to mask the taste of the diluted protein content (Johnson 2014: 1). Bottemiller (2011) adds that melamine is a chemical used in plastic manufacturing and can result in kidney failure and kidney stones once consumed. Bottemiller (2011) reports that post the high profile melamine scandal, more culprits of food fraud with melamine were discovered. Reportedly, 26 tons of melamine-contaminated milk powder was seized from an ice cream maker in China and additionally up to

two thousand tons of illegal products that contained melamine were confiscated from Chinese illegal producers and sellers during a raid in January of 2011.

In 2009, the Peanut Corporation of America was charged with fraud because of salmonella contaminated peanuts. The incident resulted in nine deaths and affected more than 200 manufacturers of products containing peanut butter and peanut paste ingredients, and the incident resulted in the product recall of 3 912 products (Johnson 2014: 2). Disturbingly, Leighton (2015: 1) states that the Peanut Corporation of America knowingly sold and distributed peanuts with salmonella contamination to schools and food manufacturers which resulted in to up to 20 000 cases of sickness and a total of 4 000 product recalls. The CDC's investigation revealed that the Peanut Corporation of America's manufacturing plant in Texas was in violation of all food safety regulations for food manufacturing and was operating without any sanitation certification and it was unlicensed for food manufacturing. The following root causes where communicated:

- Flooded basement
- Rat infestation
- Hole in the roof that allowed rain contaminated with bird feaces to enter into the production areas.

(Leighton 2015: 2).

Other international food fraud scandals include misbranded chocolate bars, adulterated pet food in China, unapproved chemicals in honey, horse meat labelled as beef and fruit juices made from toxic moulded rotten fruit (Johnson 2014: 2).

Knowler (2017) in the Herald newspaper reported that the tactics of fraudsters are the same and that South Africa is not immune to food fraud scandals. The cases of food fraud that have made headlines in South Africa are highlighted below:

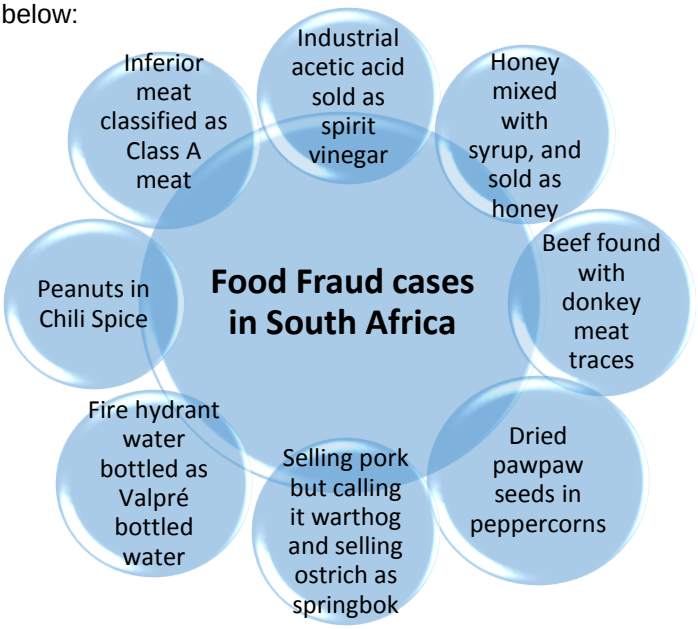

Figure 2.3: Food fraud cases in South Africa

Spink and Fejes (2012: 249) expressed that counterfeiting, which is a sub-category of food fraud, has been labelled the 21st century crime. Leighton (2015: 3) blames a weak food safety regulatory system for the success of it and Knowler (2017) shares that the lack of analytical capability in South Africa helps perpetrators succeed. The economic impact food fraud has on the food industry and the country is unknown but it can be detected by the loss of sales and annual revenues. The Grocery Manufacturers Association (GMA) predicts that food fraud may affect up to 10% of the food products sold commercially in the global food industry, which may account for up to 15 billion US dollars per year. It is assumed that the true scale of food fraud is unknown due to the minimal cases of defrauded products reported when considering the annual amounts of money spent on food and food ingredients globally and the scale of reported/detected food fraud cases (Johnson 2014: 3).

2.6 Globalization

Globalization has spoiled consumers who now have a wide variety of foods available all year round regardless of season or origin, and as a result, the consumer's plate is no longer made up of foods from their own region but includes foods provided by extensive worldwide networks. The mandate thus becomes that food must be safe for everyone everywhere. The challenge with global food safety assurance, however, is that one country's standards may be higher than another, for example, labelling requirements and microbial residue limit values may differ per country (World Food Regulation Review 2014). For example, Dooley (2008: A337) points out that 15% of food imports into the USA in 2006 that came from developing countries were found to have had lower food safety production standards than those enforced in the USA. Moreover, 80% of seafood is imported majorly from Asia where USA unapproved pesticides and antibiotics are used. Shockingly, only one percent of more than 9 million imports annually are tested.

Volansky (2008: 12) highlights that even when there are strict food safety policies in place contamination can still occur. Volansky shares that although the USA has control over Mexico's food safety regime (as Mexico exports several food commodities to the USA) they are unable to control all the activities within their supply chain. Evidently, with this said, repeat cases of Salmonella and e-coli contamination in spanspek have been recorded, and the point of contamination was identified as the packing and washing process, which lead to all Mexican spanspek imports being rejected and denied entry into the USA. Another case in the USA of salmonella contamination in seafood stemmed from Thailand's unsafe farming practices where a chicken farm was located above the shrimp farm and the chicken manure that fell into the shrimp farm was consumed by the shrimps as feed.

Food safety is the result of having systematic studies in place, which guarantee the safety of food from farm to fork, but it is becoming difficult to trace food and assess the quality and safety of such due to the extensive worldwide networks in food and feed (World Food Regulation Review 2014). Not all of the food coming into

USA (or any other country) is tested and 100% inspection is reserved for the foods that have been deemed high risk because of previous cases but other products of the same nature that may pose a risk remain unknown until disaster strikes. A shortage of labour has led to less than one percent of imports being visually inspected and even less that are tested. This is a risk because the majority of food coming into the USA is from developing countries who have poorer food safety standards. Researchers fear that an increase in food-borne disease may be seen in the near future due to the increased globalization of food (Volansky 2008: 12).

Newell *et al.* (2010: S4) explains that it is suspected that with changes in eating habits and advanced methods in food processing, the list of food-borne illnesses causing bacteria will increase. Changes in trends about food-borne diseases are caused by a global market shift that is influenced by consumer diets that have shifted to more authentic, exotic and raw or lightly cooked foods. In addition, the increased demand for fruits and vegetables and high protein foods that has resulted in a greater demand for meat and fish products that may come from countries with less strict food safety procedures is a cause for concern. The rapid increase of an elderly generation with compromised health, changes in farming strategies in response to the growing population, climate change and food transportation conditions that enable food products to host bacteria throughout the food chain and which can successfully cause harm to consumers, are other factors contributing to food-borne diseases.

According to Sigge (2014) the consumption of raw produce has escalated globally as more people are following this healthier lifestyle trend; likewise, this has increased the burden of food-borne disease outbreaks as the majority of food-borne disease outbreaks are linked to raw produce since they undergo minimal or no cooking. Moreover, Grafton and Hussey (2011: 4) share that water quality and availability is affected by population growth, as the demand for water has increased. Additionally, the shift in water usage patterns (the movement of people from rural to urban dwelling), a higher demand for food security which increases the requirements for irrigation water, and water pollution which reduces the availability of safe water for domestic and industrial use affects water resources.

Cusato *et al.* (2012: 30) report that food safety has been challenged by changes in the food supply chain with the emergence of new product developments in response to consumer demand, a shorter supply chain that has become more complex in order to satisfy a quick turnaround time, increased product shelf life and new discoveries of microorganisms. Cusato *et al.* (2012: 21) states that with the emerging global markets and the constraints on the economy, gaining competitive advantage has become dependent on product quality together with ensuring consumer health protection, food safety, low production costs and improved production processing. Established food safety systems have thus become important in the efforts to maintain a trusted company image, reputation and trading in the local and global market. Food safety has

become a global concern requiring public health departments and governments to exercise greater control over the food supply chain.

The responsibility of ensuring that only safe food is imported into the USA still remains that of the country of origin. The FDA in the USA has amended the previous food protection plan of 2007 in order to protect food imported into the USA. China's food safety standards have been designed in order to ensure quality acceptability and control from the start of processing. Implementation of advanced contamination detection and screening methods for food together with increased numbers of inspectors have been established (Volansky 2008: 12).

2.7 Climate change

James and James (2010: 1944) declare that the entire global community is affected by climate change. According to Volansky (2008: 12), climate change has been identified as the biggest factor to affect the food safety of seafood; in addition James *et al.* (2010: 1945) share that from 1900 to 2005 the average world temperatures have increased by 0.45 degrees Celsius. In the UK temperatures increased by 2.1 degrees Celsius in the first quarter of 2007 compared to the first quarter of the previous year. Estimates suggest temperatures will increase by 0.4 to 2 degrees Celsius by 2030 and by 1 to 6 degrees Celsius by 2070 in Australia.

One World (2011:9) states that man is no longer able to predict the weather and is thus unable to understand it and intensive high temperatures have limited grazing time for livestock. To supplement this, the mass media has been reporting a growing number of livestock dying because of intensive heat that could directly affect dairy farming. According to James *et al*. (2010: 1944), the result of climate change is post-harvest losses that account for 30% of total production. Warmer temperatures have also put the livelihood of fish and other aquatic animals under threat as warmer oceans lead to reduced oxygen levels and the growth of algae blooms in the ocean water leading to sea life deaths (Grafton *et al.* 2011: 16).

Climate change has resulted in uncontrollable weather that negatively affects a region's natural resources thus promoting their depletion. Climate change may also result in unworkable land, making it expensive and difficult to produce crops quickly and cheaply thus causing food prices to increase (FAO 2011a:12; Laing 2011:12-13,30). Grafton *et al.* (2011: 3-4) explain that the quality and the availability of water is under threat because of the changes in weather patterns as climate change has affected the natural phases of water thus directly affecting the ice cover and the rain : snow ratios in parts of the world. Water is essential for life and makes up 70.7% of the Earth and it controls the energy of the climate through cloud formation and humidity in the atmosphere. Grafton *et al.* (2011: 16) states that poor water quality claims the lives of an estimated 10 million people yearly in Africa.

Dooley (2008: A336) shares that in Alaska the microbial community is at risk as nitrogen levels in soil are increasing uncontrollably because of warmer temperatures that are caused by global warming. The microbes work to regulate the nitrogen levels in the soil to the required levels for plant growth and transform waste to nutrients. The reduced freezing periods are resulting in tree droughts since the mould that grows underneath the snow is hindered from retaining enough snowmelt for nitrogen regulation.

James *et al*. (2010: 1945) explains that as climate change manifests in warmer temperatures, it will cause heat loads on systems in the cold chain leading to refrigeration plants using more energy and prolonged usage in order to deal with the challenge. The issue is that a break in the cold chain will lead to unsafe food as refrigeration has been designed to slow down or prevent the rate of food spoilage and enables food to be supplied to the global market. With the impact of climate change on the cold chain there is a need to reevaluate the recommended cold chain storage conditions. Chakraborty and Newton (2011: 2) add that the increased temperatures caused by climate change pose a risk to the cereal production plants in Asia since the melting of the Himalayan glaciers will make more water available. Additionally, carbon based fuels used by industrial sites have been the main suspects causing climate change.

Furthermore, evidence suggests that food poisoning cases are influenced by temperature changes with increased cases in summer compared to winter. Global warming will bring about a rise in food poisoning cases as warmer temperatures encourage the multiplication of microorganisms in food. Multiplication of Salmonella occurs at between 7 to 37 degrees Celsius and Campylobacter in chicken flocks increases in warmer temperatures. Humidity and warmer weather encourages the survival of microbes resulting in contamination of food and infection, which can affect animals through contaminated feed (James *et al*. 2010: 1945).

2.8 Food security

According to Barrette, (2010: 825) food security is a global concern that spiralled after the global price crisis in 2008 that negatively affected more than 12 countries around the world and thus increased the awareness and importance of food security.

The FAO in (2011b) reported that the effects of the world food crises of 2006 to 2008 affected every country differently. The poor countries were the most vulnerable and highly affected whereas large developed countries were equipped to deal with the crises and thus the effect was minimal. Countries that were dependent on imports rather than exports were subjected to high price increases and although the price crisis was a temporary situation, it may have created a permanent setback on a country's future earnings and the ability to break the chain of poverty. Furthermore, predictions show that future food price increases will double due to climate change (Barrette 2010: 827).

Barrette (2010: 827) further explains that the challenges that threaten food security are not only limited to food price increases, declaring that food insecurity can be seasonal and suggests that it could be caused by natural disasters, loss of land/livestock, climate change, food safety and ill health. Grafton and Hussey (2011: 148) states that analytical data suggests that by 2050 the number of the world's hungry will have increased to 1 billion, whereas 11% of households in South Africa were experiencing hunger as reported by Statistics SA (2016: 27) and 22.3% of households were food insure. Chakraborty *et al.* (2011: 3) mentions that Sub-Saharan African countries are earmarked as having the highest food insecurity. Furthermore, Chakraborty *et al.* (2011: 4) shares that food security is not only defined by food production but also encompasses other factors such as food format which requires the whole food supply chain process to ensure accessibility to and safety of food. According to Godfray, Beddington, Crute, Haddad, Lawrence, Muir, Pretty, Robinson, Thomas and Toulmin (2010: 812-813), although the population has doubled in the past 50 years, the rate of hunger has decreased but one in seven people are food insecure which remains an epidemic and statistics suggest that the world will require up to 100% more food by 2050.

According to Mead (2008: A335), globalization has resulted in food variety and easy food access channels like supermarkets which have been located in areas inhabited by middle to high-income earners. However, this is a disadvantage for the less fortunate since the low-income population is left with little or no food variety. The low-income population is left with easier access to high fat, starchy and sugary foods with low fruit and vegetable alternatives, which results in unhealthy individuals. In contrast, middle to high-income earners have greater access to a variety of foods which allows for better food nutrition decisions. The FAO in 2009, as cited by Barret (2010: 826), shows that 82% of an undernourished global population were declared food insure. Thus Ruel (2003:39175S) reports that dietary diversity may help to measure food security. Unfortunately, the predicted rise in food prices and assumed food scarcity could make the situation of access of the poor to food worse (Mead 2008: A335). Godfray *et al.* (2010: 812) explains that the changed dietary requirements of the world have put additional pressure on the world's food supply. The change in demand for certain food commodities has put strain on the meat, dairy, fish and processed food industries more than ever before. The challenge now becomes producing food in an environmentally and sustainable way and this requires change throughout the food supply chain. Chakraborty *et al.* (2011: 2) suggests that in order to meet the predicted food demand by the world, food production needs to increase by 50% by 2050.

Increased food production to satisfy the growing food demand is solely dependent on the productivity of the earth's natural resources (land, oceans and the weather) together with the availability of agricultural land for farming which is, however, challenged by other human/ industrial land activities that are considered a priority over farming. Other factors that pose a challenge to farming land is unworkable land due to climate change, soil erosion and other unsustainable land factors (Godfray *et al.* 2010: 813). The use of farming land for non-food purposes will reduce agricultural investment by up to 20% by 2050 on the global scale as

predicted by Chakraborty *et al.* (2011: 4). Increased food production is also challenged by the amount of waste generated; up to 40% of food is lost to waste both in developing and developed countries. In developing countries, it is mainly due to the lack of good storage procedures. For example, it is estimated that the lack of cold storage is the cause of about 40% of food waste in India. Another reason is the lack of food safety knowledge as in Asia significant amounts of rice yields are claimed by pests and spoilage, whereas in developed countries the waste losses are seen at the latter end of the food supply chain (more in food production establishments and consumers' homes) as discussed by (Godfray *et al.* 2010: 816). Chakraborty *et al.* (2011: 3) add that production loss of up to 15.1% in rice plantations was because of plant disease caused by pests and losses as a result of plant disease amounted to 220 billion US dollars. In addition, plant pests claim up to 82% of cotton production and 50% of major crops.

Grafton *et al.* (2011: 131) believes that the growing population's demand for quality water and land resources motivated by the growing need for food, is a heavy burden on a world that is already constrained. As stated by Chakraborty *et al.* (2011: 3), water is essential for plant growth but Rockstrom, Karlberg and Falkenmark as cited by Grafton *et al.* (2011: 131) report that data suggests that there will be insufficient water available on a global scale for a healthy diet post climate change effects. With that said, other areas in the world would periodically have restricted access to water in a population of 9.1 billion. The intervention is that water resource planning should be a solution to water scarcity and wastewater in water-rich counties can be utilized in water deficient countries for food production.

Gebbers and Adamchuck (2010: 828) state that a well-established agricultural system will be able to sustain and improve food availability and supply in any country. Barret (2010: 827) adds that it is always much better to teach an individual how to catch fish so that an individual is able to procure fish for themselves instead of relying on handouts. He feels so strongly about this that he deems policies and programmes aimed at reducing poverty by means of creating jobs and empowering the poor to be more beneficial than feeding schemes.

2.9 Conclusion

As highlighted in the literature review, in order to overcome the predicted increase in infectious disease that is due to a globalized food chain, food safety measures need to be implemented at the source and continue throughout the value chain as contamination can occur at any point of food production and still cause harm. Where the source of contamination may not be obvious, diagnosis may take months before the source is identified and addressed. Tauxe from the CDC division of Food-borne, Bacterial and Mycotic Diseases shares that some cases take months to solve as contamination can occur at any point in the food supply chain, as communicated by (Volansky 2008: 12).

International standards and legislation have driven the improvements in microbiological food safety, which has been largely demanded by consumers in response to food safety outbreaks. The WHO predicts that on a global scale, food-borne illness deaths, in particular diarrhoeal cases, will decrease because of the positive impact food safety standards and legislation have had in this regard. In order for this prediction to materialize, it becomes vital that countries that are responsible for the largest share of the world's food production maintain food safety standards and adhere to legislation. The lack of understanding around food-borne disease outbreaks that occur around the world remains because of the level of food contamination according to Newell *et al.* (2010: S4). Schaffner, as shared by Volansky (2008: 12) suggests that mathematical models can facilitate cross-contamination prediction, identification of hazardous food and monitoring. The use of pH level graphs has assisted in identifying the rate at which Salmonella grows and in another case graphs assisted in identifying the germinating temperature of Clostridium Perfringens.

James *et al*. (2010: 1945) mentions that climate change will affect all nations but will be more detrimental to the southern hemisphere countries, as they will not be able to grow and yield as much produce thus causing the burden of hunger to increase. Chakraborty et al. (2011: 3) shares that the challenge for farmers is to ensure that there is enough produce to supply consumers on both a national and international scale. In order to achieve enough safe food the use of plant pesticides and insecticides together with agricultural technology has promoted the growth of grain production over the years, although warmer temperatures and water restrictions have challenged productivity. However, the increased use of pesticides has negatively affected wheat quality and safety. Wheat production is an important crop accounting for one fifth of the total dietary requirements for humankind. Climate change is a natural phenomenon but the activities of humans on the earth have somehow accelerated the natural occurrence of climate change, with a rapid increase of carbon dioxide emissions into the atmosphere since 1750 Chakraborty et al. (2011: 2-5).

The importance of this study is its focus on food hygiene, food safety, food handling practice and the knowledge of Food Handlers in a food retail company in Durban. Food Handlers play a significant role in the overall food supply chain. The results of this study will be shared with the management team of the organization under investigation, which will help them to intervene and make improvements where necessary.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

The aim of this study is to investigate the food hygiene, food safety, food handling practice and the knowledge of Food Handlers in a food retail company in Durban. The objective of the study is to determine and describe the knowledge of food hygiene and food safety and the standard of the observed food hygiene, food safety and food handling practices demonstrated by the Food Handlers in the particular establishments. In addition, the study will investigate any differences in the food safety standards practised in the different establishments within the company in order to establish whether there is a relationship between knowledge, practices and established standards as literature suggests. This study will also attempt to draw a comparison between the managers knowledge and that of the Food Handlers, and the general food safety knowledge versus the food safety behaviour demonstrated in the different establishments. In addition, the food safety training will be compared against the food safety knowledge which should have been imparted during training, and this comparison will be extended to the observed behaviour which should be influenced by the level of knowledge obtained during training. The objective is to inform management on the standard of food hygiene, food safety, food handling practice and knowledge of the Food Handlers in the company.

In this study the tools used to collect data include the following:

- Managers questionnaire
- Food Handlers questionnaire, and
- Food practice observation sheet.

This chapter will focus on the planning and administration of the study and review the research and study design. The study population and sampling will be revealed. The pilot study, and the selection and training of field workers will be explained. The data collection tools and process will be covered in the data capturing, data analysis and statistics section. In addition the data quality control and ethical considerations will be discussed.

3.2 Planning and administration

Approval from the food retail company was obtained to undertake this study, a meeting with the representative from the food retail company was arranged and permission to do the study was granted verbally. The results in the form of a report will be presented to the company at the end of this study. Due to confidential codes of conduct, the company shared sensitive information (policies, procedures and documentation) for this study therefore a confidentiality contract was drawn up and signed at the first

meeting (Annexure A); this was to protect company policies and it also serves as permission to do the study (binding contract). A permission letter to gain access to the individual establishments was drawn up and signed by the company Director and was presented at each establishment upon arrival (Annexure B). Access was obtained immediately at some of the establishments and scheduled access was granted at other establishments. An introductory meeting with the managers and/ or owners of the respective selected establishments happened on the day of the data collection.

Once access was granted by the owners and or the mangers of each establishment an information letter (Annexure C) was presented to the participants; the information letter explained that participation was on a voluntary basis, and the purpose of the study and the data collection process was explained in detail. The participants were requested to consent to participate in the study; therefore a consent letter (Annexure D) accompanied the information letter presented before the commencement of the data collection. Some managers and Food Handlers within the selected establishments declined to participate and some owners and/or managers requested that access be rescheduled for the following week.

3.3 Ethical considerations

Permission was granted by the food retail company to conduct the study. A confidentiality contract was signed by the company's director and the researcher.

Ethical permission was obtained from the Institutional Research Ethics Committee (IREC) at Durban University of Technology (Ethics number IREC 017/14) in line with the Human Sciences Research Council (HSRC) guidelines. Refer to Annexure E.

All the participants' paperwork was coded, and no identity numbers or names were used. Numbers were allocated to all paperwork and questionnaires. The participants were made aware of the fact that all information gathered during this study was confidential. Personal information in respect of the participants will be stored in a locked cupboard in the Department of Food and Nutrition for a period of five years, and after this period it will be disposed of by shredding. Only the researcher and supervisor will have access to this information. The organization will be given a copy of the final report on completion of the study.

The information letter that was given to the participants stipulated the purpose of the study and explicitly stated that participation in this study was on a voluntary basis and that participants could withdraw from the study at any time. During the fieldwork, the participants were requested to consent to participate in the study.

It was clearly communicated to the participants and the respective store managers/owners that there was and would be no financial gain for participating in this study. Inspectors/ auditors and managers will not be present when data is being collected so as to obtain objective results.

3.3.1 Questionnaire development and piloting

Adaptations from a selection of material were utilized in order to develop the questionnaires used for this study. Permission to use questionnaires developed as part of a previous study was obtained from Meaker (2011) (Annexure F). The combination of the Food Safety material and monitoring documents used by the mass catering company (pilot study) and the Food safety store safe training material from the food retail company under investigation for this study was used in order to develop the questionnaires.

Once the adaptation of the questionnaires was completed the questionnaires were validated for content validity by two qualified Durban University of Technology Food and Nutrition lecturers and corrections were made. Thereafter the pilot study was conducted with the food retail company's managers and Food Handlers. Permission to do the pilot study was obtained from the area manager of the particular establishment within the broader company and the researcher conducted the pilot study with 10 Food Handlers and one kitchen manager who were not participating in the main study. The Managers/Supervisors questionnaire, the Food Handlers questionnaire and the observation sheet were tested in the pilot study. The planned data collection procedure was used during the pilot study. Based on the results of the pilot study it was seen as imperative that the fieldworkers needed to administer the questionnaires in an interview setup and also to attempt to engage in a conversation rather than operate in a test mode in order to complete the questionnaire as the measuring tools seemed extensive. The probability of not managing to complete the questionnaires with the Food Handlers was also considered as food production and service within the establishment took priority. It was also necessary for the fieldworkers to wear proper food protective clothing as they may have been required to stand in the production and service area so as not to interrupt the running of the establishment. Furthermore, the time allocated for completion of the questionnaire was affected by the production and service area demands on the food handler. The need to translate the questionnaires into isiZulu was not necessary as simple language was used and the pilot study proved that it would be of benefit to have fieldworkers who spoke both English and isiZulu so as to make the interviewing process easier.

The pilot group was excluded from the sample group selected for the study and the obtained data was not utilized for this study. The lessons learnt from the pilot study influenced the in-store data collection procedure and directed the data collection planned activities. The pilot study was conducted in June 2014.

3.4 Research design

The research was conducted in Durban, KwaZulu-Natal in 20 food service establishments that belonged to the same food retail company. This food retail company has about 150 stores which practise voluntary trading. The company has a solid food safety policy which is made available to the owners of each establishment to implement and maintain. Quarterly food safety audits by an external company are carried out at each establishment and the results are shared with the owners in order to resolve any shortcomings

that may be revealed. This research aims to provide data that will report on the food safety standards that the company assumes are being maintained in each establishment. The sample was randomly selected (all the names of the stores were put into a container and randomly selected) based on the establishment category i.e. supermarket, mini market and hyper store. Four managers were unable to complete the interview process due to the demands of their service departments. Information letters and consent forms were presented and signed by the participants before data collection commenced.

An observational and descriptive research design was used. The data was collected in July and August 2014.

Planned research activities

Step 1: Completed proposal was approved, ethical clearance was obtained and permission to conduct the study was granted in 2014.

Step 2: Questionnaires were developed, validation was carried out and corrections were made.

Step 3: Completed questionnaires were tested in a pilot study by the researcher and corrections were made.

Step 4: A list of all the stores was obtained. Stores to be visited were randomly selected and store locations were established. Store visits were planned according to the location of the stores. Additional stores were added to the sample group in the event that access was denied whereupon another store in the same store category would be approached.

Step 5: Field workers were employed and trained and data collection commenced in July 2014. One establishment was visited per day; if access was denied another store within the area was approached in order to complete the work quota for the day. Data was captured by the researcher and analysed for reporting.

3.5 Study population and sampling

3.5.1 Study population

Twenty establishments within the Durban, KwaZulu-Natal area were included in the study population, being eight Super stores, seven Mini stores and five Hyper stores as per the food retail company's categorization of establishments.

3.5.2 Sampling selection procedure

A random sample of 20 food establishments was selected. All the names of the establishments were grouped according to the three categories that exist within the company, given store numbers and placed in a container, the numbers were randomly selected per category and linked to store names. The sample group that was used for the pilot study was excluded from the sample selection.

3.5.2.1 Sample size

The sample size of the employees (n=250) was made up of 234 Food Handlers (FHs) and 16 managers/supervisors (Mngrs/Sups). The sample size per category is as illustrated below.

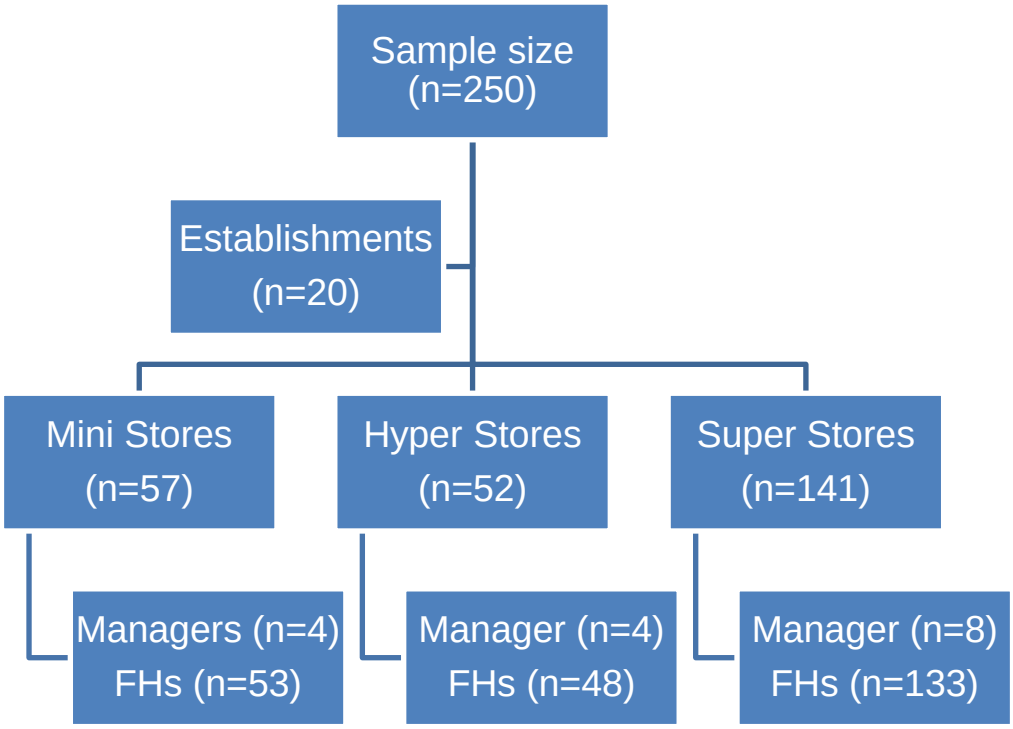

Figure 3.1 Sample size

3.5.2.2 Inclusion criteria

- Food Handlers and food service managers/supervisors, working in all food departments within the establishment (Delicatessen (Deli), Fresh produce, Bakery and Butchery)
- Female and male Food Handlers
- Full-time and part-time Food Handlers.

3.5.2.3 Exclusion criteria

- Casual Food Handlers
- General workers
- Employees who do not work in the food department
- The discount category establishments within the food retail company

3.6 Study design

The Managers/Supervisors questionnaire and Food Handlers questionnaire were used in an interview set-up whereas the observational sheet was a checklist to obtain more detailed information, to verify the information gathered in the questionnaires and to correlate the link between knowledge and food handling practices demonstrated by the Food Handlers.

3.6.1 The managers/supervisors questionnaire

A valid and reliable managers/supervisors questionnaire (Annexure G) was used for this study. The questionnaire was adapted from the site managers/supervisors questionnaire and Food Handlers questionnaire from an earlier study by Meaker (2011) and the Store safe material from the food retail company under investigation. The managers/supervisors questionnaire will determine the food hygiene and safety knowledge of the managers/supervisors in the establishment and the influence managers have over the Food Handlers. The questionnaire was in English as English was the medium of communication used in this study but in case some of the managers and supervisors were not able to communicate confidently in English, the researcher was fluent in both English and isiZulu and administered this questionnaire accordingly. Sections covered in this questionnaire included general personal information, training, personal hygiene and food safety knowledge, knowledge of food storage, receiving, handling, and serving and wastage practices. It took approximately 45 minutes to interview each manager and the interview was done in the service area so as not to disrupt the normal operations of the establishment.

3.6.2 The Food Handlers questionnaire

A valid and reliable Food Handlers questionnaire (Annexure H) was adapted from a study done by Meaker (2011) and the Store safe material from the food retail company under investigation. The Food Handlers questionnaire investigated the food hygiene and safety knowledge and self-reported food handling practice. The Food Handlers questionnaire was in English as English was the medium of communication used in this study but in case some Food Handlers were not able to communicate confidently in English, an isiZulu-speaking field worker administered this questionnaire. Sections covered in this questionnaire included general personal information, training, personal hygiene and food safety knowledge, knowledge of food storage, receiving, holding, serving and wastage practices. It took approximately 45 minutes to an hour to interview each food handler and the interviews were conducted in the area where the food handler was working so that the normal operations of the establishment could continue without any disruption.

3.6.3 Observation checklist

The observation checklist (Annexure I) was adapted from an observation sheet used in an earlier study by Meaker (2011) and the food retail company's food safety guidelines used for the pilot study. This observation checklist was adapted to be more relevant for the sample group and used to verify the

information on the questionnaires and examined the food hygiene and safety conditions and measures that existed within the establishments. The observation checklist revealed the food handling practices more objectively over and above the self-reported practices and knowledge. The observation checklist was administered by the researcher and not the field workers. The observation checklist was administered at midday so as to record a true representation of the food handler's behaviour and the normal running of the food establishment. The observation checklist was in English and the focal points included general management checks, and aspects of receiving, storage, food preparation, holding, serving, waste and hygiene. It took approximately two hours to observe one establishment as the researcher needed to observe some of the processes in case they needed more attention. For example, upon receiving information that the truck was there to deliver goods, the researcher would observe the process fully so as to document accurate information. General comments were documented that included reporting on the temperature of food being served and oil tests done by the researcher.

3.7 Fieldworker selection, training and supervision

3.7.1 Fieldworker selection

Fieldworkers were required for the study as the sample size was extensive. Third year students from the Department of Food and Nutrition at Durban University of Technology were selected as fieldworkers for the study. It was confirmed that using third year students would result in them completing the measuring instrument accurately as fieldworker training had been given during the course. A list of students was given to the researcher and each student who was available and interested was requested to attend an introductory meeting. Since the questionnaire was in English, the employed fieldworkers had to be able to speak isiZulu as well. During data collection the fieldworkers were requested to only complete the interview process of the Food Handlers questionnaire while the researcher conducted all the observation checklists. Field workers were appointed according to where they lived in relation to the store location.

3.7.2 Fieldworker training

During the introductory meeting the study was explained to the employed fieldworkers. All the fieldworkers were trained to administer the Food Handlers questionnaire and lessons learnt during the pilot study were shared by the researcher in order to better prepare the fieldworkers for the data collection day. The Food Handlers questionnaire was covered thoroughly and the fieldworkers were required to administer the questionnaire to the researcher as part of role-playing within the predicted timeframe. It was important that the fieldworkers did not influence the answers given for the data collection thus the role-playing allowed any such influence to be picked up on especially when questions were translated into isiZulu. The fieldworkers were also informed about the ethical considerations and were trained on how to communicate the importance of the information letter and the signing of the consent letter prior to data collection.

3.7.3 Fieldworker supervision

The researcher was present at the establishments with the fieldworkers during data collection. On the first day of the data collection the researcher administered the managers questionnaire and the fieldworker that was accompanying the researcher was required to observe the process. Thereafter the fieldworker was observed by the researcher to ensure that the fieldworker was performing as expected. The fieldworker was made aware that she should stop and ask for clarity if needed during the completion of the measuring tool. The researcher checked all measuring tools for completion before departure.

3.8 Data collection process

As per the researcher's data collection schedule, twenty days were allocated to visit twenty establishments and an additional ten days were allocated for data collection in the event of access being denied and relocating not being possible.

3.8.1 Data collection schedule

The selected establishments were grouped according to location. Establishments that were located in the same area were visited in the same week; this assisted in the event of access denial where another establishment within the area could be approached. Data collection was done from Monday to Friday and excluded weekends as directed by the representative from the food retail company under investigation. Data collection on the first day started at 9h00 but this proved to be an inconvenient time due to demands on the service department but nevertheless data collection commenced. On subsequent days data collection started at 10h00 which was convenient for some of the establishments whereas other establishments requested that the researchers return after lunch.

At three of the establishments access was denied and the managers declined to schedule visits, whereupon the representative of the food retail company was contacted and thereafter the managers agreed to scheduled visits. On the days that access was denied other establishments within the same radius were approached around lunch time and data collection was conducted although the Food Handlers were under pressure to serve customers and/or were undergoing shift changes.

3.8.2 Data collection procedure

Each visit at any given establishment took approximately six hours since the Food Handlers were busy preparing and serving food and the researcher and fieldworkers weren't allowed to stop production and customer service and therefore needed to be patient when the interview process was paused while serving and production took priority.

The data collection procedure was as follows:

Step 1: Arrival at the establishment. The researcher checked the fieldworker's uniform and confirmed that stationary and measuring tools had been given to the fieldworker.

Step 2: The researcher and fieldworker entered the establishment and requested to meet with the store owner and/ or manager in order to request access. At this point the permission letter and information letter were presented to the owner and/or manager in order to formally request access and explain the purpose of the visit.

Step 3: Once access was granted, the service department managers were requested to present themselves and an introductory meeting led by the store owner/ manager was conducted. Protective clothing was provided and the service departments were visited.

Step 4: The delicatessen (deli) area was visited first where the deli manager introduced the researcher and field worker to the employees, the information letter was explained and the consent form was signed. Data collection was then conducted. The manager was interviewed by the researcher and the researcher then carried out the observation. The fieldworker interviewed the Food Handlers without interrupting customer service.

Step 5: Once the deli area inspection was completed the bakery, butchery and the fresh produce departments were visited.

Step 6: Data collection was completed, the measuring tools were checked for completion and handed over to the researcher for storage. The researcher and fieldworker approached the store manager to thank them and announced their departure.

3.9 Data analysis and statistics

The managers/ supervisors questionnaires and the Food Handlers questionnaire followed an interview process whereas the observation checklist was administered by the researcher. Answers on all the questionnaires were coded and data was captured on Windows Excel® spread sheet by the researcher and analysed using the Statistical software Package for the Social Sciences (SPSS) version 21.0 for descriptive statistics. Results are represented in tables and graphs in chapter 4.

3.10 Data quality control: Validity and Reliability

The measuring instruments used for this study were adapted from tools previously used in another study by Meaker (2011) and those of the company under investigation together with food safety material

belonging to the food company used during the pilot study. Therefore the material used was assumed to be valid and reliable. The validity of the developed questionnaires and observation sheets was established during the pilot study.

The representative of the food retail company under investigation and the researcher agreed that scheduled visits may result in establishments portraying ideal food safety standards as assumed by the company to be in practice and would result in an audit type of environment, therefore prior contact with the selected establishments did not take place, and access was only requested on the day of data collection and the introductory meeting with the manager happened immediately thereafter.

3.11 Conclusion

All the methodology regarding the study was discussed in this chapter; all the relevant measuring instruments were implemented in order to investigate the food hygiene, food safety, food handling practice and the knowledge of Food Handlers in a food retail company in Durban. Chapter 4 will present the statistics and Chapter 5 will present a discussion of the results.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This study investigated the food hygiene, food safety and food handling practice knowledge of Managers and Food Handlers (FHs) in a food retail company in Durban. In this chapter all the results and findings gathered in this study will be presented and discussed. The statistical data from the Managers questionnaires and the Food Handlers questionnaires will be presented. Furthermore, the findings from the observational checklist will be presented. The food safety knowledge versus the observed food safety standards will be compared in the three establishment categories of the food retail company. A comparison will be drawn between the knowledge of the Managers/ Supervisors (Mngrs/Sups) (n=16) versus the knowledge of the Food Handlers (FHs) (n=234). Because of the sample size the results for the managers are presented in numbers with percentages in brackets and the results for the FHs in percentages with numbers in brackets. For ease of reading, where possible the data will be colour coded to show the different store categories, i.e., Mini stores will be in blue, Hyper stores will be in red and Super stores will be in green.

4.2 Managers and Food Handlers questionnaire

4.2.1 Demographic information

The study consisted of twenty establishments from the selected retail stores with seven Mini stores (35.0%), five Hyper stores (25.0%) and eight Super stores (40.0%), as indicated in figure 4.1.

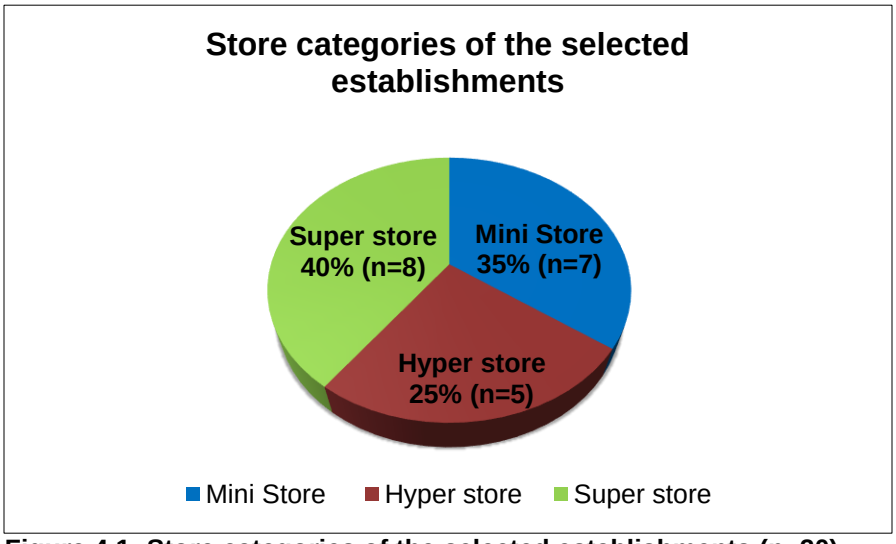

Figure 4.1: Store categories of the selected establishments (n=20)

Of the 20 establishments visited, a total of 16 Mngrs/Sups and 234 Food Handlers were interviewed; and seven (43.8%) were Supervisors and nine (56.3%) were Managers as indicated in figure 4.2. At the Mini stores one (25.0%) of the respondents was a Supervisor and three (75.0%) were Managers. At the Hyper store three (75.0%) were Supervisors and one (25.0%) was a Manager and at the Super store five (62.5%) were Supervisors and three (37.5%) were Managers as indicated in Figure 4.2. It was evident that each establishment had a different organizational structure that either had Supervisors and/ or Managers in each service departmental area who reported directly to the store manager or the store owner.

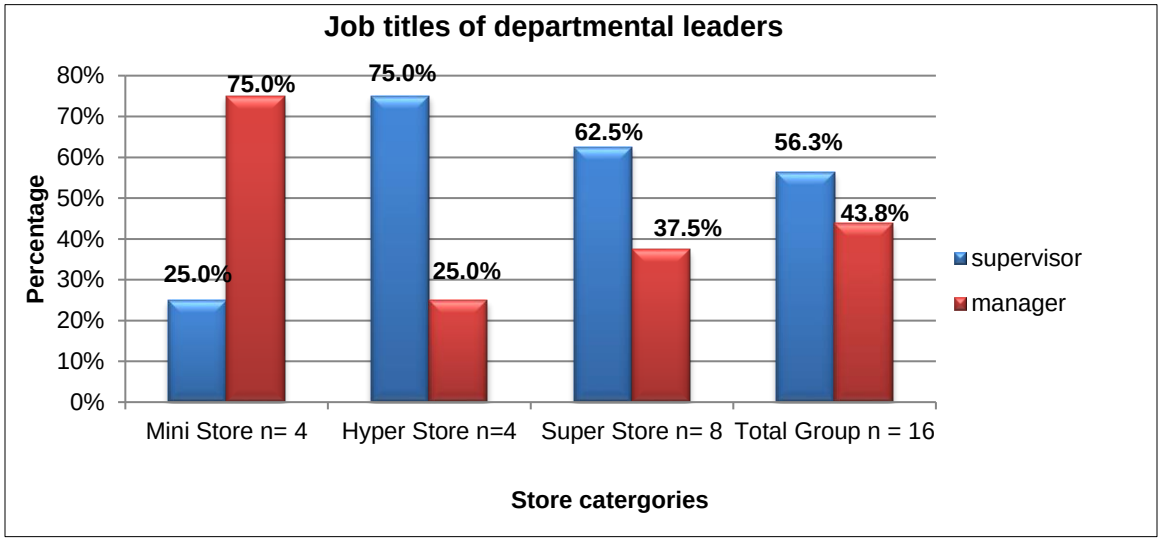

Figure 4.2: Job titles of the departmental leaders in the establishment (n=16)

Figure 4.3 indicates the sex of the respondents. There were 12 (75.0%) female and four (25.0%) male Mngrs/Sups for the total group of respondents. In the Mini stores three (75.0%) were female and one (25.0%) was male, in the Hyper stores all the departmental leaders were female (n=4; 100%) and in the Super stores five (62.5%) females and three (37.5%) males were managing the department. For the total group of FHs, 74.8% (n=175) were female and 25.2% (n=59) were male. In the Mini stores 73.6% (n=39) were female and 26.4% (n=14) were male, in the Hyper stores 81.3% (n=39) were female and 18.8% (n=9) were male and in the Super stores 72.9% (n=97) were female and 27.1% (n=36) were male.

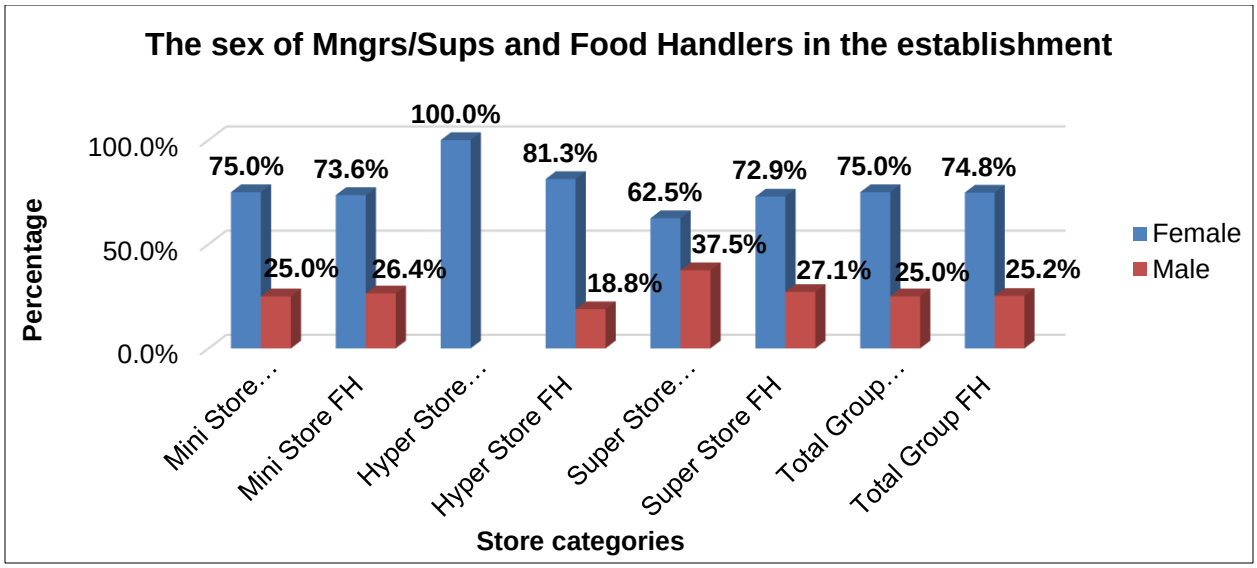

Figure 4.3: Sex of Mngrs/Sups (n=16) and FHs (n=234)

Figure 4.4 shows the age of the respondents. Two respondents (12.5%) were below the age of 30 and 14 respondents (87.5%) were 30 years old and older. The Mini stores and the Hyper stores both had one respondent (25.0%) each who were less than 30 years of age and three respondents (75.0%) each who were 30 years old and older, whereas for the Super stores all the respondents (n=8) were 30 years old and older. Furthermore, for the FHs in the total group, 39.3% (n=92) were younger than 30 years whereas 60.7% (n=142) were 30 years and older. In the Mini stores 24.5% (n=13) were younger than 30 years whereas the majority (75.5%; n=40) were 30 years and older. At the Hyper stores 56.3% (n=27) of the respondents were below 30 years of age and 43.8% (n=21) were 30 years and older. In the Super stores 39.1% (n=52) were below 30 years and 60.9% (n=68) were 30 years and older.

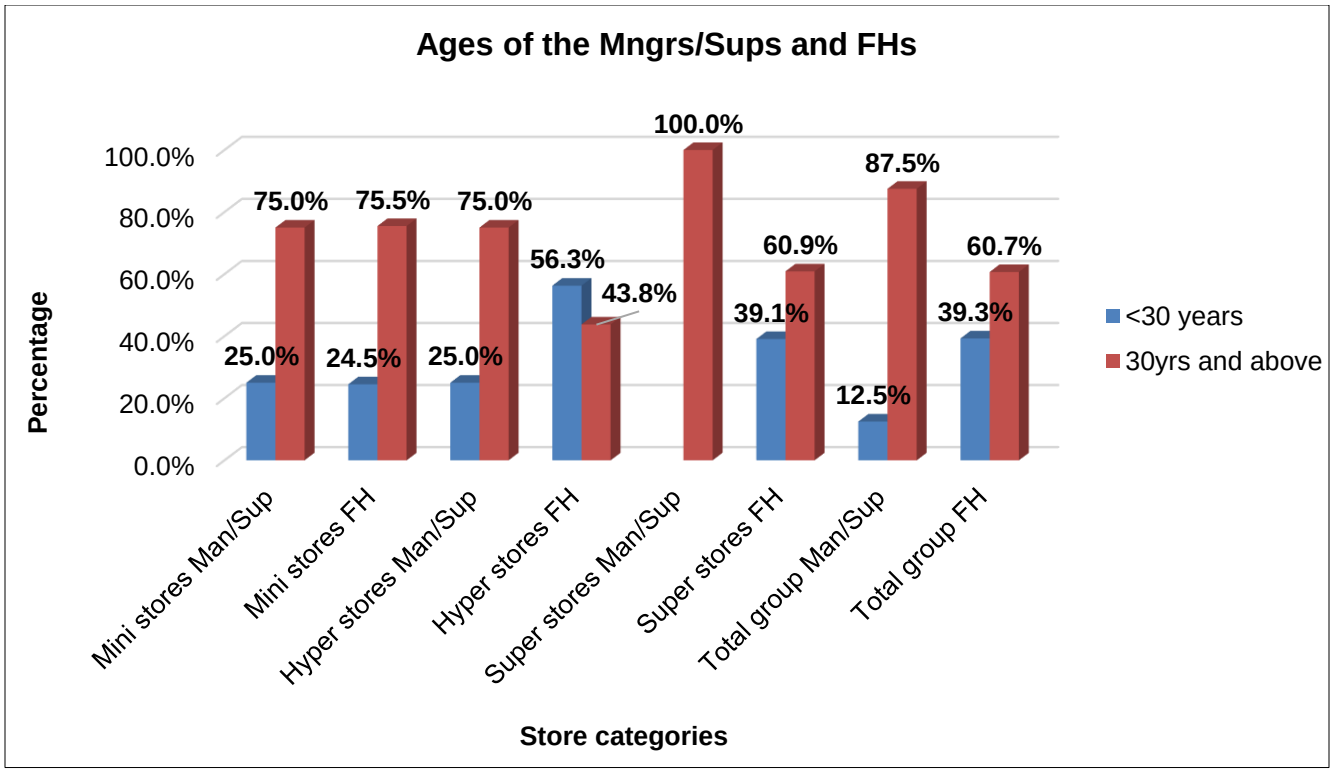

Figure 4.4: Ages of the Mngrs/Sups (n=16) and FHs (n=234)

Figure 4.5 indicates the level of education of the Mngrs/Sups respondents. It is evident that the majority (n=10; 62.5%) of the Mngrs/Sups have grade 12 as the highest level of education. Four (25.0%) have grade eight to grade 11 and one (6.3%) had obtained a tertiary diploma and one (6.3%) had obtained a university degree. At the Mini stores two (50.0%) Mngrs/Sups had a grade 12, one (25.0%) had a grade eight to 11 and one (25.0%) had obtained a degree whereas the Hyper store had three (75.0%) Mngrs/Sups who had obtained a grade 12 qualification and one (25.0%) who had a grade eight to11 education. The Super stores, however, had five (62.5%) Mngrs/Sups with a grade 12 qualification, two (25.0%) with a grade eight to11 education and one (12.5%) with a tertiary diploma.

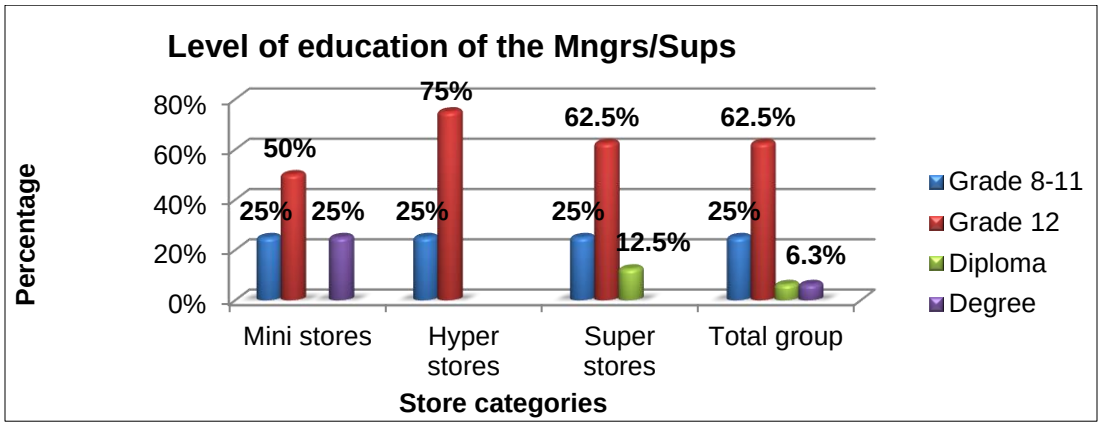

Figure 4.5: Level of education of Mngrs/Sups (n=16)

The level of education of the FHs is depicted in Table 4.1. For the total group, 1.3% (n=3) have no formal education, 0.9% (n=2) have grade one to three education, and 0.4% (n=1), have a grade four to seven education. Fourteen point one percent (n=33) have a grade eight to 11 education and 74.8% (n=175) have obtained a grade 12 certification. One point seven percent (n=4) have been through an apprenticeship, 4.7% (n=11) have obtained a diploma and 2.1% (n=5) have obtained a degree. At the Mini stores 1.9% (n=1) have had no education, another 1.9% (n=1) have a grade four to seven education and 18.9% (n=10) have a grade eight to 11 education. Seventy-one point seven percent (n=38) have a grade 12 certificate and only 5.7% (n=3) have obtained a diploma. At the Hyper stores 2.1% (n=1) have a grade one to three education, 16.7% (n=8) have a grade eight to 11 education, 68.8% (n=33) have a grade 12 certificate, 2.1% have been through an apprenticeship and 10.5% (n=5) have a diploma. At the Super stores 1.5% (n=2) have had no formal education, 0.8% (n=1) have a grade one to three education, 11.3% (n=15) have a grade eight to 11 education and 78.2% (n=104) have a grade 12 certificate, whereas 2.3% (n=3), 4.5% (n=6), and 1.5% (n=2) have been through an apprenticeship, obtained a diploma and obtained a degree respectively.

Table 4.1: Level of education of FHs (n=234)

Variables	Mini stores FH % (n=53)	Hyper stores FH % (n=48)	Super stores FH % (n=133)	Total group FH % (n=234)
No education	1.9 (n=1)	0.0	1.5 (n=2)	1.3 (n=3)
Grade 1-3	0.0	2.1 (n=1)	0.8 (n=1)	0.9 (n=2)
Grade 4-7	1.9 (n=1)	0.0	0.0	0.4 (n=1)
Grade 8-11	18.9 (n=10)	16.7 (n=8)	11.3 (n=15)	14.1 (n=33)
Grade 12	71.7 (n=38)	68.8 (n=33)	78.2 (n=104)	74.8 (n=175)
Apprenticeship	0.0	2.1 (n=1)	2.3 (n=3)	1.7 (n=4)
Diploma	5.7 (n=3)	10.4 (n=5)	4.5 (n=6)	4.7 (n=11)
Degree	0.0	0.0	1.5 (n=2)	2.1 (n=5)

Table 4.2 Shows that 12 (75.0%) of the Mngrs/Sups have been employed for three years and more and two (12.5%) have been working for less than one year and two (12.5%) have been working between two to three years (total group). The FH's total group data shows that 20.1% (n=47) have worked for less than a year, 15.4% (n=36) have worked for between one and two years, 12.4% (n=29) and 52.1% (n=122) have worked for two to three years and three and more years respectively. At the Mini stores two (50.0%) of the Mngrs/Sups have been employed by the retail company for less than one year whereas 17.0% (n=9) of the FHs have been employed for the same duration. None of the Mngrs/Sups have been employed for one to two years and two to three years but 9.4% (n=5) and 13.2% (n=7) of the FHs have been working for that duration respectively. Two (50.0%) of the Mngrs/Sups have been working for three years and more whereas 60.4% (n=32) of the FHs have been employed for the same amount of time. At the Hyper stores it was found that two (50.0%) of the Mngrs/Sups have been employed for two to three years but only 16.7% (n=8) of the FHs have been employed that long and two (50.0%) have been employed for three years and more, whereas 33.3% (n=16) of the FHs have been working there for the same duration. Twenty-seven point one

percent (n=13) of the FHs have been working for less than a year and 22.9% (n=11) have been working for one to two years. At the Super stores all (n=8; 100%) of the Mngrs/Sups have been employed for three years and more and 55.7% (n=74) of the FHs have been employed for the same duration. However, 18.8% (n=25), 15.0% (n=20) and 10.5% (n=14) have been employed for less than one year, one to two years and two to three years respectively.

Table 4.2: Duration of employment of the Mngrs/Sups (n=16) and FHs (n=234)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FH % (n=234)
<1 Year	50.0 (n=2)	17.0 (n=9)	0.0	27.1 (n=13)	0.0	18.8 (n=25)	12.5 (n=2)	20.1 (n=47)
1- 2 years	0.0	9.4 (n=5)	0.0	22.9 (n=11)	0.0	15.0 (n=20)	0.0	15.4 (n=36)
2-3 years	0.0	13.2 (n=7)	50.0 (n=2)	16.7 (n=8)	0.0	10.5 (n=14)	12.5 (n=2)	12.4 (n=29)
3 and more years	50.0 (n=2)	60.4 (n=32)	50.0 (n=2)	33.3 (n=16)	100.0 (n=8)	55.6 (n=74)	75.0 (n=12)	52.1 (n=122)

Fifteen (93.8%) Mngrs/Sups had previous work experience whereas 62.8% (n=147) of the FHs had previous work experience. At the Mini stores as well as the Super stores all the Mngrs/Sups had previous work experience but 77.4% (n=41) and 54.1% (n=72) of the FHs had previous work experience at the Mini stores and Super stores respectively. At the Hyper stores three (75.0%) of the Mngrs/Sups and 70.8% (n=34%) of the FHs had work experience as depicted in figure 4.6.

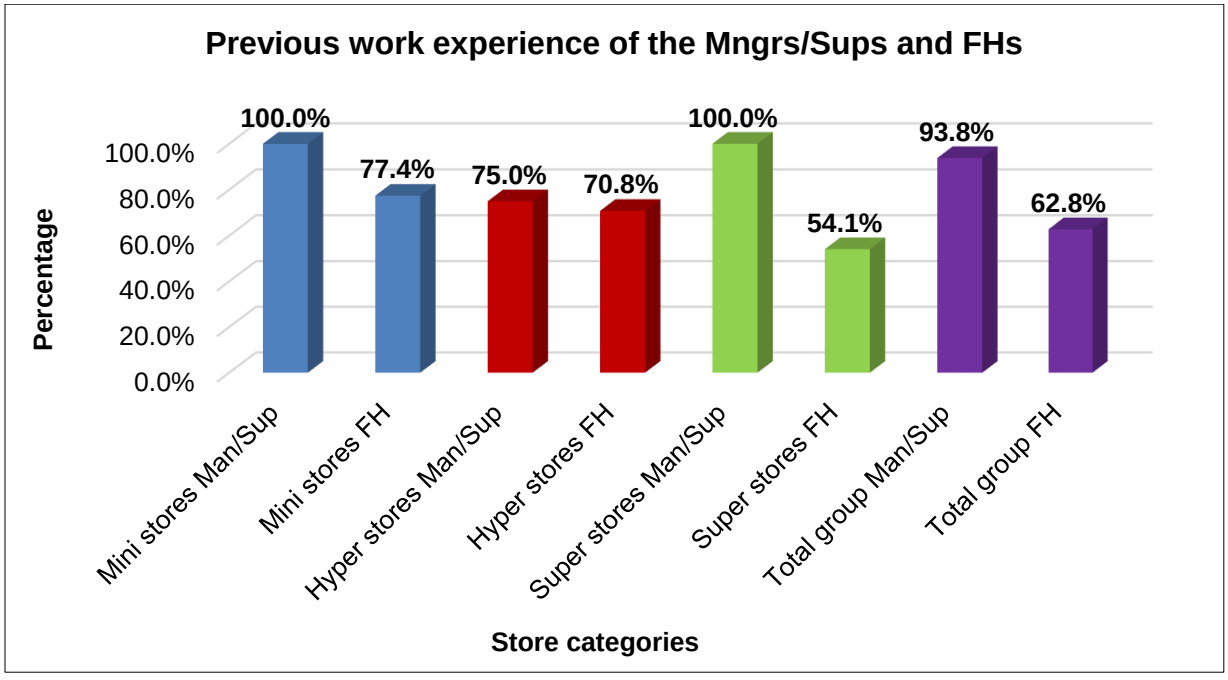

Figure 4.6: Previous work experience of the Mngrs/Sups (n=16) and FHs (n=234)

When investigating the use of menus in order to structure meal selections, figure 4.7 reveals that for the total group 12 (75.0%) of the establishments used a menu. At the Mini stores and the Hyper stores two (50.0%) of the Managers used menus at each establishment. At the Super stores, however, all (n=8; 100%) the Managers used a menu in order to structure the meal selection. The FHs reported the use of standard recipes to prepare meals (Figure 4.8). For the total group 80.8% used recipes to prepare meals. At the Mini stores 83.0% (n=44), at the Hyper stores 72.9% (n=35) and at the Super stores 83.5% (n=111) used standard recipes to prepare meals.

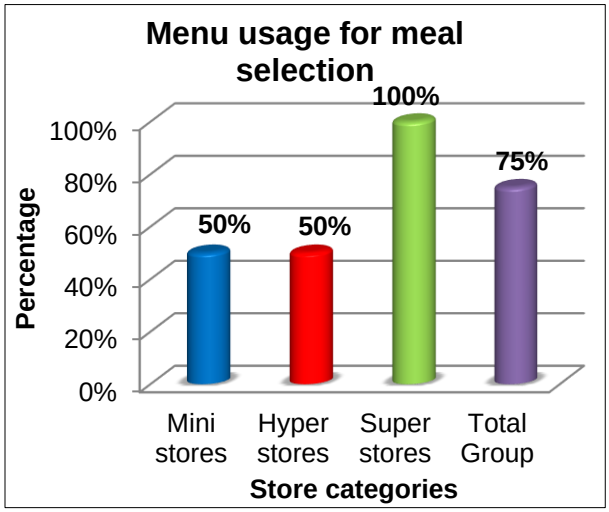

Figure 4.7: Menu usage for meal selection (n=16)

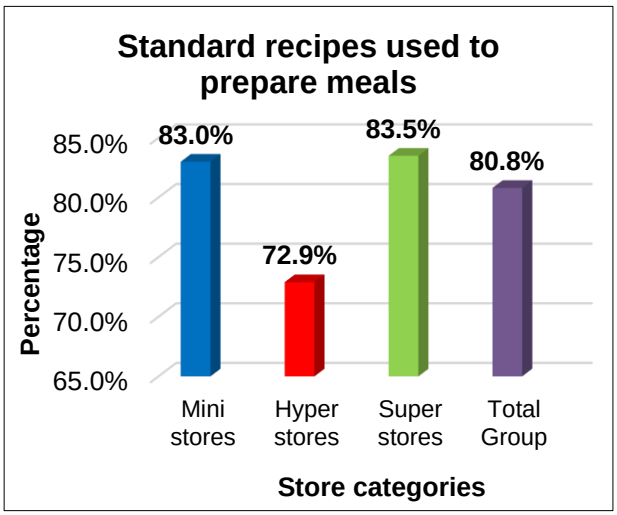

Figure 4.8: Recipe usage for meal preparation (n=234)

Table 4.3 indicates the factors that contributed to the selection of menu items in the establishments. For the total group, four (25.0%) of the Managers reported that the menu is based on locally accepted foods, whereas ten (62.5%) reported that the menu is based on customer preference; however, two (12.5%) of the Managers reported that the menu is a set menu which is determined by the management of the establishment. At the Mini stores one (25.0%) of the Managers reported that the menu is influenced by locally accepted food whereas three (75.0%) of the Managers reported that the menu is based on customer preferred food. At the Hyper stores one (25.0%) of the Managers reported that the menu is influenced by locally accepted food and one (25.0%) of the Managers reported that the menu is determined by customer preferred food and one (25.0%) of the Managers reported that the menu is a set menu; however, one (25.0%) of the Managers reported that a menu system is not used. At the Super stores two (25.0%) of the Managers reported that locally accepted foods influence the menu and six (75.0%) of the Managers of the establishments reported that the menu is based on customers preference.

Table 4.3: Factors that contribute to the selection of menu items in the establishments (n=16)

Variables	Mini store % (n=4)	Hyper store % (n=4)	Super store % (n=8)	Total group % (n=16)
Locally accepted food	25.0 (n=1)	25.0 (n=1)	25.0 (n=2)	25.0 (n=4)
Customer preference	75.0 (n=3)	25.0 (n=1)	75.0 (n=6)	62.5 (n=10)
Set menu	0.0	25.0 (n=1)	0.0	12.5 (n=2)
No menu	0.0	25.0 (n=1)	0.0	0.0

Water is a necessary resource for cooking and access to such is essential. Data shows that eleven (68.8%) of the establishments get water from the kitchen tap whereas five (31.3%) access water from the kitchen and the outside tap. At the Mini stores and the Super stores three and six (75.0% each) of the establishments use only the kitchen tap for water supply, whereas one and two (25.0% each) of the establishments access water from both the kitchen tap and an outside tap. At the Hyper stores two (50.0%) of the establishments access the water supply from the kitchen tap only and two (50.0%) use the kitchen tap and an outside tap for water supply as indicated in figure 4.9.

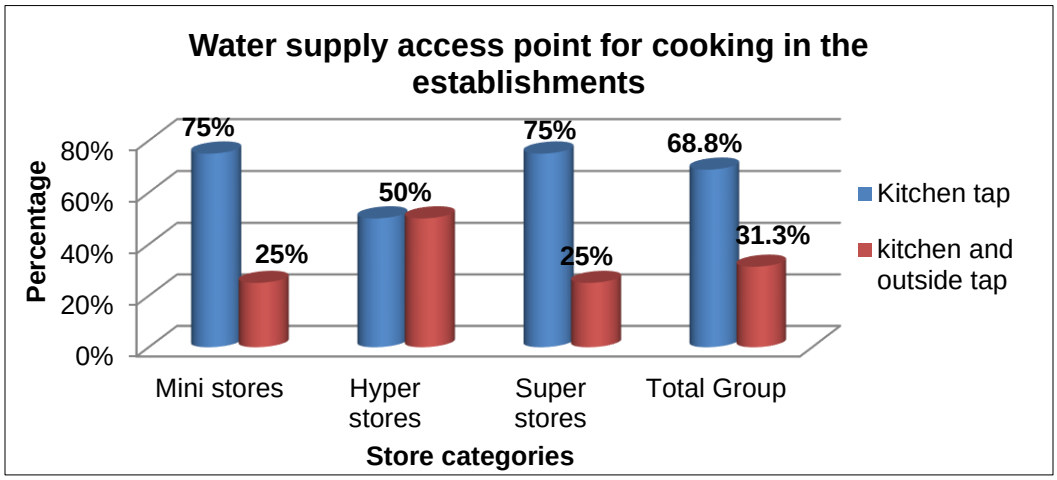

Figure 4.9: Water supply access point used for cooking in the establishments (n=16)

Figure 4.10 indicates the energy source that the establishments use for cooking. For the total group one (6.3%) establishment uses gas to cook and 15 (93.8%) establishments use both gas and electricity for food preparation. At the Mini stores one (25.0%) establishment uses gas only whereas three (75.0%) use both gas and electricity for cooking. At the Hyper and the Super stores both gas and electricity is used as a source of energy for cooking.

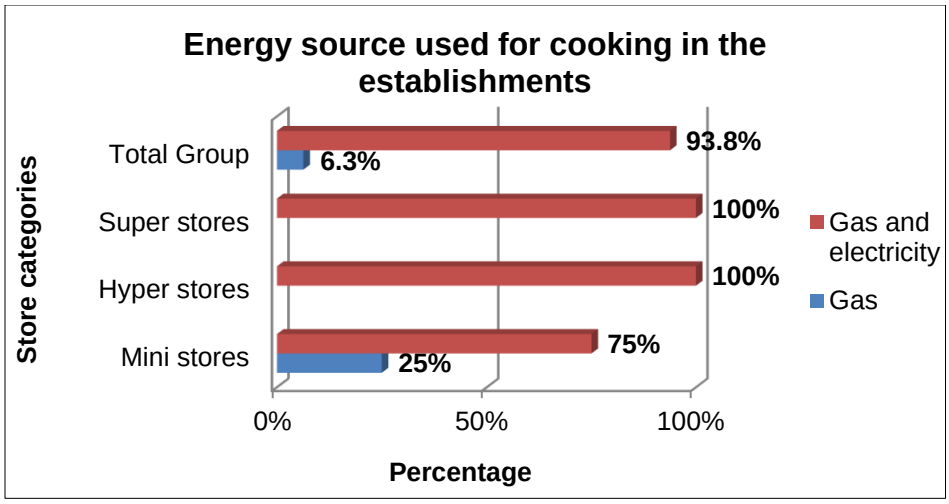

Figure 4.10: Energy source used for cooking in the establishments (n=16)

Figure 4.11 shows the monitoring of staff duties. All the Managers communicated that the monitoring of staff duties is done on a daily basis. Furthermore, three (75.0%) of the Managers from the Mini stores and the Hyper stores delegate the monitoring of staff duties to another staff member, while at the Super stores all of the Managers delegate the monitoring of staff duties to another member of staff in their absence. For the total group, 14 (87.5%) of the Managers delegate the monitoring of staff duties to another member of staff, whereas two (12.5%) of the Managers do not delegate any of the monitoring duties.

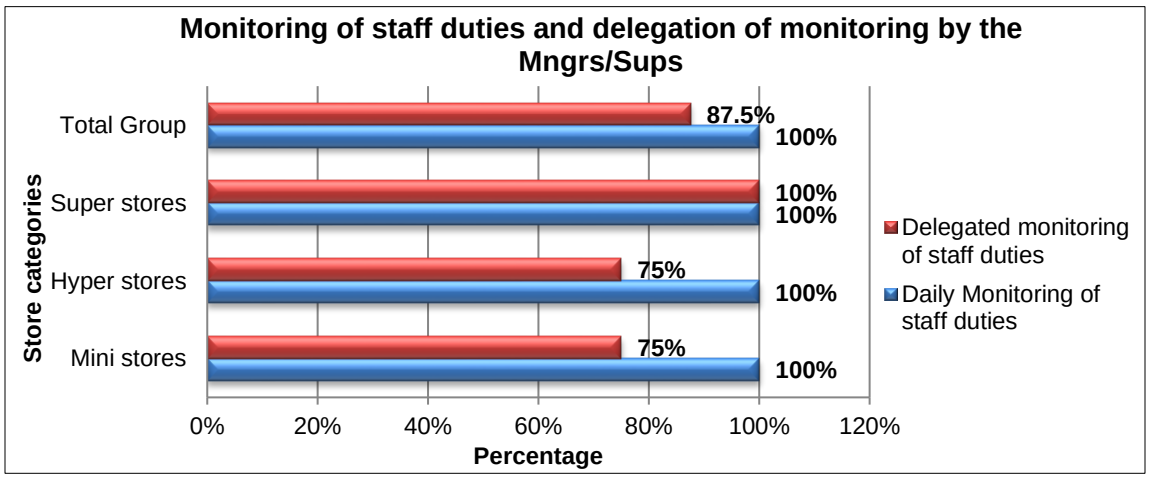

Figure 4.11: Monitoring of staff duties and delegation of monitoring by the Mngrs/Sups (n=16)

When the FHs were asked about the frequency at which monitoring of staff duties is done by the Managers, the data in table 4.4 shows that 89.7% (n=210) of the FHs are monitored on a daily basis as opposed to the 100% depicted by the Managers data on Figure 4.11. Three percent (n=7) are monitored on a weekly basis, 0.9% (n=2) on a monthly basis, 0.4% (n=1) on a quarterly basis, 0.9% (n=2) seldom and 5.1% (n=12) never. At the Mini stores 88.7% (n=47) are monitored on a daily basis, 5.7% (n=3) on a weekly basis, 1.9% (n=1) on a monthly basis and 3.8% (n=2) never. At the Hyper stores 81.3% (n=39) are monitored daily,

2.1% (n=1) are monitored weekly, 4.2% (n=2) are seldom monitored and 12.5% (n=6) are never monitored. At the Super stores 93.2% (n=124) are monitored daily, 2.3% (n=3) are monitored weekly, 0.8% (n=1) are monitored monthly and 3.8% (n=5) monitored quarterly.

Table 4.4: The frequency that staff duties are monitored by the Mngrs/Sups as reported by the FHs (n=234)

Variables	Mini store FH % (n=53)	Hyper store FH % (n=48)	Super store FH % (n=133)	Total group FH % (n=234)
Daily	88.7 (n=47)	81.3 (n=39)	93.2 (n=124)	89.7 (n=210)
Weekly	5.7 (n=3)	2.1 (n=1)	2.3 (n=3)	3.0 (n=7)
Monthly	1.9 (n=1)	0.0	0.8 (n=1)	0.9 (n=2)
Quarterly	0.0	0.0	3.8 (n=5)	0.4 (n=1)
Seldom	0.0	4.2 (n=2)	0.0	0.9 (n=2)
Never	3.8 (n=2)	12.5 (n=6)	0.0	5.1 (n=12)

When the Manager/Supervisor is unable to personally monitor staff duties, the option to delegate monitoring duties is implemented. Figure 4.12 shows the person entrusted to monitor staff duties in the Mngr's/Sup's absence. One (6.3%) Manager delegates monitoring duties to a food handler, four Managers (25.0%) delegate monitoring duties to another Manager of another department, five (31.3%) delegate monitoring duties to the Assistant Manager and six (37.5%) delegate monitoring duties to the Supervisor. At the Mini stores three (75.0%) of the Managers delegate the monitoring of staff duties to the Assistant Manager, whereas one (25.0%) Manager delegates the responsibility to the Supervisor. At the Hyper stores one (25.0%) Manager delegates monitoring duties to the Assistant Manager, two (50.0%) delegate monitoring duties to the Supervisor and one (25.0%) delegates monitoring duties to the Manager of another department. At the Super stores one (12.5%) Manager delegates monitoring duties to a food handler, one (12.5%) delegates monitoring duties to the Assistant Manager and three (37.5%) delegate monitoring duties to the Supervisor and or another Manager.

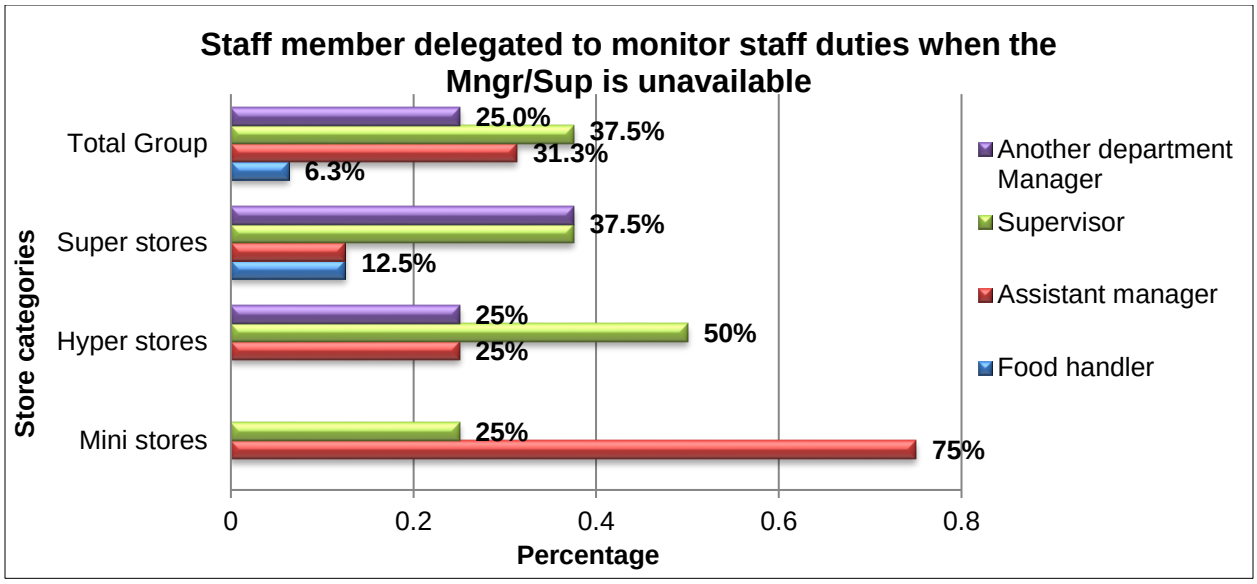

Figure 4.12: The staff member delegated to monitor staff duties when the Mngr/Sup is unavailable (n=16)

Regarding written policies and procedures existing in each establishment, for the total sample group figure 4.13 depicts that seven (43.8%) of the establishments have written policies on receiving, eight (50.0%) on storage, 11 (68.8%) on serving, 14 (87.5%) on hygiene, six (37.5%) on administration (documentation) and only one (6.3%) on customer service as communicated by the Mngrs/Sups. The FHs, however, communicated that 58.5% (n=137) have written policies on receiving, 56.4% (n=132) on storage, 55.1% (n=129) on serving, 91.5% (n=214) on hygiene, 24.8% (n=58) on administration and 2.6% (n=6) on customer service.

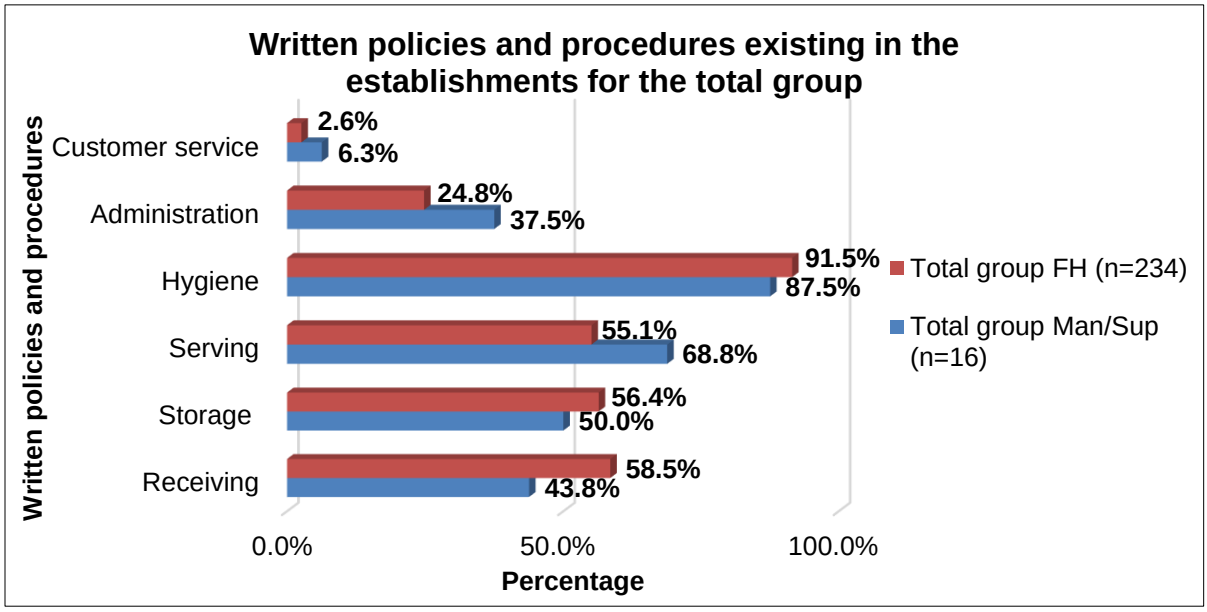

Figure 4.13: Existing written policies for the total sample group Mngrs/Sups (n=16) and FH (n=234)

When looking at the individual establishments, Table 4.5 indicates data communicated by the Mngrs/Sups versus data given by the Food Handlers. Managers/ Supervisors at the Mini stores reported that two (50.0%) of the establishments had a written policy on receiving whereas 54.7% (n=29) of the FHs reported that three (75.0%) of the establishments have written policies on storage, serving, hygiene and administration respectively whereas all (n=4; 100%) of the Mini stores have a written policy on customer service. Fifty-two point eight (n=28) of the FHs at the Mini stores indicated that their establishments had policies on storage, 35.8% (n=19) on serving, 94.3% (n=50) on hygiene, 26.4% (n=14) on administration and 1.9% (n=1) on customer service. Mngrs/Sups at the Hyper stores communicated that all of the establishments have written policies on receiving, storage, administration and customer service; however, only two (50.0%) establishments have a written policy on serving and three (75.0%) of the establishments have written policies on hygiene. The FHs communicated that 62.5% (n=30) of the establishments have policies on both receiving and storage. Sixty-four point six percent (n=31) have policies on serving, 93.8% (n=45) on hygiene, 41.7% (n=20) on administration and 6.3% (n=3) on customer service. At the Super stores it was found that 10 (62.5%) of the establishments have written policies on receiving and storage, three (75.0%) on serving, eight (100.0%) on hygiene, three (37.5%) on administration and only one (12.5%) on customer service. However, the FHs reported that only 58.6% (n=78) of the establishments have written policies on receiving, 55.6% (n=74) on storage, 59.4% (n=79) on serving, 89.5% (n=119) on hygiene, 18.0% (n=24) on administration and 1.5% (n=2) on customer service.

Table 4.5: Existing written policies for each establishment Mngrs/Sups (n=16) and FH (n=234)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)
Receiving	50.0 (n=2)	54.7 (n=29)	100.0 (n=4)	62.5 (n=30)	62.5 (n=5)	58.6 (n=78)
Storage	75.0 (n=3)	52.8 (n=28)	100.0 (n=4)	62.5 (n=30)	62.5 (n=5)	55.6 (n=74)
Serving	75.0 (n=3)	35.8 (n=19)	50.0 (n=2)	64.6 (n=31)	75.0 (n=6)	59.4 (n=79)
Hygiene	75.0 (n=3)	94.3 (n=50)	75.0 (n=3)	93.8 (n=45)	100.0 (n=8)	89.5 (n=119)
Administration	75.0 (n=3)	26.4 (n=14)	100.0 (n=4)	41.7 (n=20)	37.5 (n=3)	18.0 (n=24)
Customer service	100.0 (n=4)	1.9 (n=1)	100.0 (n=4)	6.3 (n=3)	12.5 (n=1)	1.5 (n=2)

4.2.2 Training information

The results show that all the Mngrs/Sups from all the establishments have undergone food safety and hygiene training whereas 84.2% (n=197) of the FHs have undergone the same training (Mini stores 77.4% (n=41), Hyper stores 75.0% (n=36) and Super stores 90.2% (n=120))

When the Mngrs/Sups were appointed as departmental heads the majority (n=14; 87.5%) communicated that as part of the induction programme food safety specific training was provided (total sample group) as depicted in Figure 4.14 whereas two (12.5%) did not get inducted upon appointment and thus did not receive food safety specific training. At the Mini stores three (75.0%) of the Mngrs/Sups were inducted and

trained whereas one (25.0%) was not inducted and trained. At the Hyper stores all the Mngrs/Sups were inducted and trained. At the Super stores the majority of the Mngrs/Sups (n=7; 87.5%) were inducted and trained but one 12.5% was not inducted upon appointment and did not receive food safety training. Of the total group of FHs 77.8% (n=182) were inducted and trained. At the Mini stores 67.9% (n=36) of the FHs were inducted and trained whereas at the Hyper stores 60.4% (n=29) were inducted and trained and a large majority (88.0%; n=117) at the Super stores were inducted and received Food safety specific training.

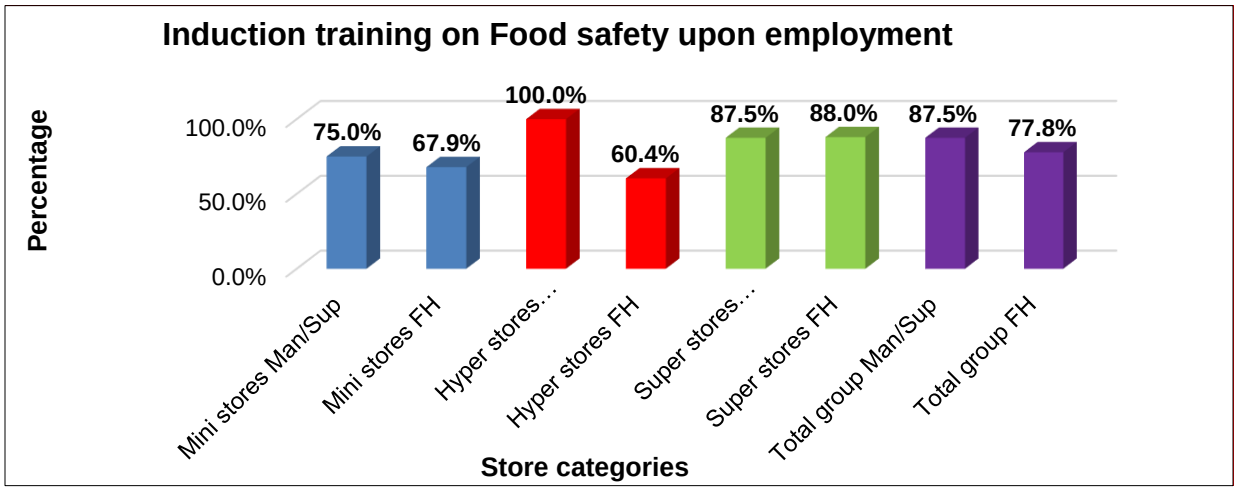

Figure 4.14: Induction training on Food safety upon employment Mngrs/Sups (n=16) and FH (n=234)

Table 4.6 shows the induction material used for training. For the total sample group; six (37.5%) of the Mngrs/Sups were inducted using the 'Store safe file' training material only whereas only 22.6% (n=53) of the FHs used the same material exclusively, two (12.5%) of the Mngrs/Sups were inducted with the 'Store safe DVD' training material whereas 25.6% (n=60) of the FHs were inducted with the same material, seven (43.8%) of the Mngrs/Sups were inducted with a combination of both the Store safe file and 'Store safe DVD' training material but only 13.7% (n=32) of the FHs used the combination of training materials; only one (6.3%) of the Mngrs/Sups was inducted verbally without any training material and 38.1% (n=89) of the FHs reported that no training material was used for the induction training. At the Mini stores three (75.0%) of the Mngrs/Sups and 13.2% (n=7) of the FHs were inducted with the 'Store safe file' training material only and 17.0% (n=9) of the FHs were inducted with the 'Store safe DVD' only; however, one (25.0%) Mngr/Sup and 5.7% (n=3) of the FHs were inducted with both the 'Store safe file' and the 'Store safe DVD' training material. Sixty-four point two percent (n=34) of the FHs reported that no training material was used for the induction. At the Hyper stores two (50.0%) of the Mngrs/Sups and 18.8% (n=9) of the FHs were inducted with the 'Store safe file' training material whereas one (25.0%) Mngr/Sup and a minority (8.3%; n=4) of FHs were inducted with the 'Store safe DVD' training material. None of the Mngrs/Sups were inducted with a combination of the 'Store safe file' and DVD training material but 10.4% (n=5) of the FHs were trained using a combination of training material and one (25.0%) Mngr/Sup received informal induction training (verbal) and 62.5% of the FHs reported that no training material was utilized for induction training. At the Super

stores one (12.5%) Mngr/Sup and 27.8% (n=37) of the FHs were inducted with the 'Store safe file' training material, two (25.0%) Mngrs/Sups and 35.3% (n=47) FHs used the 'Store safe DVD' training material and five (62.5%) Mngrs/Sups and 18.0% (n=24) FHs were inducted with both the 'Store safe file' and DVD; however, no training material was used for induction training for 17.3% (n=23) of the FHs.

Table 4.6: Induction training material used upon employment for Mngrs/Sups (n=16) and FH (n=234)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FH % (n=234)
Store safe file only	75.0 (n=3)	13.2 (n=7)	50.0 (n=2)	18.8 (n=9)	12.5 (n=1)	27.8 (n=37)	37.5 (n=6)	22.6 (n=53)
Store safe DVD only	0.0	17.0 (n=9)	25.0 (n=1)	8.3 (n=4)	25.0 (n=2)	35.3 (n=47)	12.5 (n=2)	25.6 (n=60)
Store safe file & DVD	25.0(n=1)	5.7 (n=3)	0.0	10.4 (n=5)	62.5 (n=5)	18.0 (n=24)	43.8 (n=7)	13.7 (n=32)
Verbal	0.0	0.0	25.0 (n=1)	0.0	0.0	0.0	6.3 (n=1)	0.0
Nothing	0.0	64.2 (n=34)	0.0	62.5 (n=30)	0.0	17.3 (n=23)	0.0	38.1 (n=89)

Figure 4.15 shows the modules covered during training for the total sample group of the Mngrs/Sups as well as for the FHs. It is evident that all the Mngrs/Sups have been trained on food preparation, merchandising and cleaning practice. A large majority (n=15; 93.8%) of the Mngrs/Sups have been trained on personal hygiene, food storage, temperature control and documentation and record keeping, 14 (87.5%) have been trained on labelling, 13 (81.3%) have been trained on receiving and 12 (75.0%) have been trained on allergens whereas 11 (68.8%) have been trained on purchasing practice and 10 (62.5%) on pest control but only eight (50.0%) of the Mngrs/Sups have been trained on first aid. A large majority (91.9%; n=215) of the FHs have been trained on personal hygiene, 42.7% (n=100) have been trained on purchasing practice, 65.4% (n=153) on labelling, 49.1% (n=115) on receiving, 75.2% on food storage, 71.8% (n=168) on food preparation, 43.2% (n=101) on merchandising, 77.4% (n=181) on cleaning practice, 58.5% (n=137) on pest control, 66.7% (n=156) on temperature control, 52.6% (n=123) on allergens but only 26.5% (n= 62) have been trained on documentation and recording and a small minority (4.3%; n=10) on first aid.

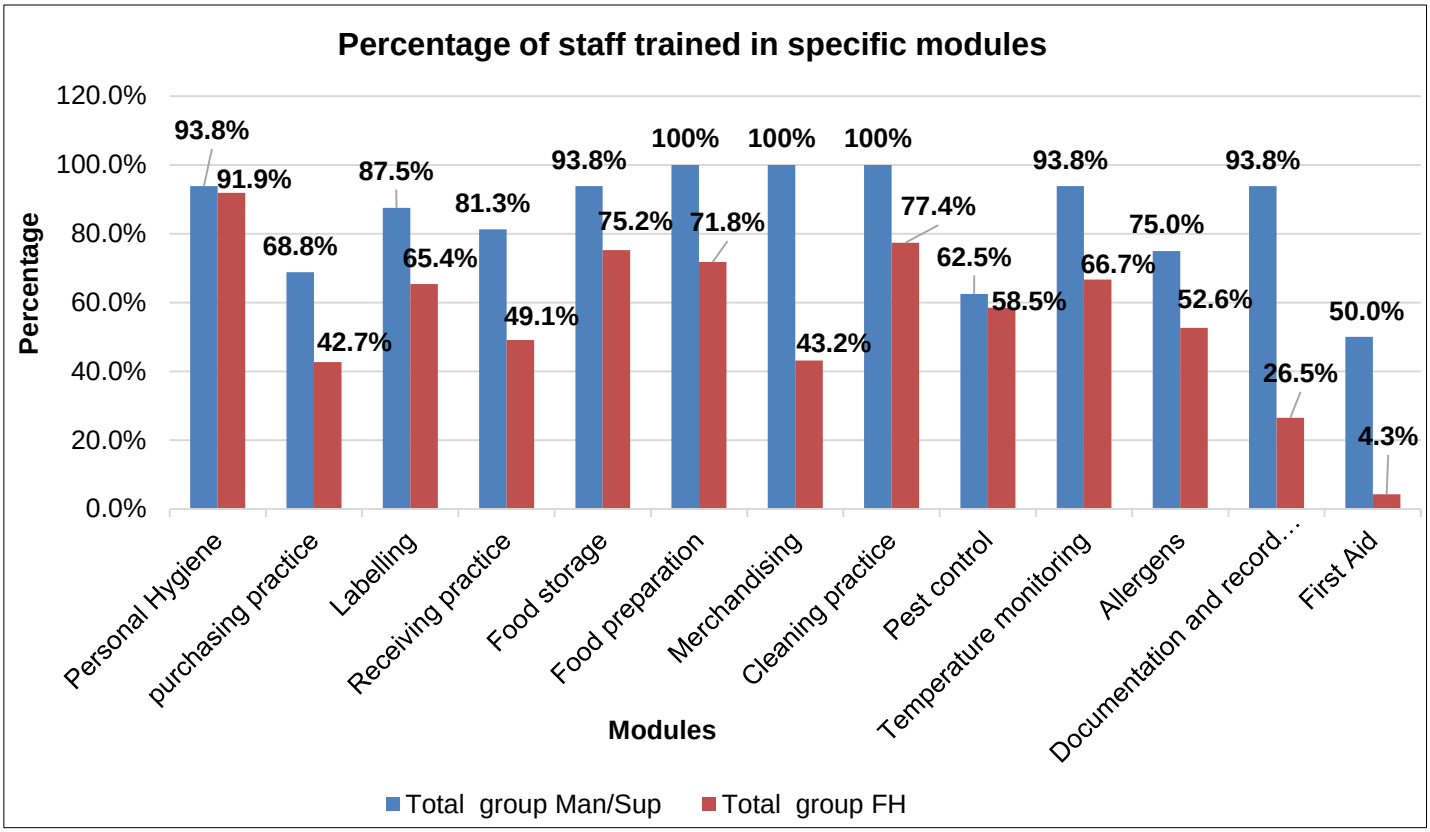

Figure 4.15: Percentage of staff trained in specific modules Mngrs/Sups (n=16) and FH (n=234)

Table 4.7 shows the modules that have been covered during training for each establishment for both the Mngrs/Sups and the FHs. The data from the Mini stores shows that all the Mngrs/Sups have been trained on personal hygiene, food storage, food preparation, merchandising, cleaning practice, temperature monitoring, allergens and documentation whereas for the FHs the statistics are 90.6% (n=48), 73.6% (n=39), 62.3% (n=33), 26.4% (n=14), 69.8% (n=37), 60.4% (n=32), 47.2% (n= 25) and 18.9% (n=10) respectively. An additional three (75.0%) of the Mngrs/Sups have been trained on labelling and receiving whereas of the FHs 60.4% (n=32) and 43.4% (n=23) have been trained on labelling and receiving respectively. Two (50.0%) Mngrs/Sups have been trained on purchasing practice and pest control whereas for the FHs it is 41.5% (n=22) and 45.3% (n=24) respectively. At the Hyper stores it was evident that all of the Mngrs/Sups have been trained on receiving, food storage, food preparation, merchandising and cleaning practice whereas for the FHs it was 25.0% (n=12), 79.2% (n=38), 72.9% (n= 35, 25.0% (n=12) and 81.3% (n=39) respectively. Three (75.0%) of the Mngrs/Sups have been trained on personal hygiene, labelling, temperature monitoring and documentation; however for the FHs it was 89.6% (n=43), 62.5% (n=30), 64.6% (n=31) and 22.9% (n=11) respectively. One (25.0%) Mngr/Sup has been trained on pest control and allergens whereas 37.5% (n=18) of the FHs have been trained on pest control and allergens. According to the data gathered at both the Mini stores and the Hyper stores only one (25.0%) Mngr/Sup (at

each establishment) has been trained on first aid whereas for the FHs it was 1.9% (n=1) and 4.2% (n=2) respectively. At the Super stores all the Mngrs/Sups have been trained on personal hygiene, labelling, food preparation, merchandising, cleaning practice, temperature monitoring and documentation and record keeping although 93.2% (n=124), 68.4% (n=91), 75.2% (n=100), 56.4% (n=75) 78.9% (n=109), 69.9% (n=93) and 30.8% (n=41) of the FHs have been trained on the same modules respectively. Seven (87.5%) Mngrs/Sups have been trained on purchasing practice, food storage, pest control and allergens but 48.1% (n=64), 74.4% (n=99), 71.4% (n=95) and 60.2% (n=80) of the FHs received similar training respectively. The data further shows that six (75.0%) Mngrs/Sups have been trained on receiving and first aid whereas 60.2% (n=80) and 5.3% (n=7) FHs have been trained on receiving and first aid.

Table 4.7: Training modules covered during training for the individual establishments Mngrs/Sups (n=16) and FH (n=234)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)
Personal Hygiene	100.0 (n=4)	90.6 (n=48)	75.0 (n=3)	89.6 (n=43)	100.0 (n=8)	93.2 (n=124)
Purchasing practice	50.0 (n=2)	41.5 (n=22)	50.0 (n=2)	29.2 (n=14)	87.5 (n=7)	48.1 (n=64)
Labelling	75.0 (n=3)	60.4 (n=32)	75.0 (n=3)	62.5 (n=30)	100.0 (n=8)	68.4 (n=91)
Receiving practice	75.0 (n=3)	43.4 (n=23)	100.0 (n=4)	25.0 (n=12)	75.0 (n=6)	60.2 (n=80)
Food storage	100.0(n=4)	73.6 (n=39)	100.0 (n=4)	79.2 (n=38)	87.5 (n=7)	74.4 (n=99)
Food preparation	100.0 (n=4)	62.3 (n=33)	100.0(n=4)	72.9 (n=35)	100.0 (n=8)	75.2 (n=100)
Merchandising	100.0(n=4)	26.4 (n=14)	100.0(n=4)	25.0 (n=12)	100.0 (n=8)	56.4 (n=75)
Cleaning practice	100.0(n=4)	69.8 (n=37)	100.0(n=4)	81.3 (n=39)	100.0 (n=8)	78.9 (n=109)
Pest control	50.0 (n=2)	45.3 (n=24)	25.0 (n=1)	37.5 (n=18)	87.5 (n=7)	71.4 (n=95)
Temperature monitoring	100.0(n=4)	60.4 (n=32)	75.0 (n=3)	64.6 (n=31)	100.0 (n=8)	69.9 (n=93)
Allergens	100.0(n=4)	47.2 (n=25)	25.0 (n=1)	37.5 (n=18)	87.5 (n=7)	60.2 (n=80)
Documentation and record keeping	100.0(n=4)	18.9(n=10)	75.0 (n=3)	22.9 (n=11)	100.0 (n=8)	30.8 (n=41)
First Aid	25.0 (n=1)	1.9 (n=1)	25.0 (n=1)	4.2 (n=2)	75.0 (n=6)	5.3 (n=7)

Figure 4.16 shows the training providers that trained the Mngrs/Sups and the FHs for the total group. The data shows that all the Mngrs/Sups have been trained by the Department of Education (DOE), the Department of Health (DOH) and by another food handler but the FHs reported that 1.3% (n=3) had been trained by the DOH and 11.1% (n=26) had been trained by another food handler (FH). Fifteen (93.8%) Mngrs/Sups and 74.8% (n=175) FHs stated that the current employer has also provided training whereas two (12.5%) Mngrs/Sups and 8.1% (n=19) FHs indicated that training was also provided by a previous employer but one (6.3%) Mngr/Sup and 7.3% (n=17) FHs have had formal training through an institution and another one (6.3%) Mngr/Sup and 0.4% (n=1) FHs have had training done by suppliers.

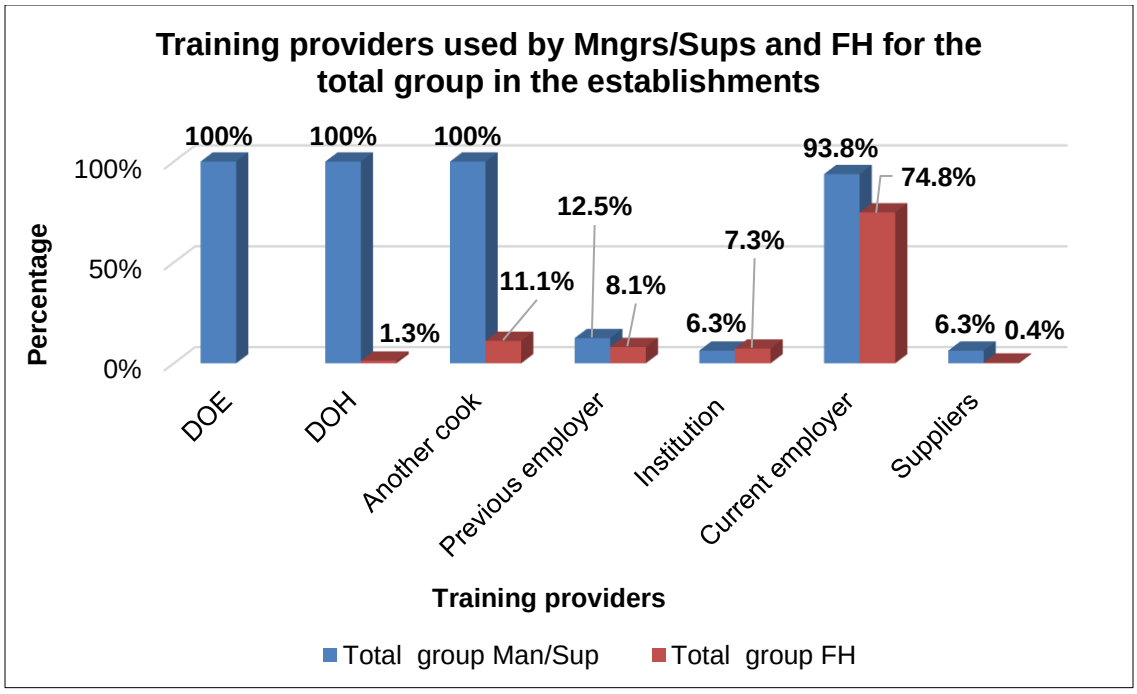

Figure 4.16: Training providers used by Mngrs/Sups (n=16) and FH (n=234) for the total group

When taking the individual establishments into consideration, table 4.8 shows that even though all the Mngrs/Sups have received training from the DOE, the DOH and from another FH (total sample group), at the Mini stores all the Managers revealed that their current employer and the suppliers have provided training but the FHs reported that none have received training from the DOE and DOH and only 7.5% (n=4) have had training provided by another FH. Two (50.0%) of the Managers received some level of training from previous employers whereas only 11.3% of the FHs reported the same. One (25.0%) Mngr/Sup received training from an institution but only 1.9% (n=1) of the FHs received similar training. For the Hyper stores it was found that in addition the training for three (75.0%) of the Mngrs/Sups was provided by the current employer and for one (25.0%) it was provided by the suppliers. For 2.1% (n=1) of the FHs the training was provided by the DOH, for 27.1% (n=13) it was provided by another FH, and for 20.8% (n=10) it was provided by a previous employer, for 10.4% (n=5) it was provided by an institution, for 58.3% (n=28) it was provided by the current employer and for 2.1% (n=1) training was provided by suppliers. In respect of the Super stores all the Mngrs/Sups received training from all the training providers whereas for the FHs none received training from the DOE, 1.5% (n=2) received training from the DOH, 6.8% (n=9) received training from another FH, 2.3% (n=3) received training from a previous employer, 8.3% (n=11) received training from an institution, 81.2% (n=108) received training from the current employer, and 0.8% (n=1) received training from suppliers.

Table 4.8: Training providers per establishment for Mngrs/Sups (n=16) and FHs (n=234)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)
DOE	100.0	0.0	100.0	0.0	100.0	0.0
DOH	100.0	0.0	100.0	2.1 (n=1)	100.0	1.5 (n=2)
Another cook	100.0	7.5 (n=4)	100.0	27.1 (n=13)	100.0	6.8 (n=9)
Previous employer	50.0 (n=2)	11.3 (n=6)	100.0	20.8 (n=10)	100.0	2.3 (n=3)
Institution	25.0 (n=1)	1.9 (n=1)	100.0	10.4 (n=5)	100.0	8.3 (n=11)
Current employer	100.0	73.6 (n=39)	75.0 (n=3)	58.3 (n=28)	100.0	81.2 (n=108)
Suppliers	100.0	1.9 (n=1)	25.0 (n=1)	2.1 (n=1)	100.0	0.8 (n=1)

The information shown in Table 4.9 reports on the last occurrence of training as reported by the Mngrs/Sups and the FHs. For the total group, it shows that seven (43.8%) of the Mngrs/Sups last received training in the previous year (2013) whereas 18.4% (n=43) of the FHs reported the same information, three (18.8%) either received training in the previous month or in a period of between two to five years respectively but only 12.0% (n=28) of the Mngrs/Sups and 5.5% (n=13) of the FHs respectively have had training in the same timeframe. Two (12.5%) Mngrs/Sups and 27.8% (n=65) FHs were on ongoing training but one (6.3%) Mngr/Sup and 19.7% (n=46) FHs were last trained in the last term of the year. In addition 3.0% (n=7) of the Mngrs/Sups had been on training in the previous week and 13.7% (n=32) of the FHs had never had training. At the Mini stores two (50.0%) of the Mngrs/Sups had received training over the period of the last two to five years and last year respectively whereas for the FHs 20.8% (n=11) last received training in the previous year and 1.9% (n=1) last received training two to five years ago. Furthermore, 37.7% (n=20) of the FHs last received training in the last term of the year, and 15.1% (n=8) were receiving ongoing training. Seven point five percent of the FHs reported that their last training was a month ago and 1.9% (n=1) reported that the training had occurred in the previous week. At the Hyper stores all the Mngrs/ Sups had last received training in the previous year whereas 22.9% (n=11) of the FHs also last attended training in the previous year. Twenty-seven point one percent of the FHs reported that training had never occurred, 22.9% (n=11) of the FHs last went to training in the previous month, 12.5% (n= 6) were receiving ongoing training, 6.3% (n=3) had last been trained either in the previous week or in the previous term and 2.1% (n=1) of the FHs were last trained two to five years ago. At the Super stores six (37.5%) Mngrs/Sups and 9.8% (n= 13) of the FHs received training in the previous month, four (25.0%) of the Mngrs/Sups and 38.3% (n=51) of the FHs were receiving ongoing training and two (12.5%) of the Mngrs/Sups either received training in the previous term, in the previous year or between two to five years ago, whereas 17.3% (n=23), 15.8% (n=21) and 8.3% (n=11) of the FHs had last received training in the same time frames respectively. Furthermore, 2.3% (n=3) of the FHs last received training in the previous week and 8.3% (n=11) had never been trained.

Table 4.9: The last occurrence of training for the Mngrs/Sups (n=16) and FHs (n=234) as at 2014

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FH % (n=234)
Ongoing	0.0	15.1 (n=8)	0.0	12.5 (n=6)	25.0 (n=2)	38.3 (n=51)	12.5 (n=2)	27.8 (n=65)
Last week	0.0	1.9 (n=1)	0.0	6.3 (n=3)	0.0	2.3 (n=3)	0.0	3.0 (n=7)
Last month	0.0	7.5 (n=4)	0.0	22.9 (n=11)	37.5 (n=3)	9.8 (n=13)	18.8 (n=3)	12.0 (n=28)
Last term	0.0	37.7 (n=20)	0.0	6.3 (n=3)	12.5 (n=1)	17.3 (n=23)	6.3 (n=1)	19.7 (n=46)
Last year	50.0 (n=2)	20.8 (n=11)	100.0 (n=4)	22.9 (n=11)	12.5 (n=1)	15.8 (n=21)	43.8 (n=7)	18.4 (n=43)
Never	0.0	15.1 (n=8)	0.0	27.1 (n=13)	0.0	8.3 (n=11)	0.0	13.7 (n=32)
Last 2-5 years	50.0 (n=2)	1.9 (n=1)	0.0	2.1 (n=1)	12.5 (n=1)	8.3 (n=11)	18.8 (n=3)	5.5 (n=13)

Table 4.10 shows the frequency of the training for the Mngrs/ Sups and FHs for the total group and the individual establishments. For the total group it is evident that seven (43.8%) of the Mngrs/Sups and 17.1% (n=40) of the FHs received training annually, three (18.8%) Mngrs/Sups and 31.2% (n=73) of the FHs were receiving ongoing training, three (18.8%) Mngrs/Sups and 14.5% (n=34) of the FHs had training once a term and another three (18.8%) Mngrs/Sups and 9.8% (n=23) of the FHs were receiving training on a monthly basis. In addition 2.1% (n=5), 18.8% (n=44) and 6.4% (n=15) of the FHs respectively had training schedules either on a weekly basis, or reported that no frequency of training existed, or reported that two to five year schedules existed. For the Mini stores two (50.0%) of the Mngrs/Sups were either receiving training on a monthly basis or on an annual basis, whereas 9.4% (n=5) and 30.2% (n=16) of the FHs reported the same frequency of training. Twenty point eight percent (n=11), 3.8% (n=2), 22.6% (n=12), and 13.2% (n=7) of the FHs reported respectively that the frequency of training was either ongoing, on a weekly basis, once a term or had never happened. In respect of the Hyper stores, as reported by the Mngrs/Sups the frequency of training is either on an ongoing basis (n=2; 25.0%) or on an annual basis (n=3; 75.0%) whereas the FHs reported that for 33.3% (n=16) of them the frequency of training is ongoing or on an annual basis respectively. Furthermore, 2.1% (n=1), 6.3% (n=3), 4.2% (n=2), 39.6% (n=19) and 10.4% (n=5) of the FHs reported that the training frequency was weekly, monthly, once a term, never and between two to five years respectively. In respect of the Super stores, for three (37.5%) Mngrs/Sups and 15.0% (n=20) of the FHs training frequency was once a term, for two (25.0%) Mngrs/Sups and 39.8% (n=53) of the FHs the training frequency was ongoing, for two (25.0%) Mngrs/Sups and 11.3% (n=15) of the FHs the frequency of training was annual and for one (12.5%) Man/ Sup and 11.3% (n=15) of the FHs training takes place on a monthly basis. Moreover, 1.5% (n=2), 13.5% (n=18) and 7.6% (n=10) of the FHs respectively reported that the frequency of training was on a weekly basis, had never occurred or takes place between two to five years.

Table 4.10: Frequency of training for the Mngrs/Sups (n=16) and FH (n=234)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FHs % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FHs % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FHs % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FHs % (n=234)
Ongoing	0.0	20.8 (n=11)	25.0 (n=1)	33.3 (n=16)	25.0 (n=2)	39.8 (n=53)	18.8 (n=3)	31.2 (n=73)
Weekly	0.0	3.8 (n=2)	0.0	2.1 (n=1)	0.0	1.5 (n=2)	0.0	2.1 (n=5)
Monthly	50.0 (n=2)	9.4 (n=5)	0.0	6.3 (n=3)	12.5 (n=1)	11.3 (n=15)	18.8 (n=3)	9.8 (n=23)
Once a term	0.0	22.6 (n=12)	0.0	4.2 (n=2)	37.5 (n=3)	15.0 (n=20)	18.8 (n=3)	14.5 (n=34)
Once a year	50.0 (n=2)	30.2 (n=16)	75.0 (n=3)	33.3 (n=16)	25.0 (n=2)	11.3 (n=15)	43.8 (n=7)	17.1 (n=40)
Never	0.0	13.2 (n=7)	0.0	39.6 (n=19)	0.0	13.5 (n=18)	0.0	18.8 (n=44)
2-5 years	0.0	0.0	0.0	10.4 (n=5)	0.0	7.5 (n=10)	0.0	6.4 (n=15)

In figure 4.17 the Mngrs/Sups indicated that there is a need for further training for managerial personnel and as well for the Food Handlers. For the total group 15 (93.8%) of the Managers stated that there was a need for further training. At the Mini stores and the Super stores all the Managers communicated the need for further training whereas at the Hyper stores only three (75.0%) of the Managers stated the need for further training.

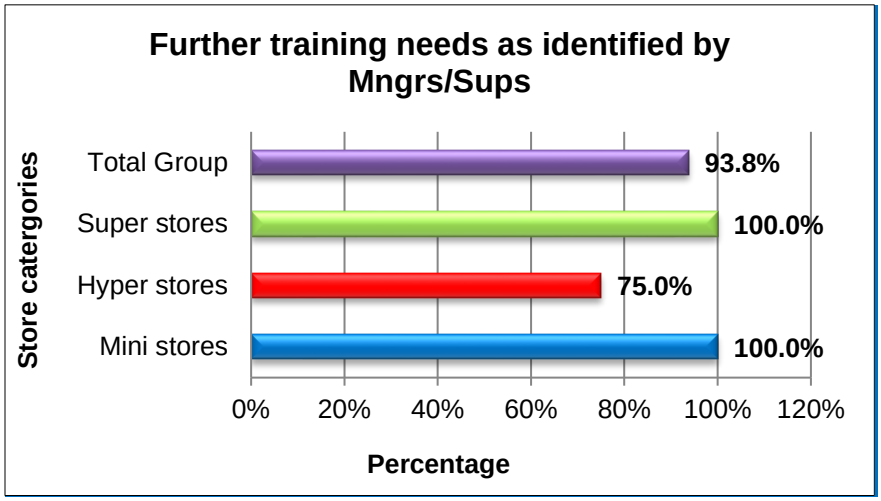

Figure 4.17: Further specific training needs for Mngrs/Sups

4.2.3 Personal hygiene practice, cleaning practice and food safety knowledge

4.2.3.1 Personal hygiene practice and knowledge

4.2.3.1.1 Personal hygiene practice

Table 4.11 indicates the self-reported positive answers by the respondents to personal hygiene questions as shown in the variables column. When the Mngrs/Sups were asked about ensuring that correct Personal Protective Equipment (PPE) is worn by the FHs, all of the Mngrs/Sups indicated that this is ensured in all the stores. For the total group 15 (93.8%) of the Mngrs/Sups regularly supervise staff to work hygienically, 11(68.8%) of the Mngrs/Sups communicated that there were enough hand washing facilities and 14 (87.5%) indicated that hand washing facilities were designated for hand washing only. At the Mini stores three (75.0%) of the Mngrs/Sups indicated that staff were regularly supervised to work hygienically and also communicated that there were enough hand washing facilities for hand washing whereas all (n=4; 100%) of the Mngrs/Sups communicated that there were designated hand washing stations. At the Hyper stores all of the Mngrs/Sups indicated that staff were regularly supervised to work hygienically and that hand washing facilities were designated for hand washing, whereas only three (75.0%) of the Mngrs/Sups indicated that there were enough hand washing facilities. At the Super stores all of the Mngrs/Sups regularly supervise staff to work hygienically while six (75.0%) indicated that hand washing facilities were designated for hand washing; however, only five (62.5%) indicated that there were enough hand washing facilities.

Table 4.11: Personal hygiene practices of the Mngrs/Sups (n=16) and FH (n=234)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FH % (n=234)
Do you ensure that correct PPE is worn?	100.0 (n=4)	94.3 (n=50)	100.0 (n=4)	91.7 (n=44)	100.0 (n=8)	96.2 (n=128)	100.0 (n=16)	94.9 (n=222)
Are staff regularly supervised to work hygienically?	75.0 (n=3)	n/a	100.0 (n=4)	n/a	100.0 (n=8)	n/a	93.8 (n=15)	n/a
Is frequent hand washing during food preparation worth the extra time?	n/a	98.1 (n=52)	n/a	100.0 (n=48)	n/a	94.7 (n=126)	n/a	96.6 (n=226)
Are the hand washing facilities adequate?	75.0 (n=3)	49.1 (n=26)	75.0 (n=3)	66.7 (n=32)	62.5 (n=5)	60.2 (n=80)	68.8 (n=11)	59.0 (n=138)
Do you have a designated hand washing station?	100.0 (n=4)	86.8 (n=46)	100.0 (n=4)	87.5 (n=42)	75.0 (n=6)	90.2 (n=120)	87.5 (n=14)	88.9 (n=208)

4.2.3.1.2 Personal hygiene knowledge

When the Mngrs/Sups were asked about personal hygiene knowledge, all (n=16; 100%) of the Mngrs/Sups stated that under no circumstance should a food handler handle food or even enter a food preparation area when they were suffering from any illness or disease that could be transmitted through food, when they had infected wounds, when they were vomiting or feeling nauseous or had diarrhoea, or when they were suffering from the flu, and coughing and sneezing.

Table 4.12 reflects the answers given by the FHs with regard to whether they are permitted to handle food when they have health issues and they seemed to contradict the unanimous answers given by the managers. The data reveals that the FHs seemed to think that some illnesses are more "permissible" than others. For the total group, the FHs seemed to consider having an infected wound and/or skin infection (93.6%; n=219) to be more hazardous to food safety than having the flu, cough and sneezing (92.7%; n=217). In the case of the Mini stores the FHs indicated that suffering from illness and disease that can be transmitted to food, vomiting and nausea as well as diarrhea (92.5%; n=49) were less of an issue for food safety compared to having infected wounds/skin infection and having the flu and coughing and sneezing (94.3%; n=50). At the Hyper stores 93.8% (n=45) of the FHs stated that handling food should not be allowed when they are suffering from an illness that can be transmitted to food, when having infected wounds and skin infections and when having the flu, coughing and sneezing, whereas 95.8% (n=46) indicated that vomiting and/ or nausea was a health issue and 97.9% (n=47) indicated that diarrhoea was a health issue. At the Super stores 94.0% (n=125) indicated that when a FH is suffering from an illness that can be transmitted to food and/or has infected wounds and skin infections they should not be allowed to handle food, 92.5 (n=123) indicated access to the food preparation area should be denied when vomiting/ feeling nauseous or suffering from diarrhoea and 91.7% (n=122) indicated that flu, coughing and sneezing was a health issue.

Table 4.12: FHs' answers to whether they are allowed to handle food when they have health issues (n=234)

Variables	Mini store FH % (n=53)	Hyper store FH % (n=48)	Super store FH % (n=133)	Total group FH % (n=234)
Suffering from illness and disease that can be transmitted to food	92.5 (n=49)	93.8 (n=45)	94.0 (n=125)	93.6 (n=219)
Having infected wounds and skin infection	94.3 (n=50)	93.8 (n=45)	94.0 (n=125)	94.0 (n=220)
Vomiting and/ or nausea	92.5 (n=49)	95.8 (n=46)	92.5 (n=123)	93.2 (n=218)
Flu, coughing and sneezing	94.3 (n=50)	93.8 (n=45)	91.7 (n=122)	92.7 (n=217)
Diarrhoea	92.5 (n=49)	97.9 (n=47)	92.5 (n=123)	93.6 (n=219)

For effective hand-washing all the Mngrs/Sups agreed that an antibacterial hand soap, disposable paper towels and an alcohol based hand sanitizer should be available in a hand-washing station as shown in Table 4. 13. For the total group a large majority 93.8% (n=15) of the Mngrs/Sups of the Mini stores and

Super stores revealed that an open/pedal bin should be available whereas 75.0% (n=3) of the Mngrs/Sups at the Hyper stores agreed. For the total group 13 (81.3%) stated that both hot and cold water should be available and this was also indicated by three (75.0%) Mngrs/Sups at Mini stores and two (50.0%) Mngrs/Sups at Hyper stores but two (12.5%) Mngrs/Sups indicated that cold water alone is effective in hand-washing (Mini and Hyper stores one (25.0%) each). On the other hand, all of the Mngrs/Sups indicated correctly that an open bin, hand soap from the shelf and hand towel should not be made available for effective hand washing.

Table 4.13: Items that should be available at a hand washing station for effective hand-washing (n=16)

Variables	Mini store Mngrs/Sups % (n=4)	Hyper store Mngrs/Sups % (n=4)	Super store Mngrs/Sups % (n=8)	Total group Mngrs/Sups % (n=16)
Antibacterial hand soap	100.0 (n=4)	100.0 (n=4)	100.0 (n=8)	100.0 (n=16)
Disposable paper towels	100.0 (n=4)	100.0(n=4)	100.0 (n=8)	100.0 (n=16)
Open/pedal bin	100.0 (n=4)	75.0 (n=3)	100.0 (n=8)	93.8 (n=15)
Cold water	25.0 (n=1)	25.0 (n=1)	0.0	12.5 (n=2)
Alcohol based hand sanitizer	100.0 (n=4)	100.0 (n=4)	100.0 (n=8)	100.0 (n=16)
Hot and cold water	75.0 (n=3)	50.0 (n=2)	100.0 (n=8)	81.3 (n=13)
Open bin	0.0	0.0	0.0	0.0
Hand soap (off the shelf)	0.0	0.0	0.0	0.0
Hand towel	0.0	0.0	0.0	0.0

In table 4.14 the FHs' results show that for the total group 98.7% (n=231) stated that antibacterial hand soap should be available, 95.7% (n=224) indicated that disposable paper towels are also important, and 67.9% (n=159) indicated that hot and cold water should be available, and 51.3% (n=120) indicated that an open/pedal bin should be available and only 36.3% (n=85) stated that an alcohol-based hand sanitizer is important for effective hand-washing. At the Mini stores all the FHs stated that antibacterial hand soap should be available for effective hand-washing; however, 17.0% (n=9) stated that hand soap from the shelf also achieves effective hand washing. At the Hyper stores 95.8% (n=46) of the FHs stated that antibacterial hand soap and disposable paper towels are important items for effective hand-washing. Twenty point eight percent of the FHs stated that off-the-shelf hand soap would contribute to effective hand-washing. At the Super stores 99.2% (n=132) of the FHs indicated that antibacterial hand soap is an important item to have whereas 10.5% (n=14) stated that off-the-shelf hand soap should be made available for effective hand-washing.

Table 4.14: Items that should be available at a hand washing station for effective hand-washing (n=234)

Variables	Mini store FH % (n=53)	Hyper store FH % (n=48)	Super store FH % (n=133)	Total group FH % (n=234)
Antibacterial hand soap	100.0 (n=53)	95.8 (n=46)	99.2 (n=132)	98.7 (n=231)
Disposable paper towel	96.2 (n=51)	95.8 (n=46)	95.5 (n=127)	95.7 (n=224)
Open/pedal bin	60.4 (n=32)	45.8 (n=22)	49.6 (n=66)	51.3 (n=120)
Cold water	0.0	22.9 (n=11)	3.0 (n=4)	6.4 (n=15)
Alcohol based hand sanitiser	32.1 (n=17)	56.3 (n=27)	30.8 (n=41)	36.3 (n=85)
Hot and cold water	56.6 (n=30)	91.7 (n=44)	63.9 (n=85)	67.9 (n=159)
Open bin	24.5 (n=13)	27.1 (n=13)	18.8 (n=25)	21.8 (n=51)
Hand soap (off the shelf)	17.0 (n=9)	20.8 (n=10)	10.5 (n=14)	14.1 (n=33)
Hand towel	24.5 (n=13)	43.8 (n=21)	16.5 (n=22)	21.8 (n=51)

Figure 4.18 shows that for the total group all the Mngrs/Sups stated that washing of hands should be done before starting work, in-between tasks, after using the toilet, after handling raw food, after removing gloves, after every break and after eating or drinking but only 93.8% (n=15) stated that it is necessary to wash hands after cleaning duties. For the total group of FHs the majority (98.3%; n=230) stated that washing of hands should be done before the start of work and 93.8% (n=227) stated that hands should be washed after cleaning duties.

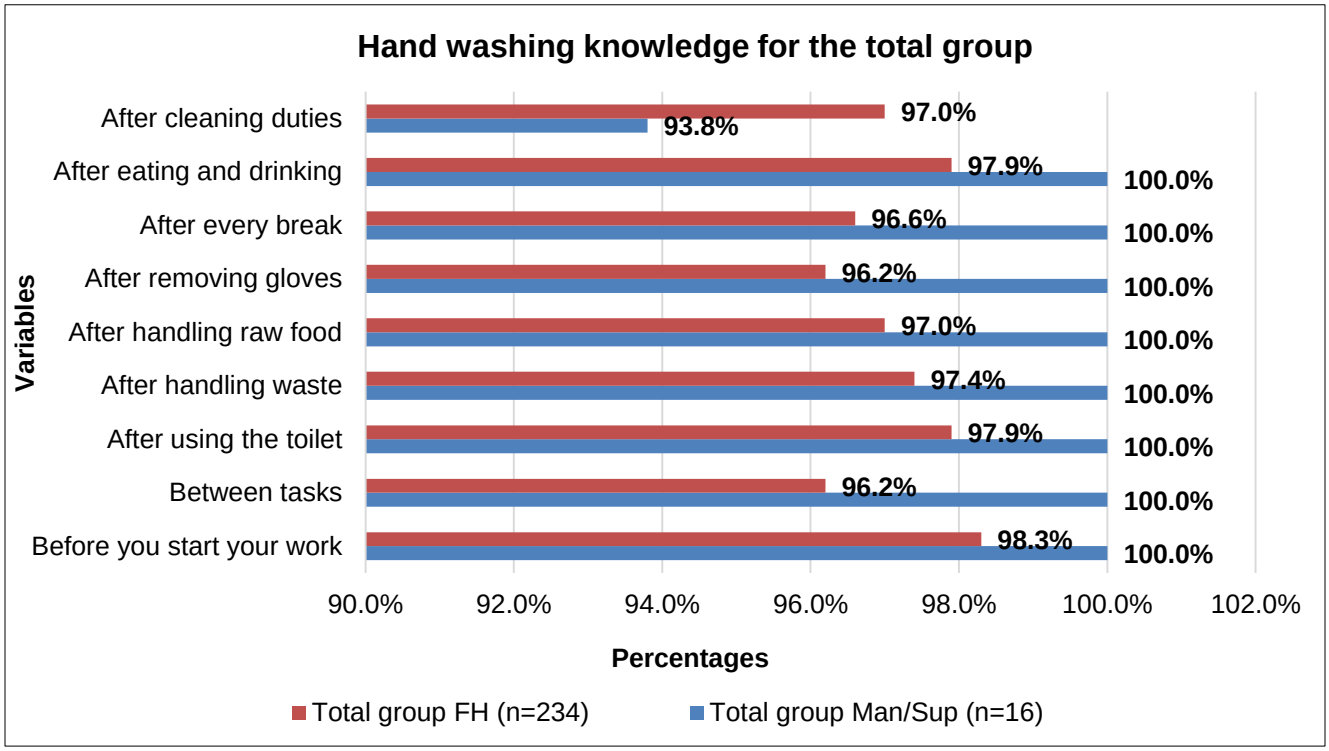

Figure 4.18: Hand washing knowledge for the total group of Mngrs/Sups (n=16) and FHs (n=234)

When the Mngrs/Sups were asked when hands need to be washed, all the Mngrs/Sups from each establishment revealed that hand washing should be done before the start of work, in-between tasks, after using the toilet, handling waste, handling raw food, removing gloves, eating and drinking and after every break; however, only three (75.0%) Mngrs/Sups from the Hyper stores responded that hands need to be washed after cleaning duties as shown in Fig 4.18. With regard to the FHs, at the Mini stores all the FHs concurred with the Mngrs/Sups about when to wash hands except for 98.1% (n=52) of FHs who stated that it should be done in-between tasks. At the Hyper stores all the FHs stated washing of hands needed to be done before the start of work and after eating and drinking. Ninety-seven point nine percent (n=47) stated that hands should be washed in-between tasks, after using the toilet, after handling raw food, after removing gloves and after every break; 95.8% (n=46) stated that hands should be washed after handling waste and after cleaning duties. At the Super stores the majority (97.0%; n=129) of the FHs stated that hands must be washed at the start of work, after using the toilet and after handling waste. Ninety-six point two percent stated hands should be washed after eating and drinking and after cleaning duties. Ninety-five point five percent (n=127) said that hands should be washed after handling raw food, 94.7% (n=126) stated that hands should be washed in-between tasks and after every break and lastly 94.0 % (n=125) said that hands should be washed after removing gloves.

Table 4.15: When hand washing should be done as answered by the Mngrs/Sups (n=16) and the FHs (n=234) from each establishment

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)
Before you start work	100.0	100.0 (n=53)	100.0	100.0 (n=48)	100.0	97.0 (n=129)
Between tasks	100.0	98.1 (n=52)	100.0	97.9 (n=47)	100.0	94.7 (n=126)
After using the toilet	100.0	100.0	100.0	97.9 (n=47)	100.0	97.0 (n=129)
After handling waste	100.0	100.0	100.0	95.8 (n=46)	100.0	97.0 (n=129)
After handling raw food	100.0	100.0	100.0	97.9 (n=47)	100.0	95.5 (n=127)
After removing gloves	100.0	100.0	100.0	97.9 (n=47)	100.0	94.0 (n=125)
After every break	100.0	100.0	100.0	97.9 (n=47)	100.0	94.7 (n=126)
After eating and drinking	100.0	100.0	100.0	100.0 (n=48)	100.0	96.2 (n=128)
After cleaning duties	100.0	100.0	75.0 (n=3)	95.8 (n=46)	100.0	96.2 (n=128)

4.2.3.2 Cleaning practice and knowledge

4.2.3.2.1 Cleaning practice

The entire group of Mngrs/Sups communicated that all cleaning areas were sanitized frequently. Additionally, 13 (81.3%) Mngrs/Sups indicated that there was adequate cleaning equipment available for effective cleaning. At the Mini stores three (75.0%) Mngrs/Sups revealed that there was a shortage of cleaning equipment whereas at the Hyper stores two (50.0%) Mngrs/Sups revealed the same shortage but

at the Super stores all the Mngrs/Sups expressed satisfaction with the quantity of cleaning equipment; however, overall, 84.2% (n=197) of the FHs stated that there was adequate cleaning equipment, and at the Mini stores 77.4% (n=41) indicated the same, while at the Hyper stores 72.9% (n=35) agreed and 91.0% (n=121) of the FHs at the Super stores were of the same opinion (Table 4.16).

Regarding the frequency at which the utensils were washed, the results below indicate that none of the Mngrs/Sups believed that utensils should be washed after work was finished. For the total group 15 (93.8%) Mngrs/Sups stated that utensils should be washed during preparation but one (6.3%) said after the food was ready. At the Mini stores it was indicated that three (75.0%) Mngrs/Sups believed that utensils should be washed during preparation while one (25.0%) stated that utensils should be washed after the food was ready. At the Hyper stores and Super stores all the Mngrs/Sups indicated that utensils should be washed during food preparation. For the total group of FHs, 71.8% (n=168) either washed utensils during preparation, 50.4% (n=118) washed utensils after the food was ready and only 44.9% (n=105) indicated that utensils should be washed after work was finished. At all the establishments the majority (Mini stores 83.0%; n=44, Hyper stores 64.6%; n=31 and Super stores 69.9%; n=93) washed utensils during food preparation. Most of the Mngrs/Sups (n=10; 62.5%) indicated that hot water and detergent were used when cooking utensils were washed whereas 60.3% (n=141) of the FHs indicated that hot water, detergent and sanitizer was mostly used to wash utensils which is also evident in each establishment except for the Hyper stores where two (50.0%) of the Mngrs/Sups stated hot water and detergent was used and two (50.0%) stated that cold water and detergent was used whereas 56.3% (n=27) of the FHs reported that hot water, detergent and sanitizer was used.

The stove was cleaned either during food preparation, after food was ready or after work was finished as reported by the Mngrs/Sups (31.3%; n=5) but the FHs reported that the stove was mostly cleaned after work was finished. The preparation areas are mostly cleaned during food preparation as reported by both the Mngrs/Sups and the FHs. All the Mngrs/Sups communicated that working areas are always sanitized but only 95.7% (n=224) of the FHs reported the same information. Fifteen (93.8) Mngrs/Sups stated that working areas are frequently sanitized whereas only 88.0% (n=206) FHs agreed with this statistic.

Table 4.16: Cleaning practice as communicated by the Mngrs/Sups (n=16) and the FHs (n=234)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FHs % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FHs % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FHs % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FHs % (n=234)
Do you have enough cleaning tools?								
Yes	75.0 (n=3)	77.4 (n=41)	50.0 (n=2)	72.9 (n=35)	100.0 (n=8)	91.0 (n=121)	81.3 (n=13)	84.2 (n=197)
How frequently are the utensils washed?								
During preparation	75.0 (n=3)	83.0 (n=44)	100.0 (n=4)	64.6 (n=31)	100.0 (n=8)	69.9 (n=93)	93.8 (n=15)	71.8 (n=168)
After the food is ready	25.0 (n=1)	58.5 (n=31)	0.0	31.3 (n=15)	0.0	54.1 (n=72)	6.3 (n=1)	50.4 (n=118)
After work is finished	0.0	49.1 (n=26)	0.0	41.7 (n=20)	0.0	44.4 (n=59)	0.0	44.9 (n=105)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FHs % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FHs % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FHs % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FHs % (n=234)
How are cooking utensils washed?								
Hot water and detergent	75.0 (n=3)	18.9(n=10)	50.0 (n=2)	31.3 (n=15)	62.5 (n=5)	39.1 (n=52)	62.5 (n=10)	32.9 (n=77)
Cold water and detergent	0.0	15.1 (n=8)	50.0 (n=2)	12.5 (n=6)	12.5 (n=1)	1.5 (n=2)	18.8 (n=3)	6.8 (n=16)
Hot water, detergent and sanitizer	25.0 (n=1)	66.0 (n=35)	0.0	56.3 (n=27)	25.0 (n=2)	59.4 (n=79)	18.8 (n=3)	60.3 (n=141)
How frequently is the stove cleaned?								
During preparation	25.0 (n=1)	24.5 (n=13)	0.0	35.4 (n=17)	50.0 (n=4)	32.3 (n=43)	31.3 (n=5)	31.2 (n=73)
After the food is ready	25.0 (n=1)	7.5 (n=4)	0.0	6.3 (n=3)	50.0 (n=4)	18.8 (n=25)	31.3 (n=5)	13.7 (n=32)
After the work is finished	50.0 (n=2)	71.7 (n=38)	50.0 (n=2)	35.4 (n=17)	12.5 (n=1)	57.1 (n=76)	31.3 (n=5)	56.0 (n=131)
No stove	0.0	1.9 (n=1)	0.0	0.0	0.0	4.5 (n=6)	0.0	3.0 (n=7)
Weekly	0.0	0.0	25.0 (n=1)	0.0	0.0	0.0	6.3 (n=1)	0.0
How often is the preparation area cleaned?								
During preparation	100.0 (n=4)	79.2 (n=42)	100.0 (n=4)	70.8 (n=34)	87.5 (n=7)	82.0 (n=109)	93.8 (n=15)	79.1 (n=185)
After the food is ready	0.0	52.8 (n=28)	0.0	29.2 (n=14)	12.5 (n=1)	43.6 (n=58)	6.3 (n=1)	42.7 (n=100)
After work is finished	0.0	50.9 (n=27)	0.0	27.1 (n=13)	0.0	36.1 (n=48)	0.0	37.6 (n=88)
Are working areas ever sanitized?								
Yes	100.0 (n=4)	98.1 (n=52)	100.0 (n=4)	87.5 (n=42)	100.0 (n=8)	97.7 (n=130)	100.0 (n=16)	95.7 (n=224)
How often are working areas sanitized								
Frequently	100.0 (n=4)	88.7 (n=47)	100.0 (n=4)	70.8 (n=34)	87.5 (n=7)	94.0 (n=125)	93.8 (n=15)	88.0 (n=206)
Daily	0.0	11.3 (n=6)	0.0	14.6 (n=7)	12.5 (n=1)	6.0 (n=8)	6.3 (n=1)	6.4 (n=15)
Weekly	0.0	0.0	0.0	14.6 (n=7)	0.0	0.0	0.0	5.6 (n=13)

Every department in a food establishment has different colour-coded cleaning equipment. Table 4.17 shows that most of the Mngrs/Sups (n=11; 68.8%) stated that white was used for the deli/food service area, three (18.8%) use yellow and one (12.5%) uses blue. Forty-five point seven percent (n=107) of the FHs reported that yellow was used, 25.2% (n=59) reported blue was used and 11.5% (n=27) reported red was used. Results from each establishment show the same trend as the majority use the white cleaning equipment.

Table 4.17: The colour of cleaning equipment used in the food service area

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FH % (n=234)
Blue	50.0 (n=2)	35.8 (n=19)	0.0	10.4 (n=5)	0.0	26.3 (n=35)	12.5 (n=1)	25.2 (n=59)
Red	0.0	9.4 (n=5)	0.0	6.3 (n=3)	0.0	14.3 (n=19)	0.0	11.5 (n=27)
Green	0.0	1.9 (n=1)	0.0	8.3 (n=4)	0.0	5.3 (n=7)	0.0	5.1 (n=12)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FH % (n=234)
White	50.0 (n=2)	47.2 (n=25)	75.0 (n=3)	45.8 (n=22)	75.0 (n=6)	45.1 (n=60)	68.8 (n=11)	45.7 (n=107)
Yellow	0.0	7.5 (n=4)	0.0	10.4 (n=5)	25.0 (n=2)	4.5 (n=6)	18.8 (n=3)	6.4 (n=15)

4.2.3.2.2 Cleaning knowledge

When the respondents were asked about their cleaning knowledge most of the Mngrs/Sups (n=15; 93.8%) and the FHs (91.1%; n=215) knew that wiping cloths can spread microorganisms. All the Mngrs/Sups knew that it is not true that any cleaning chemical can be used in the kitchen whereas only 6.8% (n=16) of the FHs knew it was not true that any cleaning chemical can be used in the kitchen. All of the Mngrs/Sups knew that every area had to have its own colour-coded cleaning equipment whereas 96.2% (n=225) of the FHs stated that they knew this; more FHs at the Super Stores (97.7%; n=130) knew this compared to (94.3%; n=50) in the Mini stores and (93.8%; n=45) at the Hyper stores knew this. None of the Mngrs/Sups but 12.0% (n=28) of the FHs answered that sanitizing is not important when you are cleaning with hot water. One (6.3%) Mngr/Sup and 58.5% (n=137) of the FHs agreed that you can always clean up at the end of food preparation. All the Mngrs/Sups and the vast majority (82.5%; n=193) of the FHs knew that cleaning equipment must be stored away from food. One (6.3%) Mngr/Sup and 56.8% (n=133) of the FHs stated that it is permissible to keep brushes and mops in used water in-between use. Disposable cloths are used for cleaning as indicated by 13 (81.3%) Mngrs/Sups and 84.6% (n=198) of the FHs. All of the Mngrs/Sups knew that cloths need to be kept in a sanitizer solution in a bucket in-between use and that chopping boards need to be washed, soaked in a sanitizer solution and placed in a clean rack to dry; however only 11 (90.2%) Mngrs/Sups and 96.6% (n=226) of the FHs had the same knowledge. Eleven (68.8%) Mngrs/Sups and 77.8% (n=182) of the FHs knew that the refrigerator must be cleaned weekly, as illustrated in Table 4.18.

Table 4.18: Cleaning knowledge of the Mngrs/Sups (n=16) and the FHs (n=234)

Variables	Mini store Man/Sup (n=4) %	Mini store FH (n=53) %	Hyper store Man/Sup (n=4) %	Hyper store FH (n=48) %	Super store Man/Sup (n=8) %	Super store FH (n=133) %	Total group Man/Sup (n=16) %	Total group FH (n=234) %
Wiping cloths can spread microorganisms								
Yes	100.0	96.2	75.0	79.2	100.0	94.7	93.8	91.9
Any cleaning chemical can be used in the kitchen								
TRUE	0.0	9.4	0.0	4.2	0.0	6.8	0.0	6.8
Every area has its own colour coded cleaning equipment								
TRUE	100.0	94.3	100.0	93.8	100.0	97.7	100.0	96.2
Sanitizing is not important when you are cleaning with hot water								
TRUE	0.0	7.5	0.0	14.6	0.0	12.8	0.0	12.0

Variables	Mini store Man/Sup (n=4) %	Mini store FH (n=53) %	Hyper store Man/Sup (n=4) %	Hyper store FH (n=48) %	Super store Man/Sup (n=8) %	Super store FH (n=133) %	Total group Man/Sup (n=16) %	Total group FH (n=234) %
You can always clean at the end of food prep								
TRUE	25.0	69.8	0.0	64.6	0.0	51.9	6.3	58.5
All cleaning equipment must be stored away from food								
TRUE	100.0	86.8	100.0	85.4	100.0	79.9	100.0	82.5
Brushes and mops can be kept in a bucket with used water in-between use								
TRUE	0.0	60.4	0.0	31.3	12.5	64.7	6.3	56.8
Disposable cloths are used for cleaning								
TRUE	75.0	83.0	75.0	85.4	87.5	85.0	81.3	84.6
Cloths need to be in a sanitizer solution in a bucket in between use								
TRUE	100.0	84.9	100.0	83.3	100.0	94.7	87.5	90.2
Chopping boards need to be washed, soaked in a sanitizer solution and placed in a clean rack to dry								
TRUE	100.0	96.2	100.0	97.9	100.0	96.2	100.0	96.6
Fridges must be cleaned weekly								
TRUE	25.0	88.7	100.0	85.4	75.0	70.7	68.8	77.8

4.2.3.3 Food safety knowledge

Figure 4.19 shows that for the total group six (37.5%) of the Mngrs/Sups and 10.7% (n=25) of the FHs knew that the wearing of jewellery in food preparation areas is not permitted. At the Mini stores none of the Mngrs/Sups knew this but 13.2% (n=7) of the FHs stated it was permitted, two percent (n=50) Mngrs/Sups at the Hyper stores and Super stores knew that jewellery was not permitted whereas only 12.5% (n=6) and 9.0% (n=12) of the FHs at the Hyper and Super stores had the same knowledge.

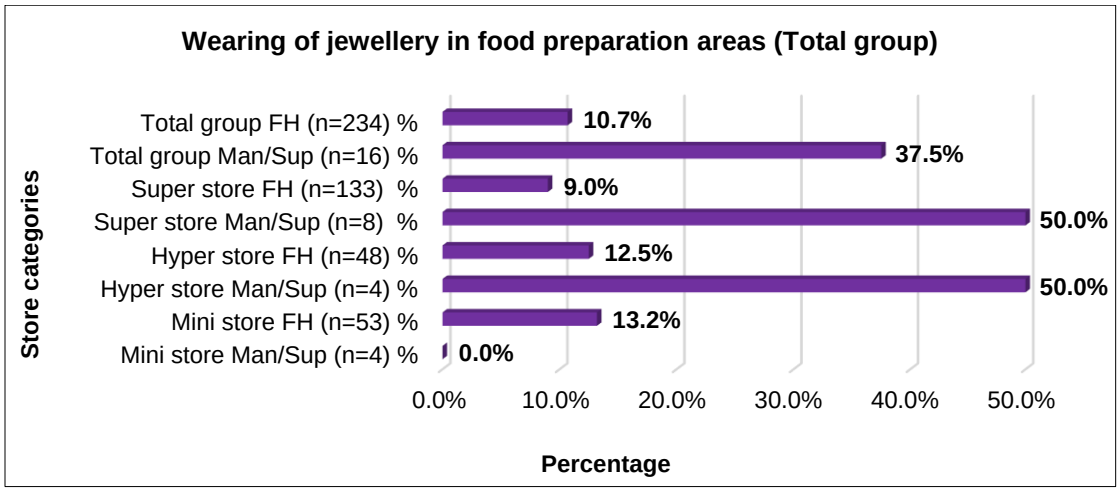

Figure 4.19: Answers to the question on whether FHs are permitted to wear jewellery in food preparation areas given as percentages

Table 4.19 shows the answers given by the respondents with regard to their knowledge about the allocation of colours to chopping boards. Thirteen (81.3%) Mngrs/Sups and 73.9% (n=173) of the FHs knew that white chopping boards are for use with dairy foods. Three (75.0%) Mngrs/Sups at both the Mini stores and Hyper stores knew this information and seven (87.5%) at the Super stores. It was evident that more FHs at the Super stores (77.4%; n=103) knew that white boards are for dairy use compared to the Mini stores (73.6%; n=39) and Hyper stores (64.6%; n=31). Blue chopping boards are used for fish preparation as communicated by 14 (87.5%) Mngrs/Sups and 66.2% (n=155) of the FHs. All of the Mngrs/Sups knew that red chopping boards are used for meat preparation and 78.6% (n=184) of the FHs had the same knowledge; this was reported by 75.5% (n=40) of the FHs at the Mini stores, 64.6% (n=31) at the Hyper stores and 85.0% (n=113) at the Super stores. Thirteen (81.3%) Mngrs/Sups and 70.5% (n=165) of the FHs knew that yellow chopping boards are used for raw chicken preparation. Knowledge that brown chopping boards are used for cooked chicken handling was revealed by 13 (81.3%) Mngrs/Sups and 69.7% (n=163) of the FHs, which knowledge was mostly expressed by Mngrs/Sups and FHs at the Super stores. All the Mngrs/Sups and 78.6% (n=184) of the FHs knew that green chopping boards are used for fruits and vegetables preparation. For the FHs, 75.5% (n=40) at the Mini stores, 60.4% (n=29) at the Hyper stores and 86.5% (n=115) at the Super stores responded that green chopping boards are for fruits and vegetables preparation.

Table 4.19: Chopping boards colour allocation knowledge for Mngrs/Sups (n=16) and FHs (n=234)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FH % (n=234)
White chopping boards are used for Dairy	75.0 (n=3)	73.6 (n=39)	75.0 (n=3)	64.6 (n=31)	87.5 (n=7)	77.4 (n=103)	81.3 (n=13)	73.9 (n=173)
Blue chopping boards are used for Fish	50.0 (n=2)	64.2 (n=34)	100.0 (n=4)	54.2 (n=26)	100.0 (n=8)	71.4 (n=95)	87.5 (n=14)	66.2 (n=155)
Red chopping boards are used for Meat	100.0 (n=4)	75.5 (n=40)	100.0 (n=4)	64.6 (n=31)	100.0 (n=8)	85.0 (n=113)	100.0 (n=16)	78.6 (n=184)
Yellow chopping boards are used for raw Chicken	75.0 (n=3)	66.0 (n=35)	75.0 (n=3)	54.2 (n=26)	87.5 (n=7)	78.2 (n=104)	81.3 (n=13)	70.5 (n=165)
Brown chopping boards are used for cooked Chicken	75.0 (n=3)	67.9 (n=36)	75.0 (n=3)	50.0 (n=24)	87.5 (n=7)	77.4 (n=103)	81.3 (n=13)	69.7 (n=163)
Green chopping boards are used for Fruits and Vegetables	100.0 (n=4)	75.5 (n=40)	100.0 (n=4)	60.4 (n=29)	100.0 (n=8)	86.5 (n=115)	100.0 (n=16)	78.6 (n=184)

Table 4.20 shows that all the Mngrs/Sups considered “clean as you go” to be important whereas 97.0% (n=227) of the FHs expressed the same opinion. None of the Mngrs/Sups and only 8.1% (n=19) of the FHs stated that it is acceptable to defrost meat overnight in a sink filled with hot water, and this was reported by only 8.4% (n=4) of the FHs at the Hyper stores and 11.3% (n=15) of the FHs at the Super stores. All the Mngrs/Sups and most of the FHs stated that it was true that frying oil should be monitored and checked

daily, that correct chopping boards need to be used to eliminate cross-contamination, utensils must be placed in a bucket containing sanitizer solution in-between use and that packaging needs to be clean but 15 (93.8%) of the Mngrs/Sups and 80.3% (n=188) of the FHs stated that no wooden equipment may be used; one (6.3%) Mngr/Sup and 5.1% (n=12), 3.8% (n=9) and 17.9% (n=42) of the FHs for the total group thought it was acceptable to top up old oil with new oil, it was acceptable to give employees used oil to take home and cooked meat can be left out at room temperature to cool overnight before refrigerating. For the total group, two (25.0%) Mngrs/Sups stated that it was true that food can be thawed on the counter and that cooked foods do not need to be thoroughly reheated whereas more FHs had the same knowledge (47.0%; n=110 and 29.9%; n=70) and fourteen (87.5%) of Mngrs/Sups and 90.2% (n=211) of FHs stated that the deep fryer needs to be covered when not in use. All the Mngrs/Sups and 93.2% (n=218) of the FHs stated that separate utensils/containers should be used for raw products and cooked foods and that it is important to wash your hands and sanitize the equipment and the surface used after handling eggs, chicken and red meat.

Table 4.20: Food safety knowledge of the Mngrs/Sups (n=16) and the FHs (n=234)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FH % (n=234)
Clean as you go is important								
TRUE	100.0 (n=4)	100.0 (n=53)	100.0 (n=4)	95.8 (n=46)	100.0 (n=8)	96.2 (n=128)	100.0 (n=16)	97.0 (n=227)
It is acceptable to defrost meat overnight in a sink filled with hot water								
TRUE	0.0	0.0	0.0	8.3 (n=4)	0.0	11.3 (n=15)	0.0	8.1 (n=19)
Frying oil needs to be monitored and checked daily								
TRUE	100.0 (n=4)	96.2 (n=51)	100.0 (n=4)	91.7 (n=44)	100.0 (n=8)	96.2 (n=128)	100.0 (n=16)	95.3 (n=223)
Correct chopping boards need to be used to eliminate cross-contamination								
TRUE	100.0 (n=4)	96.2 (n=51)	100.0 (n=4)	89.6 (n=43)	100.0 (n=8)	96.2 (n=128)	100.0 (n=16)	94.9 (n=222)
Utensils must be placed in a bucket containing sanitizer solution in-between use								
TRUE	100.0 (n=4)	98.1 (n=52)	100.0 (n=4)	91.7 (n=44)	100.0 (n=8)	97.0 (n=129)	100.0 (n=16)	96.2 (n=225)
Packaging needs to be clean								
TRUE	100.0 (n=4)	88.7 (n=47)	100.0 (n=4)	91.7 (n=44)	100.0 (n=8)	95.5 (n=127)	100.0 (n=16)	93.2 (n=218)
No wooden equipment may be used								
TRUE	100.0 (n=4)	86.8 (n=46)	75.0 (n=3)	70.8 (n=34)	100.0 (n=8)	81.2 (n=108)	93.8 (n=15)	80.3 (n=188)
It is acceptable to top up old oil with new oil								
TRUE	0.0 (=0)	1.9 (n=1)	0.0	8.3 (n=4)	12.5 (n=1)	5.3 (n=7)	6.3 (n=1)	5.1 (n=12)
It is acceptable to give employees used oil to take home								
TRUE	0.0	1.9 (n=1)	25.0 (n=3)	2.1 (n=1)	0.0	5.3 (n=7)	6.3 (n=1)	3.8 (n=9)
The deep fryer needs to be covered when not in use								
TRUE	75.0 (n=3)	96.2 (n=51)	75.0 (n=3)	77.1 (n=37)	100.0 (n=8)	92.5 (n=123)	87.5 (n=14)	90.2 (n=211)
After handling eggs, chicken and red meat, it is important to wash your hands, sanitize the equipment used and the working surface								
TRUE	100.0 (n=4)	96.2 (n=51)	100.0 (n=4)	89.6 (n=43)	100.0 (n=8)	93.2 (n=124)	100.0 (n=16)	93.2 (n=218)
Wash fruit and vegetables before eating/preparing								
TRUE	100.0 (n=4)	96.2 (n=51)	100.0 (n=4)	95.8 (n=46)	100.0 (n=8)	94.0 (n=125)	100.0 (n=16)	94.9 (n=222)
Keeping kitchen surfaces clean reduces the risk of illness								
TRUE	100.0 (n=4)	96.2 (n=51)	100.0 (n=4)	95.8 (n=46)	100.0 (n=8)	93.2 (n=124)	100.0 (n=16)	94.4 (n=221)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FH % (n=234)
Keeping raw and cooked food separate helps to prevent illness								
TRUE	100.0 (n=4)	96.2 (n=51)	100.0 (n=4)	95.8 (n=46)	100.0 (n=8)	93.2 (n=124)	100.0 (n=16)	94.4 (n=221)
Thawing food can be done on the counter								
TRUE	25.0 (n=1)	52.8 (n=28)	25.0 (n=2)	27.1 (n=13)	25.0 (n=2)	51.9 (n=69)	25.0 (n=2)	47.0 (n=110)
I think it is unsafe to leave cooked food out of the refrigerator for more than two hours								
TRUE	100.0 (n=4)	88.7 (n=47)	100.0 (n=4)	81.3 (n=39)	100.0 (n=8)	89.5 (n=119)	100.0 (n=16)	87.6 (n=205)
Cooked foods do not need to be thoroughly reheated								
TRUE	75.0 (n=3)	34.0 (n=18)	0.0	43.8 (n=21)	12.5 (n=1)	23.3 (n=31)	25.0 (n=2)	29.9 (n=70)
Cooked meat can be left out at room temperature to cool overnight before refrigerating								
TRUE	25.0 (n=1)	24.5 (n=13)	0.0	16.7 (n=8)	0.0	15.8 (n=21)	6.3 (n=1)	17.9 (n=42)
Separate utensils/containers should be used for raw products and cooked foods								
TRUE	100.0 (n=4)	96.2 (n=51)	100.0 (n=4)	93.8 (n=45)	100.0 (n=8)	91.7 (n=122)	100.0 (n=16)	93.2 (n=218)

4.2.4 Food storage practice and food safety knowledge

4.2.4.1 Food storage practice

Table 4.21 indicates that 15 (93.8%) Mngrs/Sups and 89.3% (n=209) of the FHs stated that there is a regular cleaning schedule for the storage areas. At the Mini stores three (75.0%) Mngrs/Sups and all the FHs, all the Mngrs/Sups and 79.2% (n=38) of the FHs at the Hyper stores and all the Mngrs/Sups and 88.7% (n=118) of the FHs reported the same information. The majority of the Mngrs/Sups (n=15; 93.8%) indicated that the storage areas are often cleaned once a week but the FHs indicated that the storage areas are cleaned less than once a week, which was communicated as either biweekly or once a month. Stock rotation is in place as expressed by 14 (87.5%) Mngrs/Sups and 79.9% (n=187) of the FHs. Not all the Mngrs/Sups and the FHs separated raw and cooked food during storage; for the total group 15 (93.8%) Mngrs/Sups and 88.5% (n=207) of the FHs stated they separate raw and cooked food during storage. At the Mini stores and Super stores all the Mngrs/Sups stated they separate food but 94.3% (n=50) and 83.3% (n=117) of the FHs respectively stated the same. At the Hyper stores three (75.0%) Mngrs/Sups and 83.3% (n=40) of the FHs reported that they separate food during storage.

Table 4.21: Food storage practice of the Mngrs/Sups (n=16) and the FHs (n=234)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FH % (n=234)
Is there a regular cleaning schedule for the storage areas?								
Yes	75.0 (n=3)	100.0 (n=53)	100.0 (n=4)	79.2 (n=38)	100.0 (n=8)	88.7 (n=118)	93.8 (n=15)	89.3 (n=209)
How often is the storage area cleaned?								
Less than once a week	0.0	50.9 (n=27)	0.0	25.0 (n=12)	0.0	48.9 (n=65)	0.0	44.4 (n=104)
Once a week	100.0 (n=4)	41.5 (n=22)	75.0 (n=3)	52.1 (n=25)	100.0 (n=8)	38.3 (n=51)	93.8 (n=15)	41.9 (n=98)
Daily	0.0	7.5 (n=4)	25.0 (n=1)	22.9 (n=11)	0.0	12.8 (n=17)	6.3 (n=1)	13.7 (n=32)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FH % (n=234)
Is stock rotation in place?								
Yes	75.0 (n=3)	83.0 (n=44)	75.0 (n=3)	68.8 (n=33)	100.0 (n=8)	82.7 (n=110)	87.5 (n=14)	79.9 (n=187)
Is raw and cooked food separated during storage?								
Yes	100.0 (n=4)	94.3 (n=50)	75.0 (n=3)	83.3 (n=40)	100.0 (n=8)	88.0 (n=117)	93.8 (n=15)	88.5 (n=207)

All of the Mngrs/Sups communicated that the stock-take happens once a week. Table 4.22 shows that most (80.3%; n=188) of the FHs indicated that stock-take takes place once a week and 12.8% (n=17) indicated that stock-take takes place daily.

Table 4.22: Stock-take schedule as communicated by the FHs (n=234)

Variables	Mini store FH % (n=53)	Hyper store FH % (n=48)	Super store FH % (n=133)	Total group FH % (n=234)
Not done	3.8 (n=2)	0.0	2.3 (n=3)	2.1 (n=5)
Once a month	11.3 (n=6)	2.1 (n=1)	0.8 (n=1)	3.4 (n=8)
Twice a month	1.9 (n=1)	0.0	0.0	0.4 (n=1)
Once a week	66.0 (n=35)	77.1 (n=37)	87.2 (116)	80.3 (n=188)
Twice a week	0.0	0.0	0.8 (n=1)	0.0
Three times a week	1.9 (n=1)	0.0	0.0	0.4 (n=1)
Four times a week	1.9 (n=1)	0.0	0.0	0.4 (n=1)
Every day of the week	13.2 (n=7)	20.8 (n=10)	9.8 (n=13)	12.8 (n=17)

Seven (43.8%) Mngrs/Sups and 47.0% (n=110) of the FHs expressed that stock is checked for quality and expiry dates on a daily basis. At the Mini stores two (50.0%) Mngrs/Sups and 45.3% (n=24) of the FHs stated that stock is checked daily whereas at the Hyper stores two (50.0%) Mngrs/Sups stated that it is done more than once a week but 62.5% (n=30) of the FHs stated it was done daily. At the Super stores five (62.5%) Mngrs/Sups stated it was done daily but 51.9% (n=69) of the FHs stated it was done more than once a week as illustrated by table 4.23.

Table 4.23: Frequency at which stock is checked for quality and expiry dates Mngrs/Sups (n=16) and FHs (n=234)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FH % (n=234)
Not checked	25.0 (n=1)	3.8 (n=2)	0.0	0.0	0.0	0.0	6.3 (n=1)	0.9 (n=2)
Once a month	0.0	11.3 (n=6)	25.0 (n=1)	0.0	0.0	2.3 (n=3)	6.3 (n=1)	3.8 (n=9)
<once a week	0.0	32.1 (n=17)	50.0 (n=2)	27.1 (n=13)	0.0	51.9 (n=69)	12.5 (n=2)	42.3 (n=99)
>once a week	25.0(n=1)	7.5 (n=4)	25.0 (n=1)	10.4 (n=5)	37.5 (n=3)	3.8 (n=5)	31.3 (n=5)	6.0 (n=14)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FH % (n=234)
Daily	50.0 (n=2)	45.3 (n=24)	0.0	62.5 (n=30)	62.5 (n=5)	42.1 (n=56)	43.8 (n=7)	47.0 (n=110)

Table 4.24 illustrates that for the total group 15 (93.8%) Mngrs/Sups reported that perishable foods are stored in the fridge whereas 79.1% (n=185) of the FHs communicated that perishable food is stored in a designated store room. All the Mngrs/Sups at the Mini and Hyper stores stated that perishable food is stored in the fridge whereas 87.5% (n=7) of the FHs indicated that perishable food is stored in the fridge. For the FHs, however, 90.6% (n=48) at the Mini stores, 60.4% (n=29) at the Hyper stores and 81.2% (n=108) at the Super stores reported that perishable food is stored in a designated store room. Non-food items are stored in a designated store room as was revealed by seven (43.8%) Mngrs/Sups and 77.8% (n=182) of the FHs.

Table 4.24: Storage practice as communicated by Mngrs/Sups (n=16) and FHs (n=234)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FH % (n=234)
Where are the perishable food supplies stored?								
Kitchen	0.0	0.0	0.0	2.1 (n=1)	12.5 (n=1)	0.8 (n=1)	6.3 (n=1)	0.9 (n=2)
Designated store room	0.0	90.6 (n=48)	0.0	60.4 (n=29)	0.0	81.2 (n=108)	0.0	79.1 (n=185)
Storage containers	0.0	0.0	0.0	6.3 (n=3)	0.0	0.0	0.0	1.3 (n=3)
Fridge	100.0 (n=4)	9.4 (n=5)	100.0 (n=4)	31.3 (n=15)	87.5 (n=7)	18.0 (n=24)	93.8 (n=15)	18.8 (n=44)
Where are non-food supplies stored?								
Kitchen	0.0	13.2 (n=7)	25.0 (n=1)	10.4 (n=5)	12.5 (n=1)	0.0	12.5 (n=1)	5.1 (n=12)
Designated store room	75.0 (n=3)	79.2 (n=42)	25.0 (n=1)	56.3 (n=27)	37.5 (n=3)	85.0 (n=113)	43.8 (n=7)	77.8 (n=182)
Storage containers	25.0 (n=1)	7.5 (n=4)	25.0 (n=1)	8.3 (n=4)	0.0	15.0 (n=20)	37.5 (n=6)	6.8 (n=16)
Kitchen shelf	0.0	0.0	25.0 (n=1)	25.0 (n=12)	50.0 (n=4)	0.0	6.3 (n=1)	10.3 (n=24)

4.2.4.2 Food safety storage knowledge

Table 4.25 shows that 15 (93.8%) Mngrs/Sups and 93.2% (n=218) of the FHs agreed that it is important to throw away food that has passed the expiry date. All the Mngrs/Sups at the Hyper stores and Super stores agreed but only three (75.0%) Mngrs/Sups at the Mini stores agreed with this statement whereas all the FHs agreed. Eighty-one point three (n=39) of the FHs at the Mini stores and 94.7% (n=126) of the FHs at the Super stores agreed stating that it is important to throw away food that has expired. A great minority of

Mngrs/Sups (n=1; 6.3%) and 12% of the FHs (n=28) said it was acceptable to store food on the floor. For the total group, all the Mngrs/Sups agreed that food must be stored at the correct temperature, that expiry dates are important, that defrosting food should be stored on the bottom shelf of the fridge to prevent it from dripping and that food in the freezer must be covered to prevent freezer burn, whereas 94.4% (n=221), 96.6% (n=226), 85.5% (n=200) and 94.9% (n=222) of the FHs stated the same information respectively. Raw and cooked food can be stored together was communicated by very few Mngrs/Sups and FHs and as expected even fewer respondents agreed with the statement that food can stay in the freezer indefinitely. None of the Mngrs/Sups in all the stores stated that raw food can be stored above cooked food in the refrigerator but 24.4% (n=57) of the FHs stated that this practice was acceptable. Fifty percent (n= 8) of the Mngrs/Sups stated that the freezer temperature should be at least -23 degrees Celsius whereas 69.7% (n=163) of the FHs agreed that -23 degrees Celsius is the right temperature.

Table 4.25: Food safety storage knowledge of the Mngrs/Sups (n=16) and FHs (n=234)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FH % (n=234)
I think it is important to throw away foods that have passed their expiry dates								
AGREE	75.0 (n=3)	100.0 (n=53)	100.0 (n=4)	81.3 (n=39)	100.0 (n=8)	94.7 (n=126)	93.8 (n=15)	93.2 (n=218)
Food must not be stored with chemicals								
TRUE	100.0 (n=4)	88.7 (n=47)	100.0 (n=4)	79.2 (n=38)	87.5 (n=7)	90.2 (n=120)	93.8 (n=15)	87.6 (n=205)
Food can be stored on the floor								
TRUE	0.0	13.2 (n=7)	0.0	2.1 (n=1)	12.5 (n=1)	15.0 (n=20)	6.3 (n=1)	12.0 (n=28)
When opened, food must be covered and date marked								
TRUE	100.0 (n=4)	92.5 (n=49)	75.0 (n=3)	89.6 (n=43)	100.0 (n=8)	94.0 (n=125)	93.8 (n=15)	92.7 (n=217)
Food must be stored at the correct temperature								
TRUE	100.0 (n=4)	96.2 (n=51)	100.0 (n=4)	93.8 (n=45)	100.0 (n=8)	94.0 (n=125)	100.0 (n=16)	94.4 (n=221)
Raw and cooked food can be stored together								
TRUE	0.0	1.9 (n=1)	50.0 (n=2)	14.6 (n=7)	12.5 (n=1)	9.8 (n=13)	18.8 (n=3)	9.0 (n=21)
Expiry dates are important								
TRUE	100.0 (n=4)	96.2 (n=51)	100.0 (n=4)	95.8 (n=46)	100.0 (n=8)	97.0 (n=129)	100.0 (n=16)	96.6 (n=226)
Food in the refrigerator can be stored in cardboard boxes								
TRUE	0.0	52.8 (n=28)	50.0 (n=2)	45.8 (n=22)	25.0 (n=2)	56.4 (n=75)	25.0 (n=4)	53.4 (n=125)
In the refrigerator raw food can be stored above cooked food								
TRUE	0.0	32.1 (n=17)	0.0	12.5 (n=6)	0.0	25.6 (n=34)	0.0	24.4 (n=57)
Defrosting food should be stored on the bottom shelf to prevent it from dripping								
TRUE	100.0 (n=4)	86.8 (n=46)	100.0 (n=4)	91.7 (n=44)	100.0 (n=8)	82.7 (n=110)	100.0 (n=16)	85.5 (n=200)
Food in the freezer needs to be covered in order to prevent freezer burn								
TRUE	100.0 (n=4)	92.5 (n=49)	100.0 (n=4)	97.9 (n=47)	100.0 (n=8)	94.7 (n=126)	100.0 (n=16)	94.9 (n=222)
Food can stay in the freezer indefinitely								
TRUE	0.0	13.2 (n=7)	0.0	12.5 (n=6)	12.5 (n=1)	9.0 (n=12)	6.3 (n=1)	10.7 (n=25)
The freezer temperature should be at least -23 degrees Celsius								
TRUE	25.0 (n=1)	79.2 (n=42)	75.0 (n=3)	52.1 (n=25)	50.0 (n=4)	72.2 (n=96)	50.0 (n=8)	69.7 (n=163)

4.2.5 Receiving practice and receiving food safety knowledge

4.2.5.1 Receiving practice

Table 4.26 was answered by the Mngrs/Sups only. The results show that for the total group half of the Mngrs/Sups use the organization's recommended supplier list for sourcing all the products, the majority being at the Hyper stores. Seven (43.8%) of the Mngrs/Sups have contracts with additional suppliers, three (75.0%) at the Mini stores, one (25.0%) at the Hyper stores and three (37.5%) at the Super stores. Commercial suppliers deliver supplies to the stores using an open truck for perishable deliveries and a closed truck for non-perishable foods. All perishable foods are stored in the fridge. When receiving food items only five (31.3%) of the Mngrs/Sups use a food specification manual to check the quality of food against, and this practice is most evident at the Super stores. For the total group, 13 (81.2%) Mngrs/Sups check the delivery note/invoice and 11 Mngrs/Sups communicated that the same person receives deliveries every day.

Table 4.26: Food purchasing and logistics of the Mngrs/Sups (n=16)

Variables	Mini store Mngrs/Sups % (n=4)	Hyper store Mngrs/Sups % (n=4)	Super store Mngrs/Sups % (n=8)	Total group Mngrs/Sups % (n=16)
Does your establishment use the organization's recommended supplier list for all your products?				
Yes	50.0 (n=2)	75.0 (n=3)	37.5 (n=3)	50.0 (n=8)
Are there contracts with the additional suppliers?				
Yes	75.0 (n=3)	25.0 (n=1)	37.5 (n=3)	43.8 (n=7)
Who delivers the supplies?				
Commercial supplier	100.0 (n=4)	100.0 (n=4)	100.0 (n=8)	100.0 (n=16)
How are perishable foods delivered?				
Open truck	100.0 (n=4)	100.0 (n=4)	100.0 (n=8)	100.0 (n=16)
How are non-perishable food delivered?				
Closed truck	100.0 (n=4)	100.0 (n=4)	100.0 (n=8)	100.0 (n=16)
Where are perishable foods stored?				
Fridge	100.0 (n=4)	100.0 (n=4)	100.0 (n=8)	100.0 (n=16)
Do you have a food specification manual to check the quality of food against?				
Yes	25.0 (n=1)	25.0 (n=1)	87.5 (n=7)	31.3 (n=5)
Do you check the delivery note/invoice?				
Yes	75.0 (n=3)	75.0 (n=3)	87.5 (n=7)	81.2 (n=13)
Is it the same person who receives deliveries every day?				
Yes	50.0 (n=2)	75.0 (n=3)	75.0 (n=6)	68.8 (n=11)

Figure 4.20 shows that five Mngrs/Sups purchase chicken, fish and fruit and vegetables from additional suppliers that are not on the recommended supplier list, four (25.0%) purchase meat and groceries, two (12.5%) purchase bread and one (6.3%) purchases maize from additional suppliers.

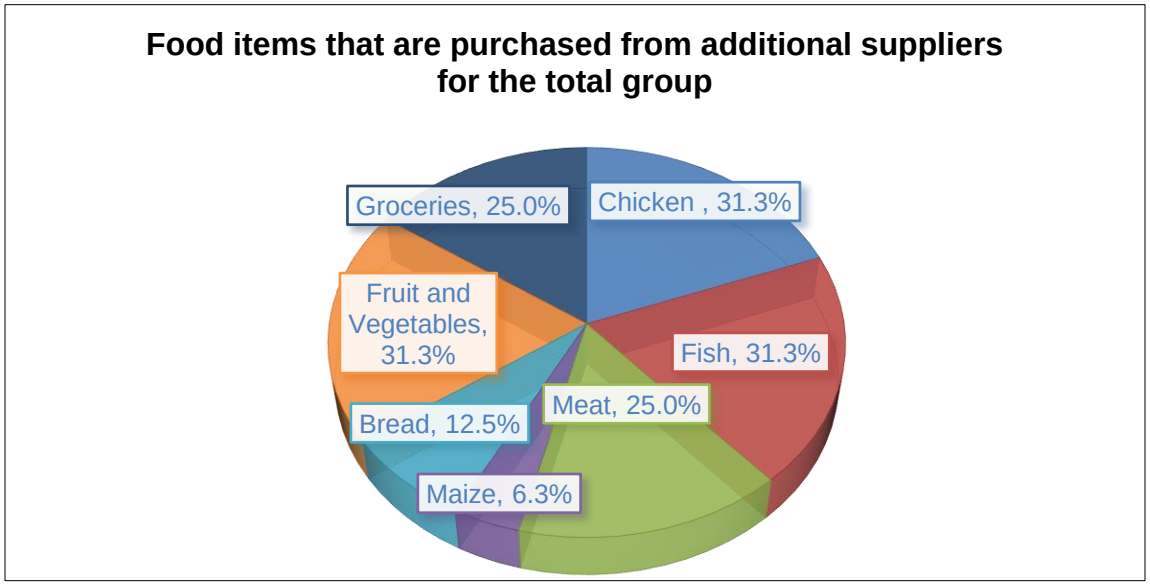

Figure 4.20: Food items that are purchased from additional suppliers for the total group as reported by the Mngrs/Sups (n=16)

Figure 4.21 shows that chicken is mostly purchased from additional suppliers at the Super stores. Half of the Super stores purchased fish from additional suppliers whereas only four (25.0%) of the Mini stores purchased fish from the additional suppliers. Meat is mostly purchased from additional suppliers at the Super stores and the Super stores are the only establishments that purchase maize and bread from an additional supplier. Half of the Mngrs/Sups at the Mini stores purchase fruit and vegetables from additional suppliers and six (37.5%) Mngrs/Sups at the Super stores purchase groceries from additional suppliers.

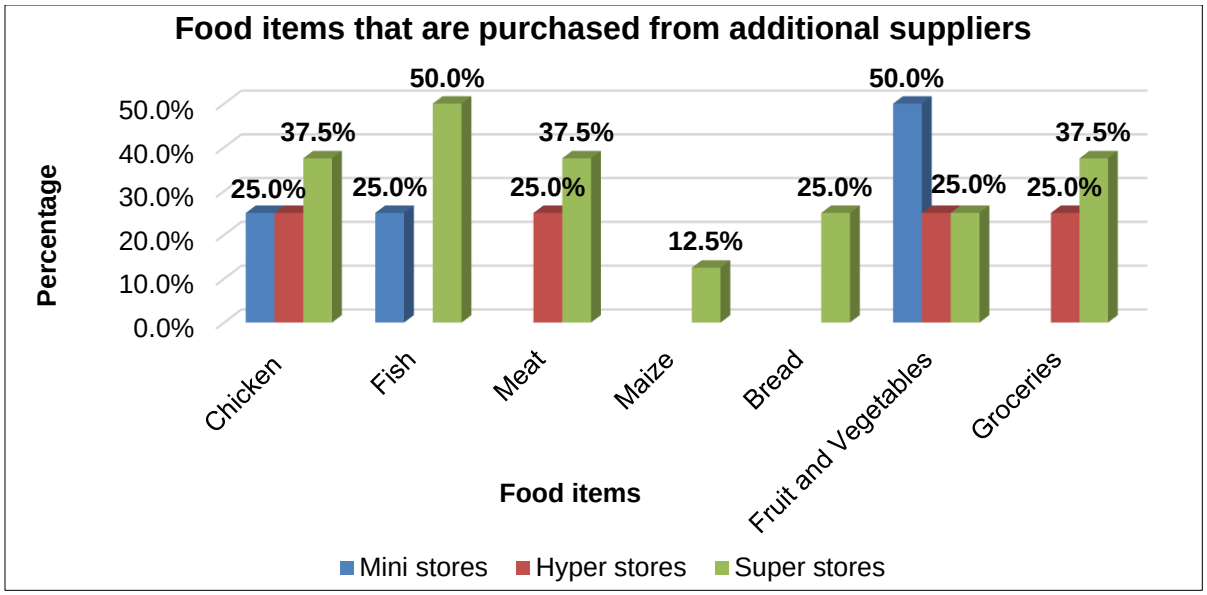

Figure 4.21: Food items that are purchased from additional suppliers per establishment as reported by the Mngrs/Sups (n=16)

Table 4.27 illustrates the receiving practice, and as reported by 14 (87.5%) of the Mngrs/Sups and 80.8% (n=189) of the FHs deliveries are scheduled. The Mngrs/Sups stated that the receiving clerk receives deliveries whereas the FHs stated that the Mngrs/Sups receives deliveries. The owners and the FHs never receive stock according to the Mngrs/Sups whereas the FHs indicated that four (1.7%) of the owners and 1.3% (n=3) of the FHs would receive stock. Fifteen (93.8%) of the Mngrs/Sups reported that the quality of food delivered is of adequate quality and 93.6% (n=219) of the FHs stated that the quality is adequate. The Mngrs/Sups at the Mini stores and Hyper stores all agreed that the quality is adequate yet 98.1% (n=52) of the FHs at the Mini stores and 83.3% (n=40) of the FHs at the Hyper stores concurred with the statement. When receiving goods, 13 (81.2%) Mngrs/Sups and 94.9% (n=222) of the FHs stated that all food items are checked. At each establishment it was evident that more FHs stated that all food items were checked compared to the answers given by the Mngrs/Sups.

Table 4.27: Receiving practice of the Mngrs/Sups (n=16) and FHs (n=234)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FH % (n=234)
Are there planned delivery schedules?								
Yes	100.0 (n=4)	90.6 (n=48)	100.0 (n=4)	66.7 (n=32)	75.0 (n=6)	82.0 (n=109)	87.5 (n=14)	80.8 (n=189)
Who receives the deliveries?								
Owner	0.0	1.9 (n=1)	0.0	2.1 (n=1)	0.0	1.5 (n=2)	0.0	1.7 (n=4)
Manager/Supervisor	25.0 (n=3)	98.1 (n=52)	0.0	62.5 (n=30)	12.5 (n=1)	80.5 (n=107)	12.5 (n=2)	79.9 (n=187)
Food handler	0.0	0.0	0.0	4.2 (n=2)	0.0	0.8 (n=1)	0.0	1.3 (n=3)
Receiving clerk	75.0 (n=3)	0.0	100.0 (n=4)	31.3 (n=15)	87.5 (n=7)	17.3 (n=23)	87.5 (n=14)	17.1 (n=40)
Is the quality of the food delivered of adequate quality?								
Yes	100.0 (n=4)	98.1 (n=52)	100.0 (n=4)	83.3 (n=40)	87.5 (n=7)	95.5 (n=127)	93.8 (n=15)	93.6 (n=219)
Are all the food items checked?								
Yes	75.0 (n=3)	98.1 (n=52)	75.0 (n=3)	87.5 (n=42)	87.5 (n=7)	96.2 (n=128)	81.2 (n=13)	94.9 (n=222)

Upon receiving food items, the items delivered need to be quality checked before being issued to the food departments for food preparation. The results in Table 4.28 show that for the total group 14 (87.5%) of the Mngrs/Sups and 88.0% (n=206) of the FHs predominantly assess quality using the expiry date. Secondary visual checking is used for quality assessment as reported by 13 (81.3%) of the Mngrs/Sups and 73.5% (n=172) of the FHs. Grade and brand are the least used variables when assessing the quality of food. At the Mini stores three (75.0%) Mngrs/Sups and 94.3% (n=50) of the FHs reported they use expiry dates more to assess quality of food whereas none of the Mngrs/Sups use brand and only 37.7% (n=20) of the FHs use brand as a method of assessment. At the Hyper stores all the Mngrs/Sups use expiry dates and 83.3% (n=40) of the FHs use expiry dates but none of the Mngrs/Sups use grade as an assessment method whereas 47.9% (n=23) of the FHs use grade to assess quality. At the Super stores seven (87.5%) Mngrs/Sups and 87.2% (n=116) of the FHs use expiry dates whereas seven (87.5%) Mngrs/Sups and 78.9% (n=109) of the FHs assess food items visually for quality. The results show that a combination of methods is implemented for assessing quality of food items as each establishment uses multiple methods to establish the acceptable level of compliance.

Delivered items are majorly weighed and counted upon receipt as was reported by 15 (93.8%) Mngrs/Sups but for the FHs 44.0% (n=103) reported that weighing of items is more predominant.

Table 4.28: The assessment of quality upon receiving by Mngrs/Sups (n=16) and FHs (n=234)

Variables	Mini store Man/Sup (n=4) %	Mini store FH (n=53) %	Hyper store Man/Sup (n=4) %	Hyper store FH (n=48) %	Super store Man/Sup (n=8) %	Super store FH (n=133) %	Total group Man/Sup (n=16) %	Total group FH (n=234) %
How is the quality of the food assessed?								
Brand	0.0	37.7	25.0	25.0	37.5	35.3	25.0	33.8
Expiry date	75.0	94.3	100.0	83.3	87.5	87.2	87.5	88.0
Grade	50.0	56.6	0.0	47.9	37.5	45.9	31.3	48.7
Visually	75.0	75.5	75.0	56.3	87.5	78.9	81.3	73.5
How are the delivered food items checked upon receipt?								
Weighed	0.0	58.5	0.0	8.3	0.0	51.1	0.0	44.0
Counted	0.0	7.5	0.0	14.6	12.5	13.5	6.3	12.4
Weighed and counted	100.0	34.0	100.0	77.1	87.5	35.3	93.8	43.6

4.2.5.2 Receiving food safety knowledge

Table 4.29 shows that 15 (93.8%) Mngrs/Sups and 91.9% (n=215) of the FHs knew that when the temperature of food is out of spec it should be rejected. All the Mngrs/Sups at the Mini and Hyper stores knew this whereas seven (87.5%) at the Super stores would reject food with a temperature that is out of specification. When frozen food is delivered not properly frozen all the Mngrs/Sups and 94.4% (n=221) of the FHs knew that it should be rejected, and when the packaging is damaged and the product is exposed all of the Mngrs/Sups and 94.4% (n=221) of the FHs knew it should be rejected, and when food has signs

of mould and food spoilage all of the Mngrs/Sups and 95.3% (n=223) of the FHs knew it should be rejected. For the total group, all the Mngrs/Sups knew that when the food has packaging that is blown and when cans are dented the delivery must be rejected whereas 95.3% (n=223) and 94.9% (n=222) of the FHs agreed with the Mngrs/Sups. All the Mngrs/Sups knew that food that has passed its sell by date/ best before date/ use by date should be rejected but only 15 Mngrs/Sups knew that when food has no visible expiry date it should be rejected upon receiving. Relatively more of the FHs at the Mini stores knew that when food has the attributes listed below in Table 4.29 it should be rejected compared to the FHs at the Hyper and Super stores.

Table 4.29: Receiving knowledge with regard to when food should be rejected upon receiving as answered by the Mngrs/Sups (n=16) and FHs (n=234)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FH % (n=234)
Temperature out of spec								
YES	100.0 (n=4)	94.3 (n=50)	100.0 (n=4)	85.4 (n=41)	87.5 (n=7)	93.2 (n=124)	93.8 (n=15)	91.9 (n=215)
Frozen food not properly frozen								
YES	100.0 (n=4)	96.2 (n=51)	100.0 (n=4)	89.6 (n=43)	100.0 (n=8)	95.5 (n=127)	100.0 (n=16)	94.4 (n=221)
Packaging damaged and product exposed								
YES	100.0 (n=4)	96.2 (n=51)	100.0 (n=4)	87.5 (n=42)	100.0 (n=8)	96.2 (n=128)	100.0 (n=16)	94.4 (n=221)
Signs of mould and food spoilage								
YES	100.0 (n=4)	96.2 (n=51)	100.0(n=4)	91.7 (n=44)	100.0 (n=8)	96.2 (n=128)	100.0 (n=16)	95.3 (n=223)
Packaging blown								
YES	100.0 (n=4)	96.2 (n=51)	100.0 (n=4)	91.7 (n=44)	100.0 (n=8)	96.2 (n=128)	100.0 (n=16)	95.3 (n=223)
Cans dented								
YES	100.0 (n=4)	96.2 (n=51)	100.0 (n=4)	87.5 (n=42)	100.0 (n=8)	97.0 (n=129)	100.0 (n=16)	94.9 (n=222)
No visible expiry date on product								
YES	100.0 (n=4)	96.2 (n=51)	100.0 (n=4)	91.7 (n=44)	87.5 (n=7)	96.2 (n=128)	93.8 (n=15)	95.3 (n=223)
Product has passed its sell by date/ best before date/ use by date								
YES	100.0 (n=4)	96.2 (n=51)	100.0 (n=4)	91.7 (n=44)	100.0 (n=8)	94.0 (n=125)	100.0 (n=16)	94.0 (n=220)

4.2.6 Food holding, serving and wastage practice and knowledge

4.2.6.1 Food holding, serving and wastage practice

The majority of the Mngrs/Sups and the FHs stated that food is held for less than 15 minutes after cooking before serving. Eleven (68.8%) Mngrs/Sups and 82.5% (n=193) of the FHs reported that there was adequate space for serving and portioning food. More of the FHs stated that there was adequate space for portioning compared to the Mngrs/Sups. Fourteen (87.5%) Mngrs/Sups and 65.4% (n=153) of the FHs stated that there was adequate measuring equipment. For the total group, 13 (81.3%) Mngrs/Sups stated

that there were enough serving spoons and tongs whereas 60.7% (n=142) and 67.1% (n=157) of the FHs expressed the same information respectively. It was reported that left-over cooked food is thrown away by most of the Mngrs/Sups and FHs. Four (25.0%) Mngrs/Sups and 23.1% (n=54) of the FHs stated that left-over food is reheated and served the next day. Four (25.0%) Mngrs/Sups stated that the left-over food is reheated on the stove and the majority of the FHs stated that it was reheated in the microwave. All the Mngrs/Sups stated that there is a designated rubbish area for waste but only nine (56.3%) practice waste separation. Additionally, 99.1% (n=232) of the FHs reported that there was a designated rubbish area and 91.5% (n=214) of the FHs stated that waste separation is practiced, and this information was communicated by the majority of the FHs in all the establishments.

Table 4.30: Food holding, serving and wastage practice Mngrs/Sups (n=16) and FHs (n=234)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FH % (n=234)
The holding time of cooked food before serving								
Less than 15 minutes	75.0 (n=3)	50.9 (n=27)	100.0 (n=4)	75.0 (n=36)	75.0 (n=6)	70.7 (n=94)	81.3 (n=13)	67.1 (n=157)
15-30 minutes	0.0	11.3 (n=6)	0.0	25.0 (n=12)	0.0	0.8 (n=1)	0.0	6.0 (n=14)
30-45 minutes	0.0	1.9 (n=1)	0.0	0.0	0.0	0.0	0.0	0.4 (n=1)
More than 45 minutes	25.0 (n=1)	35.8 (n=19)	0.0	0.0	25.0 (n=2)	28.5 (n=38)	18.8 (n=3)	26.5 (n=62)
Is there adequate space for serving and portioning food?								
Yes	75.0 (n=3)	86.8 (n=46)	75.0 (n=3)	81.3 (n=39)	62.5 (n=5)	81.2 (n=108)	68.8 (n=11)	82.5 (n=193)
Are there adequate food serving utensils?								
Ladles	25.0 (n=1)	81.1 (n=43)	25.0 (n=1)	47.9 (n=23)	37.5 (n=3)	61.7 (n=82)	31.3 (n=5)	63.2 (n=148)
Measuring equipment	100.0 (n=4)	71.7 (n=38)	50.0 (n=2)	58.3 (n=28)	100.0 (n=8)	65.4 (n=87)	87.5 (n=14)	65.4 (n=153)
Serving spoons	100.0 (n=4)	60.4 (n=32)	50.0 (n=2)	62.5 (n=30)	87.5 (n=7)	60.2 (n=80)	81.3 (n=13)	60.7 (n=142)
Tongs	100.0 (n=4)	62.3 (n=33)	50.0 (n=2)	66.7 (n=32)	87.5 (n=7)	69.2 (n=92)	81.3 (n=13)	67.1 (n=157)
Serviettes	100.0 (n=4)	66.0 (n=35)	100.0 (n=4)	79.2 (n=38)	100.0 (n=8)	62.4 (n=83)	100.0 (n=8)	66.7 (n=156)
What happens to leftover cooked food?								
Thrown away	75.0 (n=3)	81.1 (n=43)	75.0 (n=3)	52.1 (n=25)	100.0 (n=8)	72.2 (n=96)	87.5 (n=14)	70.1 (n=164)
Donated to charity/school	0.0	0.0	0.0	0.0	0.0	5.3 (n=7)	0.0	0.0
Taken home	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0 (n=7)
Kept for the next day	0.0	11.3 (n=6)	25.0 (n=1)	39.6 (n=19)	0.0	3.0 (n=4)	6.3 (n=1)	12.4 (n=29)
FHs eat it	25.0 (n=3)	7.5 (n=4)	0.0	0.0	0.0	0.0	6.3 (n=1)	0.9 (n=2)
Marked down and sold the same day before closure	0.0	0.0	0.0	8.3 (n=4)	0.0	19.5 (n=26)	0.0	13.7 (n=32)
Is left over food reheated and served the next day?								
Yes	0.0	22.6 (n=12)	25.0 (n=1)	12.5 (n=6)	37.5 (n=3)	12.8 (n=17)	25.0 (n=4)	23.1 (n=54)
If left over food is reheated and served the next day, how is it reheated?								
On the stove	0.0	15.1 (n=8)	25.0 (n=1)	14.6 (n=7)	37.5 (n=3)	3.0 (n=4)	25.0 (n=4)	8.1 (n=19)
In the microwave	0.0	5.7 (n=3)	0.0	37.5 (n=18)	0.0	2.3 (n=3)	0.0	10.3 (n=24)
In the food warmer	0.0	79.2 (n=42)	0.0	2.1 (n=1)	0.0	6.0 (n=8)	0.0	5.6 (n=13)
Is there a designated rubbish area?								
Yes	100.0 (n=4)	96.2 (n=51)	100.0 (n=4)	100.0 (n=48)	100.0 (n=8)	100.0 (n=133)	100.0 (n=16)	99.1 (n=232)
Do you separate your waste?								
Yes	50.0 (n=2)	79.2 (n=42)	50.0 (n=2)	87.5 (n=42)	62.5 (n=5)	97.7 (n=130)	56.3 (n=9)	91.5 (n=214)

4.2.6.2 Food holding and serving safety knowledge

Table 4.31 Shows that all of the Mngrs/Sups and the majority of the FHs knew about the food holding and serving information except that two (12.5%) Mngrs/Sups answered that it is true that Bain Maries can be used to reheat food and even more FHs stated the same information. Eleven (68.8%) Mngrs/Sups and 29.1% (n=68) of the FHs knew that hot food that has not been served in four hours must be thrown away. Incredibly, two (12.5%) Mngrs/Sups and 6.4% (n=15) of the FHs stated that it is in fact true that old cooked food can be mixed with new cooked food the next day; this information was given by 1.9% (n=1) of the FHs at the Mini store, 2.1% (n=1) of the FHs at the Hyper store, four (25.0%) Mngrs/Sups and 9.8% (n=13) of the FHs at the Super stores. Although 91.0% (n=213) of the FHs stated that product core temperature must be monitored, 23.9% (n=56) of the FHs stated that temperature recording is not important; this was said by 30.2% (n=16) of the FHs at the Mini stores, 10.4% (n=5) of the FHs at the Hyper stores and 26.3% (n=35) of the FHs at the Super stores. All of the Mngrs/Sups, however, stated that temperature recordings are important

Table 4.31: Food holding and serving safety knowledge Mngrs/Sups (n=16) and FHs (n=234)

Variables	Mini store Mngrs/Sups % (n=4)	Mini store FH % (n=53)	Hyper store Mngrs/Sups % (n=4)	Hyper store FH % (n=48)	Super store Mngrs/Sups % (n=8)	Super store FH % (n=133)	Total group Mngrs/Sups % (n=16)	Total group FH % (n=234)
Each dish must be served with individual, clean utensils								
TRUE	100.0 (n=4)	96.2 (n=51)	100.0 (n=4)	93.8 (n=45)	100.0 (n=8)	96.2 (n=128)	100.0 (n=16)	95.7 (n=224)
There must be no evidence of expired stock								
TRUE	100.0 (n=4)	96.2 (n=51)	100.0 (n=4)	91.7 (n=44)	100.0 (n=8)	96.2 (n=128)	100.0 (n=16)	95.3 (n=223)
Food must be sold at the correct temperature								
TRUE	100.0 (n=4)	96.2 (n=51)	100.0 (n=4)	93.8 (n=45)	100.0 (n=8)	95.5 (n=127)	100.0 (n=16)	95.3 (n=223)
Food must be protected from contamination								
TRUE	100.0 (n=4)	98.1 (n=52)	100.0 (n=4)	95.8 (n=46)	100.0 (n=8)	94.7 (n=126)	100.0 (n=16)	95.7 (n=224)
Display units must be clean and be pest free								
TRUE	100.0 (n=4)	98.1 (n=52)	100.0 (n=4)	95.8 (n=46)	100.0 (n=8)	95.5 (n=127)	100.0 (n=16)	96.2 (n=225)
Product core temperature must be monitored								
TRUE	100.0 (n=4)	92.5 (n=49)	100.0 (n=4)	83.3 (n=40)	100.0 (n=8)	93.2 (n=124)	100.0 (n=16)	91.0 (n=213)
Temperature recordings are not important								
TRUE	0.0	30.2 (n=16)	0.0	10.4 (n=5)	0.0	26.3 (n=35)	0.0	23.9 (n=56)
Fridge and freezer temperatures must be monitored and recorded								
TRUE	100.0 (n=4)	94.3 (n=50)	100.0 (n=4)	93.8 (n=45)	100.0 (n=8)	92.5 (n=123)	100.0 (n=16)	93.2 (n=218)
Bacteria in food can multiply if the food is kept at incorrect temperature								
TRUE	100.0 (n=4)	94.3 (n=50)	100.0 (n=4)	91.7 (n=44)	100.0 (n=8)	94.0 (n=125)	100.0 (n=16)	93.6 (n=219)
Bain Maries can be used for reheating food								
TRUE	0.0	28.3 (n=15)	0.0	33.3 (n=16)	25.0 (n=4)	41.4 (n=55)	12.5 (n=2)	36.8 (n=86)
Hot food that has not been served in 4 hours must be thrown away								
TRUE	50.0 (n=2)	30.2 (n=16)	50.0 (n=2)	22.9 (n=11)	87.5 (n=14)	30.8 (n=41)	68.8 (n=11)	29.1 (n=68)
Old cooked food can be mixed with new cooked food the next day								
TRUE	0.0	1.9 (n=1)	0.0	2.1 (n=1)	25.0 (n=4)	9.8 (n=13)	12.5 (n=2)	6.4 (n=15)

4.3 Observational checklist results

This section will present the observational checklist results as observed by the researcher at each establishment. The results will report on positive answers ('yes') unless otherwise indicated, as the reporting of negative answers ('no') will only be indicated where necessary. The results outlined in this section are from seven Mini stores, five Hyper stores and eight Super stores which total 20 establishments. The total sample group will not be displayed as the goal is to demonstrate a clear comparison between the three groups of the establishments.

Table 4.32 illustrates that 28.6% (n=2) of the Mini stores had the store safe file in the working area whereas only 20.0% (n=1) of the Hyper stores and 37.5% (n=3) of the Super stores had the store safe file in the working area. The researcher observed that a large majority of the Super stores (87.5%; n=7) were in a good state of repair compared to the Mini stores (57.1%; n=4) and the Hyper stores (60.0%; n=3). Pleasingly, a good majority of the stores had evidence of monitoring procedures, policies and procedures, with the exception of the 57.1% (n=4) of the Mini stores which had evidence of policies and procedures. At the Mini stores it was observed that 42.9% (n=3) had a working thermometer available in the kitchen, 60.0% (n=3) of the Hyper stores and almost all the Super stores 87.5% (n=7) had a working thermometer. A large majority at the Mini stores (85.7%; n=6) had a service learning agreement whilst all the Hyper and Super stores had service learning agreements. The evidence of pests was observed in the establishments even though some of the establishments had electric pest control devices.

Table 4.32: Observational results on general and management

Observation	Mini store % (n=7)	Hyper store % (n=5)	Super store % (n=8)
The store safe file is available in the working area	28.6 (n=2)	20.0 (n=1)	37.5 (n=3)
The area is in a good state of repair and clean and good housekeeping is evident.	57.1 (n=4)	60.0 (n=3)	87.5 (n=7)
Evidence of monitoring procedures	71.4 (n=5)	80.0 (n=4)	87.5 (n=7)
Evidence of policies and procedures	57.1 (n=4)	80.0 (n=4)	100.0 (n=8)
There is a working thermometer in kitchen	42.9 (n=3)	60.0 (n=3)	87.5 (n=7)
There is a service learning agreement	85.7 (n=6)	100.0 (n=5)	100.0 (n=8)
Evidence of any pests	28.6 (n=2)	80.0 (n=4)	62.5 (n=5)
Evidence of electric pest control devices	57.1 (n=4)	60.0 (n=3)	50.0 (n=4)

Observation in the receiving areas revealed that only 14.3% (n=1) of the Mini stores write delivery dates onto products, none of the Hyper stores practiced this procedure and only 25.0% (n=2) of the Super stores write the dates onto the products. Twenty-eight point six percent (n=2) of the Mini stores have and use the delivery vehicle inspection sheet compared to 40.0% (n=2) at the Hyper stores and more than half at the Super stores (62.5%; (n=5). The supplier receiving check sheet records the food temperature and the

vehicle temperature of received food items but only 42.9% (n=3) of the Mini stores and 40.0% (n=2) of the Hyper stores have and use the check sheet, and 75.0% (n=6) of the Super stores make use of the document upon receiving food products. A large majority of the establishments have protected and covered receiving areas whereas not all of the receiving areas are in good order, as depicted in table 4.33 below.

Table 4.33: Observational results on the receiving procedure

Observation	Mini store % (n=7)	Hyper store % (n=5)	Super store % (n=8)
Delivery date written onto the product packaging	14.3 (n=1)	0.0	25.0 (n=2)
Availability and usage of the delivery vehicle inspection checklist (*checks for cleanliness and pests*)	28.6 (n=2)	40.0 (n=2)	62.5 (n=5)
Availability and usage of the supplier receiving check sheet (*records food temperature and the vehicle temperature*)	42.9 (n=3)	40.0 (n=2)	75.0 (n=6)
The receiving area protected/ covered	85.7 (n=6)	100.0 (n=5)	100.0 (n=8)
The receiving area in good housekeeping practice followed	14.3 (n=1)	60.0 (n=3)	50.0 (n=4)

The results presented in table 4.34 reveal that none of the products are stored according to the correct storage procedure at the Mini stores and the Hyper stores whereas 37.5% (n=3) of the Super stores store products correctly. At the Mini stores food is not stored together with chemicals, packaging or waste whereas 40.0% (n=2) of the Hyper stores store food with other items and a large majority of the Super stores store food separately from other items. Some of the establishments lock the storage rooms. The evidence of opened products being resealed and date marked was not observed at the Mini stores and Super stores and only 20.0% (n=1) of the Hyper stores followed this procedure. The evidence of expiry dates on food items was observed at 85.7% (n=6) of the Mini stores, 100.0% (n=5) of the Hyper stores and 62.5% (n=5) of the Super stores whereas food items that have been decanted did not have expiry dates on the containers at all of the Mini stores. A large majority of the Mini and Super stores did not have any expired food that was being used but 80.0% (n=4) of the Hyper stores had evidence of some expired food that was being used. Evidence of decayed fresh produce and stale food was observed at some of the establishments. Food items were stored directly on the floor in some of the establishments and none of the Hyper stores had storage areas that were hygienically clean and neatly arranged. All the establishments had food stored in cardboard boxes inside the refrigerator. Raw and cooked food was stored separately at only 42.9% (n=3) of the Mini stores, 20.0% (n=1) of the Hyper stores and 75.0% (n=6) of the Super stores. At all of the Hyper stores freezer burn was observed on the products in the frozen storage areas. At the Mini stores there was no evidence of storage area stock sheets. There was no evidence of pest infestation at all of the Hyper stores in the storage areas whereas at 60.0% (n=3) of the stores unpleasant odours were noticed.

Table 4.34: Observational results on the storage procedure

Observation	Mini store % (n=7)	Hyper store % (n=5)	Super store % (n=8)
All the products are stored according to the storage procedure	0.0	0.0	37.5 (n=3)
Food stored with chemicals, packaging or waste	100.0 (n=7) No	40.0 (n=2) No	87.5 (n=7) No
The storage areas are kept locked	14.3 (n=1)	20.0 (n=1)	62.5 (n=5)
Open products are resealed and date marked	0.0	20.0 (n=1)	0.0
Adequate space in the storage areas	42.9 (n=3)	40.0 (n=2)	75.0 (n=6)
Products clearly labelled	28.6 (n=2)	20.0 (n=1)	87.5 (n=7)
Evidence of expiry dates on food items	85.7 (n=6)	100.0 (n=5)	62.5 (n=5)
Products that have been transferred to storage containers have expiry dates recorded	0.0	20.0 (n=1)	25.0 (n=2)
Evidence of foods that have passed their expiry date used	85.7 (n=6) No	20.0 (n=1) No	87.5 (n=7) No
All containers are covered	14.3 (n=1)	0.0	37.5 (n=3)
Evidence of food that is old or stale	57.1 (n=4) No	20.0 (n=1) No	87.5 (n=7) No
Evidence of decay in the fresh produce	57.1 (n=4) No	40.0 (n=2) No	75.0 (n=6) No
Storage areas in good hygienic condition	28.6 (n=2)	0.0	37.5 (n=3)
Storage areas neatly arranged	28.6 (n=2)	0.0	37.5 (n=3)
Evidence of food stored directly on the floor	42.9 (n=3) No	40.0 (n=2) No	37.5 (n=3) No
Returned products labelled correctly	0.0	20.0 (n=1)	25.0 (n=2)
Evidence of food stored in cardboard boxes in the refrigerator	100.0 (n=7)	100.0 (n=5)	100.0 (n=8)
Raw and cooked foods stored separately in the fridge (*Raw food below cooked food*)	42.9 (n=3)	20.0 (n=1)	75.0 (n=6)
Evidence of freezer burn on the products in the frozen storage	28.6 (n=2) No	0.0 No	25.0 (n=2) No
Stock sheet	0.0	60.0 (n=3)	100.0 (n=8)
Old stock of food used before the new stock (FIFO)	57.1 (n=4)	40.0 (n=2)	87.5 (n=7)
Evidence of pest (rodents/insects) infestation	42.9 (n=3) No	100.0 (n=5) No	50.0 (n=4) No
Any unpleasant odours in the storage areas	42.9 (n=3) No	60.0 (n=3) No	37.5 (n=3) No

The fuel source used for food preparation as observed by the researcher was gas and electricity. Table 4.35 shows that some of the establishments do not have adequate space for food preparation and portioning; the results show that 57.1% (n=4) of the Mini stores do not have enough space for food preparation and portioning. The majority of the establishments did not have wooden equipment in the food preparation areas: (Mini stores 71.4% (n=5), Hyper stores 80.0% (n=4) and Super stores 87.5% (n=7)). At the Mini stores only 14.3% (n=1) of the stores had colour-coded chopping boards and knives, whereas

20.0% (n=1) of the Hyper stores and 62.5% (n=5) of the Super stores did. Utensils were placed in a sanitizer solution bucket in-between cooking at 71.4% (n=5) of the Mini stores, 80.0% (n=4) of the Hyper stores and 75.0% (n=6) of the Super stores. The checking of internal temperature during food preparation was only observed at 14.3% (n=1) of the Mini stores, 60.0% (n=3) of the Hyper stores and 75.0% (n=6) of the Super stores. The monitoring of frying oil was observed at 85.7% of the Mini stores, 40.0% (n=2) of the Hyper stores and 87.5% (n=7) of the Super stores. The correct defrosting procedure was observed at 28.6% (n=2) of the Mini stores, 20.0% (n=1) of the Hyper stores and 37.5% (n=3) of the Super stores. The clean as you go procedure was evident at 71.4% (n=5) of the Mini stores, 60.0% (n=3) of the Hyper stores and 87.5% (n=7) of the Super stores.

Table 4.35: Observational results for food preparation

Observation	Mini store % (n=7)	Hyper store % (n=5)	Super store % (n=8)
Adequate space for food preparation	57.1 (n=4)	40.0 (n=2)	62.5 (n=5)
Adequate space for portioning	57.1 (n=4)	60.0 (n=3)	62.5 (n=5)
Evidence of any wooden equipment	71.4 (n=5) No	80.0 (n=4) No	87.5 (n=7) No
Colour-coded chopping boards and knives used	14.3 (n=1)	20.0 (n=1)	62.5 (n=5)
Adequate food preparation utensils	42.9 (n=3)	60.0 (n=3)	87.5 (n=7)
Utensils placed in a sanitizer solution bucket in between use	71.4 (n=5)	80.0 (n=4)	75.0 (n=6)
Internal temperature of cooked food checked	14.3 (n=1)	60.0 (n=3)	75.0 (n=6)
Evidence of frying oil monitoring	85.7 (n=6)	40.0 (n=2)	87.5 (n=7)
The correct defrosting procedure practiced	28.6 (n=2)	20.0 (n=1)	37.5 (n=3)
Evidence of clean as you go procedure	71.4 (n=5)	60.0 (n=3)	87.5 (n=7)

Table 4.36 reveals the food-holding and serving practice. It was observed at only 14.3% (n=1) of the Mini stores and at 40.0% (n=2) of the Hyper stores that food was served immediately after cooking, but this was not observed at any of the Super stores. During food holding food is kept warm at only 14.3% (n=1) of the Mini stores, 20.0% (n=1) of the Hyper stores and 37.5% (n=3) of the Super stores. The checking of internal temperature was observed at 14.3% (n=1) of the Mini stores, 40.0% (n=2) of the Hyper stores and 50.0% (n=4) of the Super stores. When the temperature of food was checked and found to be below the required temperature, the food was taken away and reheated and this practice was observed at six establishments.

The researcher observed that food was kept warm by the use of Bain Maries and hot plates. One store kept the food in a pot over low heat and once it was needed for serving it was decanted into Bain Maries.

During serving it was observed that 71.4% (n=5) of the Mini stores, 60.0% (n=3) at the Hyper stores and all the Super stores have adequate food serving utensils whereas all the establishments had adequate eating utensils. Food stations were covered at all the Mini and Super stores with 80.0% (n=4) being covered

at the Hyper stores. The temperature of food is, however, only checked by 14.3% (n=1) of the Mini stores, 40.0% (n=2) of the Hyper stores and 75.0% (n=6) of the Super stores. None of the Mini stores labelled the food items correctly. The vast majority of the stores had serving areas that were in a good state of repair. All of the Hyper stores kept cooked and raw food items separately whereas only 57.1% (n=4) of the Mini stores and 87.5% (n=7) of the Super stores did so.

Table 4.36: Observational results for food holding and serving

Observation	Mini store % (n=7)	Hyper store % (n=5)	Super store % (n=8)
HOLDING			
Food served immediately after cooking	14.3 (n=1)	40.0 (n=2)	0.0
Food kept warm	14.3 (n=1)	20.0 (n=1)	37.5 (n=3)
Internal temperature of food checked	14.3 (n=1)	40.0 (n=2)	50.0 (n=4)
SERVING			
Adequate food serving utensils	71.4 (n=5)	60.0 (n=3)	100.0 (n=8)
Adequate eating utensils	100.0 (n=7)	100.0 (n=5)	100.0 (n=8)
The food stations are covered	100.0 (n=7)	80.0 (n=4)	100.0 (n=8)
The temperature of the food is checked before serving	14.3 (n=1)	40.0 (n=2)	75.0 (n=6)
The food is labelled correctly according to the company requirements (*refer to Store Safe file*)	0.0	60.0 (n=3)	62.5 (n=5)
Serving area in a good state of repair and good housekeeping practice followed	85.7 (n=6)	80.0 (n=4)	87.5 (n=7)
Cooked food kept separately from raw food items	57.1 (n=4)	100.0 (n=5)	87.5 (n=7)

Table 4.37 shows wastage procedure. All prepared food is served at 28.6% (n=2) of the Mini stores whereas at the Hyper stores and Super stores some prepared food is left over. The left-over food at 28.6% (n=2) of the Mini stores, at 20.0% (n=1) of the Hyper stores and 62.5% (n=5) of the Super stores is stored properly. Left-over food is reused or reworked at 28.6% (n=2) of the Mini stores, 40.0% (n=2) of the Hyper stores and 75.0% (n=6) of the Super stores. When the left-over food is reheated the internal temperature is not checked at the Mini stores; however at 20.0% (n=1) of the Hyper stores and 62.5% (n=5) of the Super stores the internal temperature of reheated food is checked. Left-over food is thrown away at all the Hyper stores and Super stores. There are designated rubbish bins for food wastage at 42.9% (n=3) of the Mini stores, 40.0% (n=2) of the Hyper stores and 87.5% (n=7) of the Super stores. Dustbins are covered and clean at 42.9% (n=3) of the Mini stores and there is no waste lying outside the dustbins at 57.1% (n=4) of the Mini stores, 80.0% (n=4) of the Hyper stores and 87.5% (n=7) of the Super stores. The evidence of regular waste removal was observed at 57.1% (n=4) of the Mini stores, 60.0% (n=3) of the Hyper stores and 75.0% (n=6) of the Super stores.

Table 4.37: Observational results for wastage

Observation	Mini store % (n=7)	Hyper store % (n=5)	Super store % (n=8)
All the prepared/ cooked food is served	28.6 (n=2)	0.0	0.0
If not, is left-over food stored properly?	28.6 (n=2)	20.0 (n=1)	62.5 (n=5)
Left-over food reused/reworked	28.6 (n=2)	40.0 (n=2)	75.0 (n=6)
If yes, is internal temperature of reheated food checked?	0.0	20.0 (n=1)	62.5 (n=5)
Is any food thrown away?	85.7 (n=6)	100.0 (n=5)	100.0 (n=8)
Designated rubbish bin for food	42.9 (n=3)	40.0 (n=2)	87.5 (n=7)
Dustbins covered	42.9 (n=3)	80.0 (n=4)	87.5 (n=7)
Dustbins clean	42.9 (n=3)	60.0 (n=3)	75.0 (n=6)
Waste lying outside the dustbins	57.1 (n=4) No	80.0 (n=4) No	87.5 (n=7) No
Evidence of waste removed regularly/ no dirt buildup	57.1 (n=4)	60.0 (n=3)	75.0 (n=6)

Table 4.38 illustrates the results in respect of hygiene. The vast majority of the Mini stores (85.7%; n=6) and 60.0% (n=3) of the Hyper stores had visibly clean kitchen utensils, and all the kitchen utensils were visibly clean at the Super stores. However, the kitchen equipment was visibly clean at only 42.9% (n=3) of the Mini stores, 60.0% (n=3) of the Hyper stores and 87.5% (n=7) of the Super stores. All the Mini stores and Super stores used the correct cleaning chemicals. Most of the Super stores (87.5%; n=7) had adequate cleaning supplies compared to the Mini stores of which only (42.9%; n=3) had adequate cleaning supplies and of the Hyper stores only (40.0%; n=2) had adequate cleaning supplies. Work areas were clean at only 42.9% (n=3) of the Mini stores whereas a better trend of frequent cleaning during preparation followed by sanitization was evident at the Super stores. Water was available for cleaning at the Mini stores and Super stores with 80.0% (n=4) of the Hyper stores having water available. Hand washing basins are available at only 42.9% (n=3) of the Mini stores, 80.0% (n=4) of the Hyper stores and 87.5% (n=7) of the Super stores. The hand washing basins were clean and accessible at only 28.6% (n=2) of the Mini stores and only 62.5% (n=5) of the Super stores whereas all the hand washing basins at the Hyper stores were clean and accessible. There was water available for hand washing at 57.1% (n=4) of the Mini stores and 80.0% (n=4) of the Hyper stores. There was water available for handwashing at all the Super stores. Antibacterial soap for hand washing was available at 57.1% (n=4) of the Mini stores, at all the Hyper stores and 87.5% (n=7) of the Super stores. Hand sanitizer was available at all the Mini stores and Super stores. Disposable towels and pedal bins were not available at the Hyper stores. FHs at 28.6% (n=2) of the Mini stores washed their hands regularly whereas at the Hyper stores hand washing was not done regularly. FHs' overalls and PPEs were clean at 57.1% (n=4) of the Mini stores, 80.0% (n=4) of the Hyper stores and 87.5 (n=7) of the Super stores. The researcher observed that very few FHs (who were serving) washed their hands before serving (Mini stores 14.3%; n=1, Hyper stores 40.0%; n=2, Super stores 12.5%; n=1).

Table 4.38: Observational results on hygiene

Observation	Mini store % (n=7)	Hyper store % (n=5)	Super store % (n=8)
Kitchens utensils clean	85.7 (n=6)	60.0 (n=3)	100.0 (n=8)
Kitchen equipment clean	42.9 (n=3)	60.0 (n=3)	87.5 (n=7)
Correct cleaning chemicals available	100.0 (n=7)	80.0 (n=4)	100.0 (n=8)
Adequate cleaning supplies e.g. cloths, scourers, etc.	42.9 (n=3)	40.0 (n=2)	87.5 (n=7)
Work areas clean	42.9 (n=3)	60.0 (n=3)	87.5 (n=7)
Area cleaned frequently during preparation	42.9 (n=3)	40.0 (n=2)	87.5 (n=7)
Area sanitized following cleaning	42.9 (n=3)	60.0 (n=3)	75.0 (n=6)
Water available for cleaning	100.0 (n=7)	80.0 (n=4)	100.0 (n=8)
Hand wash basin available	42.9 (n=3)	80.0 (n=4)	87.5 (n=7)
If yes, are they accessible and clean?	28.6 (n=2)	80.0 (n=4)	62.5 (n=5)
Water available for the FHs to wash their hands	57.1 (n=4)	80.0 (n=4)	100.0 (n=8)
Antibacterial soap available for hand washing	57.1 (n=4)	100.0 (n=5)	87.5 (n=7)
Hand sanitizer available for hand washing	100.0 (n=7)	80.0 (n=4)	100.0 (n=8)
Disposable paper towels and pedal bins	28.6 (n=2)	0.0	75.0 (n=6)
FHs wash their hands regularly	28.6 (n=2)	0.0	25.0 (n=2)
FHs overalls/ clothes (PPE) clean	57.1 (n=4)	80.0 (n=4)	87.5 (n=7)
FHs wearing the correct PPE for their function	28.6 (n=2)	40.0 (n=2)	62.5 (n=5)
FHs wash their hands before serving	14.3 (n=1)	40.0 (n=2)	12.5 (n=1)
FHs wearing gloves when they serve	14.3 (n=1)	40.0 (n=2)	37.5 (n=3)

4.4 Comparison table

This section shows the summary of the observed practices as compared to the company's standards so as to clearly show a comparison of the observed food hygiene, food safety and food handling practice standards against the standards set by the company. Observational findings report on the statistics of the establishments, which comply with the standards set by the organization unless otherwise stated.

Table 4.39: Comparison between the observed food hygiene, food safety and food handling practice standards against the standards set by the company.

Company's standard	Observational findings/ Compliance
General/Management	
The store safe file is to be available in every store and used as reference for alignment with the food safety requirements (ch 1: pg. 1)	Mini stores two (28.6%) stores had it, Hyper stores one (20.0%) store had it, Super stores three (37.5%) stores had it
1. **Every establishment must have monitoring procedures which are stipulated in the store safe file (ch 15: pg. 1-4)** 2. **There must be policies and procedures displayed in their specific areas (store safe DVD)**	1. Mini stores five (71.4%) stores Hyper stores four (80.0%) stores Super stores seven (87.5%) stores 2. Mini stores four (57.1%) stores Hyper stores four (80.0%) stores Super stores eight (100.0%) stores
A thermometer must be available and in working order (ch 7: pg. 1)	Mini stores three (42.9%) stores Hyper stores three (60.0%) stores Super stores seven (87.5%) stores
1. **There must be no evidence of pests i.e. the pests themselves or droppings (ch 12: pg. 1)** 2. **Insectocutors must be installed and positioned correctly and be in good working order. Bait stations must be located outside (ch 12: pg. 1)**	There was evidence of pests in: 1. Mini stores two (28.6%) stores Hyper stores four (80.0%) stores Super stores five (62.5%) stores 2. Mini stores four (57.1%) stores Hyper stores three (60.0%) stores Super stores four (50.0%) stores
Receiving procedure	
Receiving staff must check whether delivery vehicles are clean and free of pests and must record this information on the delivery vehicle inspection checklist (ch 7: pg. 1)	Mini stores two (28.6%) stores Hyper stores two (40.0%) stores Super stores five (62.5%) stores
Perishable and frozen products' temperature and vehicle temperatures must be taken and recorded on the supplier receiving checklist (ch 7: pg. 1)	Mini stores three (42.9%) stores Hyper stores two (40.0%) stores Super stores six (75.0%) store
Storage procedure	
Food must not be stored with chemicals (ch 8: pg. 1-5)	At Mini stores none of the stores stored food with chemicals At the Hyper stores three (60.0%) stores stored food with chemicals At the Super stores one (12.5%) store stored food with chemicals
Opened products must be decanted, resealed and date marked (ch 8: pg. 1)	None of the Mini stores and Super stores followed this standard. Only one (20.0%) Hyper store complied with the standard

Company's standard	Observational findings/ Compliance
1. **All food items must have expiry dates on them and the expiry date must be adhered to (ch 8: pg. 1)** 2. **Good quality ingredients must be used, no expired products must be used (ch 9: pg. 1)**	1. Mini stores six (85.7%) stores, all the Hyper stores and five (62.5%) of the Super stores had expiry dates on all products 2. Mini stores one (14.3%), Hyper stores four (60.0%) and Super store one (12.5%) store had expired product which was being used
1. **Food must not be stored directly on the floor (ch 8: pg. 1)** 2. **Food should not be stored in cardboard boxes in the refrigerator, it should be stored in plastic sealable containers as cardboard absorbs moisture and harbours bacteria (ch 8: pg. 3)**	1. Mini stores three (42.9%) stores, Hyper stores two (40.0%) and Super stores three (37.5%) complied with the 'no food on the floor' standard 2. All the establishments had food items stored in cardboard boxes in the refrigerator. None of them complied with the standard.
Clearly separate raw and cooked foods in the refrigerator. Never store raw food above cooked food (ch 8: pg. 3)	Mini stores three (42.9%) stores, Hyper stores one (20.0%) store and Super stores six (75.0%) stores complied with the standard.
FIFO principle must be followed. New stock must be stored behind the old stock and clearly marked. Older date used first before newer date (ch 8: pg. 2)	Mini stores four (57.1%) stores, Hyper stores two (40.0%) stores and Super stores seven (87.5%) stores complied with the standard.
Protect food items from contamination such as pests (ch 8: pg. 1)	There were no pests/rodents in three (42.9%) Mini stores and four (50.0%) Superstores. No pests/rodents seen at any of the Hyper stores.
Food preparation	
No wooden equipment is to be used (ch 9: pg. 1)	Five (71.4%) Mini stores, four (80.0%) Hyper stores and seven (87.5%) Super stores complied with the 'no wood' standard.
The correct colour-coded chopping boards and knives must be used (ch 9: pg. 1,13-14)	One (14.3%) Mini store, one (20.0%) Hyper store and five (62.5%) Super stores used the correct colour-coded chopping boards and knives.
Utensils must be placed in a bucket containing sanitizer solution in between use (ch 9: pg. 1)	Five (71.4%) Mini stores, four (80.0%) Hyper stores and six (75.0%) Super stores complied with the standard.
Food preparation	
1. **Use a probe thermometer to check that the centre of the cooked food is 80 degrees Celsius (ch 9: pg. 7)** 2. **Oil should be changed regularly, oil should be tested using an oil test strip and results compared to the oil chart (Store safe DVD)**	1. One (14.3%) Mini store, three (60.0%) Hyper stores and six (75.0%) Super stores complied. 2. Six (85.7%) Mini stores, two (40.0%) Hyper stores and seven (87.5%) Super stores complied with the standard.
Always defrost the food in a refrigerator. Allow enough time to thoroughly defrost. Cover all food that is to be defrosted, defrost on the bottom shelf of the refrigerator (ch 9: pg. 6)	Two (28.6%) Mini stores, one (20.0%) Hyper store and three (37.5%) Super stores followed the correct defrosting method.

Company's standards	Observational findings/ Compliance
Work stations must constantly be clean during food preparation to ensure a hygienic working environment which prevents the spread of bacteria i.e. 'clean as you go' (ch 9: pg. 1)	Five (71.4%) Mini stores, three (60.0%) Hyper stores and seven (87.5%) Super stores showed evidence of 'clean as you go' compliance.
Food holding and serving	
As soon as food is cooked it must go to the hot display and it must be kept at above 65 degrees Celsius (ch 9: pg. 9)	One (14.3%) Mini store, two (40.0%) Hyper stores and four (50.0%) Super stores complied.
Each dish must be served with individual clean utensils (ch 10: pg. 1)	Five (71.4%) Mini stores and three (60.0%) Hyper stores and all of the Super stores complied.
Food must be stored and served at the correct temperature (ch 10: pg. 1)	One (14.3%) Mini store, two (40.0%) Hyper stores and six (75.0%) Super stores checked the temperature of food before serving.
The retail stores labelling standard states that all food products must stipulate all ingredients and allergens. The details below must be clearly printed on products (ch 6: pg. 1) - **product name** - **the manufacturer's name and address** - **ingredient list** - **instructions for use** - **the weight or volume of the item** - **date code: expiry date and sell by date**	None of the Mini stores labelled the food products correctly. Hyper stores - three (60.0%) stores labelled food products correctly Super stores - five (62.5%) stores labelled food products correctly
Wastage	
At the end of the day all the left-over cooked food must be discarded (ch 10: pg. 3); 1. **At two (28.6%) of the Mini stores there is no left-over cooked food. The balance of the establishments have left-over food** 2. **The left-over food is reused or reworked at two (28.6%) Mini stores, two (40.0%) Hyper stores and six (75.0%) Super stores.** **There was evidence of food being thrown away but not all food is thrown away; food that could be reworked and reused is so treated. The type of food that was thrown away was off-cuts, decayed foods that could not be salvaged and expired stock.**	
Cleaning and Hygiene	
Use food grade cleaning chemicals only, no household chemicals to be used (ch 11: pg. 1)	All of the Mini stores and Super stores used the correct cleaning chemicals and four (80.0%) Hyper stores complied.
Each person must use their own cloth, each department must have their own cleaning equipment to avoid cross-contamination (ch 1: pg. 9&11)	Three (42.9) Mini stores, two (40.0%) Hyper stores and seven (87.5%) Super stores complied.
'Clean as you go' principle must be evident (ch 11: pg. 1)	Three (42.9) Mini stores, two (40.0%) Hyper stores and seven (87.5%) Super stores complied.

Company's standards	Observational findings/ Compliance
Sanitizers must be used regularly to clean preparation areas (ch 11: pg. 1)	Three (42.9) Mini stores, three (60.0%) Hyper stores and six (75.0%) Super stores had evidence of compliance.
Each preparation area must be fitted with a hand washing station (ch 3: pg. 4)	Three (42.9) Mini stores, four (80.0%) Hyper stores and seven (87.5%) Super stores complied
The hand washing station must be accessible to staff (ch 3: pg. 4)	Two (28.6%) Mini stores, four (80.0%) Hyper stores and five (62.5%) Super stores complied.
Hot and cold water must be provided at the hand washing station (ch 3: pg. 4)	Four (57.1%) Mini stores, four (80.0%) Hyper stores and all the Super stores had hot and cold water for hand washing
The hand washing stations must be fitted with: 1. **A soap dispenser** 2. **A hand sanitizer**	1. Four (57.1%) Mini stores, seven (87.5%) Super stores and all the Super stores had soap dispensers. 2. All the Mini stores and Super stores and four (80.0%) Hyper stores had hand sanitizer.

Other observations

- One Mini store located in the CBD area was in a bad state of repair. The storage areas had a bad odour because the actual building was near a drainage system which seemed to be blocked and gave off a bad odour, the drain water was running underneath the passage way to the walk-in refrigerator. The store was too small and the storage area worked as a refrigerator and freezer. Items in these storage areas were either expired, decaying or unknown (as the product description was not visible).
- Another Mini store located in a residential area was under new management and the fresh produce was delivered from another chain store which belonged to the new owners. The fresh produce was back-dated in order to extend the shelf life (date code stickers for expiry date were prolonged, as in labels were stuck over each other with different dates). The bread was moulded with visible white spots (evidence of mould growth), some of the bread rolls were expired but still on the shelf for sale. I sorted through a number of expired stock items in the display fridges and bread shelves.
- Three of the Supermarkets located in townships repacked loose chicken pieces (of another brand) into the retailer's house brand chicken packs, and this frozen chicken had evidence of freezer burn and was repackaged for sale.
- One of the Supermarkets had a section for returns (container outside the receiving area) and in this container there were damaged products like rice, maize and sugar. These materials were being repackaged into generic packaging material and were being sold at discounted prices e.g. a 10kg rice pack torn or eaten by rats: these are taken and repackaged into generic rice packs and sold at a cheaper price.
- Pests like flies were common in most of the establishments that had pest issues, but rats were evident in the receiving area of one of the stores. In this store the receiving area had an infestation of huge rats which the staff had become accustomed to. This store also had a return area for products that had been eaten by these rats which they communicated they send to charities or throw away.
- One of the Hyper stores had monkeys in the receiving area that moved at will but the storage areas were locked, the waste bins were overflowing which is what attracts the monkeys plus they fed the monkeys which encouraged the monkeys to stay.
- I attempted to wash my hands at the establishments that had designated hand washing stations. Very few of them had all the items that are needed for effective hand washing even though the dispensers for the items were installed i.e. paper towel was finished and not replaced or sanitizer dispenser empty and never refilled.

- Some of the FHs didn't have uniforms or uniforms had missing items e.g. FHs were not wearing the correct shoes and/ or the same t-shirts. Some of the casuals were awaiting uniforms but others just didn't have enough uniforms to wear everyday hence some items of the uniform were missing.

4.5 Discussion of Results

4.5.1 Demographic characteristics of respondents

The study done by Martins, Hogg and Otero (2012: 188) showed that in Portugal women Food Handlers predominantly work in the catering industry and likewise in 2005 the Institute of Quality Training (IQF) shared a report that stated that 85.0% of workers in the food service industry were female which is also evident in the current study as most of the Mngrs/Sups and FHs in all of the establishments were female (75.0%; n=12 and 74.8%; n=175 respectively) with the majority being aged 30 years and older. All the Mngrs/Sups had some form of formal education compared to some of the FHs as 1.3% (n=3) of the FHs had no formal education. The vast majority (62.5% and 74.8%) of the Mngrs/Sups and the FHs had grade 12 as the highest level of education with the minority obtaining higher education qualifications in the form of a diploma or university degree; for the Mngrs/Sups, one had a diploma (Mini store) and one had a university degree (Super store) whereas there were more FHs with a higher education qualification compared to Mngrs/Sups as 4.7% of the FHs had obtained a diploma (Mini, Hyper and Super stores) and 2.1% had achieved a degree (Super store). It was noticeable that there were five FHs with a diploma at the Hyper stores who were educationally more qualified than the Mngrs/Sups (where the highest level of education was grade 12) at that particular establishment, and this data is similar to the results obtained from the study done on Food Handlers at the University of Kebangsaan in Malaysia by Sani *et al. (*2014: 211) where the majority (63.4%) of the respondents had secondary education as the highest level of education, with the minority (11.6%) obtaining a higher education qualification and 3.6% with no formal education. Most (75.0% and 52.1%) of the Mngrs/Sups and FHs had been with the company for three years and more whereas only two Mngrs/Sups and 20.1% of the FHs had been employed for one year or less while the vast majority (93.8%) of the Mngrs/Sups and 62.8% FHs had previous work experience.

4.5.2 Training

Upon appointment, as part of the employee induction programme the majority (87.5%) of the Mngrs/Sups underwent food safety specific training whereas only 77.8% of the FHs received the same training as part of the induction programme but 38.1% were never trained as part of the induction programme and were never really inducted upon appointment which was also evident in a study done by Seaman *et al.* (2010: 1038) in the South-West London region where 80.0% of the Food Handlers were untrained. It was evident in all of the establishments that food safety specific training was mostly given to the Mngrs/Sups rather than

to the FHs; for example, in the Hyper stores all of the Mngrs/Sups were trained as part of the induction but only 60.4% of the FHs were given food safety specific training. On the other hand, in Turkey, Baş, Şafak and Kıvanç (2006: 319) report that the majority of the Food Handlers in their study had never received food safety training. The organization in this study stipulates that all of the establishments must have and make use of the store safe file and DVD material when training employees on food safety as part of the induction and scheduled training. The organization makes the training material available to all establishments and recommends that the guidelines be used in order to have a food safety compliant establishment; however in other studies lack of training material was reported, for instance in the study done by Seaman et al (2010: 1038) where 30% of the managers reported a lack of training material available for effective training. Although the organization functions according to voluntary trading they still insist that owners of the establishments hold the food retail company's reputation in the highest regard by abiding by the food safety laws and regulations which are documented accurately in the store safe file and DVD, but only 43.7% of the Mngrs/Sups and only 13.7% of FHs were trained with the combination of the store safe file and the DVD. It was also evident that some of the establishments only made use of the store safe file and not the DVD, with the balance of the respondents receiving peer training without training material. It was noticeable that no food safety training material was used for training for more than half of the FHs at the Mini and Hyper stores, which was comparable to the study by Sani *et al.* (2010: 212) where 37.5% of the respondents were never formally trained on the food safety systems but knew about the HACCP system through word of mouth in the workplace and Chukuezi (2010: 55) reported that 47.6% of the respondents in his study in Nigeria on food vendors acquired food safety knowledge through observation and peer training.

Sani *et al.* (2010: 212) state that food safety knowledge is improved by training and in an attempt to increase food safety understanding and behaviour training must be utilized as a vital instrument to improve food safety practice amongst Food Handlers. The store safe file has 12 modules in it and the DVD serves as a more practical approach to the training material notes. All of the Mngrs/Sups have been trained on three of the modules (food storage, food preparation and merchandising) but only some of the FHs have been trained on the same modules; however, greater emphasis has been placed on personal hygiene training for the FHs (91.9%), lesser attention has been given to temperature recording and allergens (66.7% and 52.6% respectively), and only 26.5% of the FHs have been trained on documentation and record keeping. It was, however, noted that the responsibility for documentation and record keeping together with temperature monitoring and receiving is given to the Mngrs/Sups and the majority of the Mngrs/Sups were trained but not all of them. Consequently only 62.5% of the Mngrs/Sups and 58.5% of FHs were trained on pest control which explains the evidence of rodents and pests witnessed at some of the establishments as not all of the establishments focused on that theme. It is evident that even within the individual establishments training has been directed primarily at the Mngrs/Sups rather than the Food Handlers which was also common in a study done by Baş *et al*. (2006: 320-321) in Turkey where 63.0% of the managers had undergone training compared to the 55.0% of the FHs. A few FHs reported that training has never been

provided but none of the Mngrs/Sups reported this; however the last training that was provided for the respondents who had been trained was in 2013 for 43.8% of the Mngrs/Sups and 27.8% of the FHs who stated that training is ongoing. Furthermore, while the frequency of training was on an annual basis for the 43.8% Mngrs/Sups, further training needs were reported by all of the Mngrs/Sups at the Mini and Super stores and 75.0% at the Hyper stores.

4.5.3 Food safety knowledge

Personal hygiene knowledge answers given by the FHs with regard to whether they are permitted to handle food when they have health problems seemed to be contrary to the unanimous information given by the Mngrs/Sups, with all of the Mngrs/Sups stating that handling food when suffering from any health problem is not allowed and although the vast majority of FHs knew that food should not be handled when they were suffering from any type of health problem, 7.3% (n=17) stated that when they were suffering from the flu, and coughing and sneezing, the handling of food was permitted as it was assumed that it posed less risk to food safety. Likewise Annor and Baiden (2011: 833-834) showed that in a study done in Ghana 11.1% FHs would handle food when sick and specifically, another 40.0% would handle food when suffering from diarrhoea, which is also evident in the current study as six point four percent (n=15) of the FHs identified with this.

For effective handwashing the following fundamental items should be available at a designated wash bay at every establishment: antibacterial hand soap, hot and cold water, disposable paper towels, pedal bin and an alcohol based hand sanitizer. Only three out of the five items were stated correctly by the Mngrs/Sups and disappointingly the vast majority of FHs identified only two out of the five correctly. The items that were stated correctly by both the Mngrs/Sups and the FHs were, however, not available at all of the establishments. On a positive note all the Mngrs/Sups at the Super stores selected all the correct answers and the essential items needed for effective hand washing were present at the hand washing stations upon observation but lamentably only 30.8% (n=44) of the FHs at the Super stores considered an alcohol based sanitizer as an essential item for handwashing, which indicates that 69.2% of FHs could be excluding that step in the hand washing process. All of the Mngrs/Sups knew that hands should be washed for all the variables given in figure 4.18 besides the 6.2% who did not know that hands needed to be washed after cleaning duties but not all the FHs had the same knowledge as the Mngrs/Sups even though the vast majority answered correctly. It is evident that a wider sharing of knowledge on when to wash hands resides among the Mngrs/Sups at the Mini and Super stores as well as among the FHs at the Mini stores. Nevertheless the vast majority (91.9%) of the FHs were trained more on personal hygiene than any other module but the answers about which items should be present for effective hand washing do not correlate with this, even though increased knowledge was demonstrated in other sections that included this theme. Personal hygiene alone will not produce food safety-abiding FHs and compliant establishments according to Sani *et al.* (2014: 215).

With regard to cleaning, where the respondents were expected to answer questions by stating whether they were 'true' or 'false' some of the questions were asked contrariwise and other questions were asked twice in different ways. Almost all (n=15; 93.8%) of the Mngrs/Sups correctly stated that wiping cloths spread microorganisms but not all of the Mngrs/Sups knew that wiping cloths should be placed in a sanitizer bucket in-between use, and this indicates a lack of knowledge with regard to food safety hazards preventative measures. Although all of the Mngrs/Sups agreed that disposable cloths should be used for cleaning, the use of disposable clothes for cleaning was very scarce at the establishments, and the majority used them for front-of-house only. A study done in Malaysia on food handlers by Sani *et al.* (2014: 213-214) showed that 97.4% of the respondents used a new clean cloth to clean every time but in the current study the establishments that had disposable clothes were reusing them which defeated the purpose of them being disposable. When the FHs were asked about cleaning chemicals six point eight percent (n=16) incorrectly stated that any cleaning chemical can be used in the kitchen for cleaning and another 12.0% (n=28) incorrectly reported that sanitizing is not important when cleaning with hot water whereas the Mngrs/Sups all knew the correct answer. This result shows that some of the FHs did not know that not all cleaning chemicals are food grade and that cleaning removes dirt only but sanitizing surfaces kills bacteria which cleaning misses. More than half of the FHs incorrectly stated that it was acceptable to leave mops and brushes in a bucket of dirty water in-between use which was an unacceptable practice prevalent in most establishments. Consistently there was a good understanding of the clean-as-you-go principle. The kitchens looked cleaner at the end of food preparation and at the end of shifts than at any other time in the day. A higher percentage of FHs from the Hyper and Super stores were trained on cleaning practice compared to the Mini stores, which correlates with the observation done by the researcher as the Mini stores were generally more unhygienic than the other stores but space constraints could be a contributing factor to the rather unhygienic state of all of the Mini stores.

A noteworthy percentage (37.5% of the Mngrs/Sups; 10.7% of the FHs) of respondents fared badly as they stated that wearing of jewellery was permitted when handling food which clearly shows that there is a lack of knowledge with regard to jewellery causing bacterial contamination and jewellery being a physical hazard to food (Jianu and Chris 2012: 155). Sani *et al.* (2014: 214) in a study done in Malaysia which focused on the knowledge, attitudes and practices of food handlers on food safety in food service operations, revealed that poor hygiene was demonstrated as only 46.6% FHs did not wear jewellery while handling food.

Colour-coded food preparation equipment contributes to safer food preparation practice and assists in eliminating cross-contamination (Jianu *et al.* 2012: 153), and a high percentage of the FHs and Mngrs/Sups in the current study in all the stores understood that this was an important aspect of food safety. However, on observation only a few of the establishments had colour-coded knives and chopping boards in place even though the organization's standards state that separate colour-coded knives and chopping boards must be used in order to prevent cross-contamination (Store Safe file Ch 9: pg. 2).

Gordon-Davis (2011: 33) and Store Safe file (Ch 9: pg. 2) recommend that in order to break the chain of food poisoning it is important to protect food from cross-contamination. This can be done by washing fruit and vegetables before use, separating utensils used for raw and cooked food, keeping packaging clean and by washing hands and sanitizing after handling high-risk foods like eggs and raw meat. The majority of Mngrs/Sups and FHs demonstrated good knowledge with regard to protecting food from contamination. In addition it was noted that when the respondents were asked whether they thought thawing frozen food on the counter at room temperature was acceptable, unexpectedly four (25.0%) Mngrs/Sups and 47.0% (n=110) of the FHs incorrectly stated that the statement was 'true' demonstrating that almost half of the FHs did not know that it is important to prevent bacteria present in food from multiplying in order to eliminate food poisoning. The practice of thawing/defrosting food at room temperature was, however, observed at most of the establishments but mostly at the Hyper stores. Annor *et al.* (2011: 833) shares that in their study on FHs in Ghana it was found that the majority (61.9%) of the respondents defrosted meat at room temperature. The author further states that this practice is a risk to food safety as it encourages bacterial growth which results in food spoilage therefore defrosting/thawing of food should be done in the refrigerator. The concept of adequately cooking food and also thoroughly reheating cooked food that has cooled down is implemented in order to destroy bacteria that is present in food (Store safe file Ch 9: pg. 9 & 10); this was, however, not common knowledge to all of the respondents as 25.0% of the Mngrs/Sups and 29.9% of the FHs said cooked food does not need to be thoroughly reheated. Satisfactory knowledge was demonstrated by the respondents on this theme and training results correlated with demonstrated knowledge. Food preparation is the FHs' responsibility therefore greater knowledge should be demonstrated by the all the FHs with regard to safe food handling in order to prevent illness, therefore more FHs (currently 71.8%) should be trained on the correct methods of defrosting food because food safety should be upheld throughout the food chain process.

Fifteen (93.8%) Mngrs/Sups and 93.2% (n=218) of the FHs agreed that food that has reached its expiry date should be thrown away but the researcher found during the observations that some of the establishments had expired stock that was being used in food preparation and this was mostly evident at the Hyper stores (80.0%; n=4); however, at the Mini stores the expired stock was still on the shelves for sale. Annor *et al.* (2011: 833) explains that food is deemed unfit for use when it starts giving off an unpleasant odour and becomes mouldy, and it could be assumed that this was the reason expired food was utilized at the establishments as it was not giving off an unpleasant smell or visually mouldy. One Mngr/Sup and 12.0% (n=28) of the FHs falsely believed that food can be stored on the floor and this practice of storing food on the floor was observed in the freezers and refrigerators at the establishments where, predominately, loose chicken pieces were scattered on the floor (damages that were later going to be repackaged and sold at a reduced price, as communicated by the respondents). A small minority of the respondents incorrectly stated that raw and cooked food can be stored together and 24.4% (n=57) of the FHs stated that raw food can be stored above cooked food, and the contamination of cooked food was observed at some establishments, specifically at five Mini stores, four Hyper stores and two Super stores,

and this correlates with a study done by Annor *et al.* (2011: 833) where the majority of the respondents stated that raw and cooked food should be separated in storage as the respondents knew that the vegetable salad should be stored above the dripping meat.

With regard to receiving food from suppliers almost all of the Mngrs/Sups knew that any sign of abnormality permits rejection with the exception of one Mngr/Sup from the Super store who did not know that when a food item comes in with a temperature out of specification it should be rejected and also when there is no expiry date on an item it should be rejected, and this contradicted information gathered earlier as all of the Mngrs/Sups had stated that they knew that expiry dates were important. The vast majority of the FHs demonstrated a good understanding of food receiving and as stated previously receiving is the responsibility of the Mngrs/Sups or a designated receiving clerk, hence not all of the FHs knew that food items should be rejected when deficient in some way. For example, six percent of the FHs did not know that food should be rejected when it has passed its expiry date/sell by date or use by date and five point one percent did not know that when cans are dented they should be rejected. When interviewed the receiving clerks reported that sometimes rejection is influenced by operational needs as, for example, if the food item delivered is urgently required for production the required level of noncompliance is ignored even though the knowledge of food safety receiving standards is known.

Food preparation and temperature monitoring practices potentially impact on food safety substantially and in the current study all of the Mngrs/Sups were trained on food preparation practice and although not all the Mngrs/Sups were trained on temperature monitoring they showed 100% understanding for temperature monitoring. To validate knowledge on temperature monitoring the respondents were first asked whether it was important to monitor product core temperature and were later asked whether temperature recordings were important. All of the Mngrs/Sups answered both questions correctly thus displaying knowledge on the subject matter, whereas in the study done in Portugal by Gomes-Neves, Araújo, Ramos and Cardoso (2007) only 35.4% of the food handlers answered temperature control questions correctly. Although the responsibility for temperature monitoring resides with the kitchen leaders, the FHs have the sole responsibility to ensure hot food is kept hot and cold food is kept cold thus ensuring that food is outside of the danger zone of between five degrees Celsius and 65 degrees Celsius and in order to do that knowledge on temperature control and monitoring is vital (Store safe file Ch 10). Regulation 918 requires that refrigerators and freezers be installed with thermometers in order to indicate accurate temperatures for storing of food together with penetration probe thermometers to facilitate temperature monitoring and control which are mandatory in every food department. Knowledge on temperature control will enable good practice which was lacking in some of the FHs as there was a lack of knowledge with regard to the subject matter where incorrect answers were given. Penetration probe thermometers were scarce at most of the establishments but refrigerator and freezer temperatures were relatively within specification. Martins *et al.* (2012: 188) mentions that temperature control controls microbial growth and that improper temperature control at any stage of the food chain encourages microbial growth to disease causing levels. In a study by

Martins *et al.* (2012: 188) a lack of knowledge on temperature control was also predominant amongst food handlers with only 13.9% being knowledgeable about the danger zone.

4.5.4 Food safety practice and observation

4.5.4.1 Personal hygiene

Self-reported personal hygiene practices revealed that all of the Mngrs/Sups made sure that all the FHs were wearing the correct PPE which was contrary to observation as some of the FHs were not in full uniform and the FHs reported a lack of proper uniforms provided by the establishments and insufficient quantities of uniforms being provided. In addition, 93.8% of the Mngrs/Sups regularly supervise FHs to ensure that hygienic practices are carried out. The majority (96.6%) of the FHs stated that frequent hand washing during food preparation is worth the extra time which was communicated by all of the FHs at the Hyper store and 98.1% and 94.7% at the Mini stores and Super stores respectively. Furthermore, all of the Mngrs/Sups and most of the FHs at the Mini and Hyper stores reported that there are designated hand washing facilities available for hand washing but only 75.0% of the same Mngrs/Sups and even fewer FHs consider the facilities adequate. Contrary to the Mngrs'/Sups' account the observation report shows that not all of the Mini stores and Hyper stores had designated hand washing stations and in addition most of the hand washing basins were not accessible and clean although notably, 80.0% (n=4) of the Hyper stores had designated handwashing facilities which were accessible and clean. The lack of hand washing facilities implies that FHs are not regularly practising effective handwashing and even at the establishments that have facilities, the cleanliness of those facilities is questionable. According to Seaman (2010: 382) the application of knowledge will be limited when there is lack of resources as the FHs will not be encouraged to carry out good hygienic practices if the facilities are not available.

4.5.4.2 Cleaning

Eighty-one point three percent of the Mngrs/Sups stated that there was an adequate number of cleaning tools and the FHs concurred with 84.2% stating the same for the total group; however, only 42.9% of the FHs at the Mini stores, 40.0% at the Hyper stores and 87.5% at the Super stores had adequate cleaning supplies as observed by the researcher. Most of the Mngrs/Sups and the FHs stated that kitchen utensils were washed during preparation which was evident upon observation as at most of the establishments the kitchen utensils were found to be clean and the vast majority used the correct cleaning chemicals to administer cleaning (100.0% at the Mini stores and Super stores and 80.0% at the Hyper stores). More than half of the FHs stated that when washing cooking utensils a combination of hot water, detergent and sanitizer is used but only 18.8% of the Mngrs/Sups stated the same practice was observed whereas 62.5%

reported that hot water and detergent is sufficient for effective cleaning. On average the Super stores were found to be the cleanest of the three types of establishment.

According to the store safe file (ch 11: pg. 9) each department is assigned a specific colour of cleaning equipment so as to eliminate cross-contamination. Blue is for the Bakery, Red is for the Butchery, Green is for Produce, White is for the Deli and Hot food, Yellow is for front of house and Brown is for fish/coffee shop. This study was focused on the Deli department of the establishments and the expected cleaning equipment colour in use should be white only, and encouragingly, for the total group 68.8% of the Mngrs/Sups and 45.7% of the FHs used the correct colour cleaning equipment. It was, however, observed that 57.1% of the Mini stores, 60.0% of the Hyper stores and 12.5% of the Super stores lacked cleaning supplies and at these establishments mixed colour cleaning equipment were found as interdepartmental lending was the norm. When analyzing the results it is obvious that the majority of the Mngrs/Sups are under the impression that one specific colour cleaning equipment is being used per department whereas the FHs use a variety of colours in the same department as, for example, at the Hyper stores 75.0% of the Mngrs/Sups stated white equipment was being used whereas the FHs gave a variety of colours in their responses. Medeiros *et al*. (2011: 42) and several other authors state that Management must be willing to financially invest in food safety because adequate equipment must be provided in order for FHs to carry out good practice.

4.5.4.3 Food storage

The vast majority of the Mngrs/Sups (93.8%) and the FHs (89.3%) indicated that there is a regular cleaning schedule for the storage areas and that the cleaning areas are cleaned once a week according to the majority of the Mngrs/Sups (93.8%) whereas 44.4% of the FHs stated that the storage areas are mostly cleaned less than once a week whereas observation revealed that little or no cleaning was done at most of the establishments as good hygienic conditions and neatly arranged storage areas were only evident at 28.6% of the Mini stores and 37.5% of the Super stores whereas the Mngrs/Sups of these establishments had confidently stated cleaning is done regularly on a weekly basis and as for the Hyper stores none of the storage areas were found to be satisfactory. Most of the respondents stated that stock rotation was in place but new food was found being used before old food showing that the first in first out (FIFO) practice was not being adhered to. Raw and cooked food must be stored separately in the refrigerator but this was only evident at 42.9% of the Mini stores, 20.0% of the Hyper stores and 75.0% of the Super stores even though the majority (93.8% of the Mngrs/Sups and 88.5% of the FHs) of the respondents had stated that when storing raw and cooked food separation is practiced. Most of the FHs reported that the stock-take occurs every week and most of the Mngrs/Sups and FHs reported that on a daily basis food products are checked for quality and expiry dates but this was contradicted by the fact that at the Mini stores there was no stock sheet (which would be used to facilitate stock-taking) and moreover, evidence of expired food, decayed and stale food was found by the researcher at some of the establishments but mostly at the Hyper stores

which had the highest number of respondents who revealed that stock-take is done weekly; evidently knowledge alone does not always produce good practice (Egan *et al*. 2007: 1182).

4.5.4.4 Receiving

The food retail organization's practice of voluntary trading means that retailers are allowed to procure goods from local traders but must also make use of the organization's trading power by purchasing goods from the organization's preferred suppliers list. The organization has provided recommended suppliers for everything and encourages store owners to utilize the approved suppliers; however, for the total group only half of the establishments use all of the recommended suppliers for goods, and evidently more of the Hyper stores (75.0%) use the approved suppliers than the other establishments. Fruit and vegetables at the Mini stores are mostly (50.0%) purchased from local suppliers and fish at 50.0% of the Super stores is procured locally. Thirty-one point three percent of the establishments (for the total group) have and make use of the food specification manual when receiving deliveries which they use to check the quality of food against. Generally the deliveries are scheduled at most of the establishments and the receiving clerk (87.5%) receives the goods otherwise the manager receives the deliveries. Not all the delivered goods are checked for quality at all of the stores but all the Mngrs/Sups at the Mini and Hyper stores state that goods are of adequate quality.

4.5.4.5 Food holding, serving and waste management

As stated by 75.0% of the FHs and all of the Mngrs/Sups at the Mini and Hyper stores respectively food is held for less than 15 minutes after cooking whereas upon observation only one (14.3%) Mini store and two (40.0%) Hyper stores served food immediately after cooking. Food that is left over is mostly thrown away according to more Mngrs/Sups than FHs, and very few of the establishments reheat food and serve it the next day but at 75.0% of the Super stores the food is reused/reworked for the next day as observed by the researcher but this information was only communicated by 3.0% of the FHs. Most of the establishments practise good waste management as there were designated bins for waste and most of the FHs (91.5%) practised waste separation.

The internal temperatures of food should be checked throughout the food preparation process. Observed practices show that only one Mini store checks the internal temperature of food (preparation, holding and serving), and at the Hyper stores it was observed that three stores check the temperature during preparation, and only two check temperatures during holding and serving and for the Super stores, 75.0% check temperatures during preparation and serving but a reduced 50.0% check temperatures during holding. This information is consistent with the data represented earlier where there were more Mngrs/Sups trained on temperature monitoring then FHs whereas the FHs are the ones who interact with the food more closely than the Mngrs/Sups who may not be present throughout the food preparation process. This

explains the decline in temperature monitoring statistics as the FHs are not skilled in temperature monitoring and are not doing it as they operate and as expressed by McIntyre (2013: 154), untrained FHs showed a lack of knowledge in the area of temperature control.

4.6 Conclusion

The training of managers has been reported as being cost effective as the expectation is that managers will transfer knowledge by training FHs as the managers are departmental leaders expected to set the tone for food safety that is to be practiced by FHs (Egan *et al*. 2007: 1187), but studies show a gap in knowledge sharing which is also evident in the current study as training has been predominately given to Mngrs/Sups who displayed more knowledge than was revealed by the FHs. The FHs, however, showed satisfactory knowledge although very few of the FHs lacked basic appreciation for temperature monitoring as a significant percentage of them were not trained on the theme nevertheless the knowledge presented and practice demonstrated was satisfactory. Greater focus must be given to temperature monitoring in all the establishments as it is unacceptable that food is cooked and served without knowing the temperature which means that there is no assurance of food safety and consumers are served food that is potentially harmful to their health.

The expectation is that training impacts knowledge and once knowledge has been instilled it will influence good practice but without resources (correct infrastructure, equipment, etc.) knowledge is prevented from being put into practice which is evident in the current study. As seen in the study by Egan *et al.* (2007: 1186) training produces good examination scores but knowledge does not always result in good practice as per the current study, where training produced good self-reported practice but ran contrary to observed behaviour especially with regard to cleaning and food preparation. Lack of resources in the establishments resulting in noncompliant establishments as there was not enough cleaning equipment, colour-coded chopping boards and utensils and this lack promotes lending of resources which results in cross-contamination. Food safety is a composite whole meaning that it should be practised throughout the process of the food chain (from farm to fork) therefore food safety is the responsibility of everyone who comes in to direct or indirect contact with food.

Training material has been provided by the organization and should be used to do training. The organization has a brand image and reputation to uphold therefore it is important that establishment owners consider having healthy food safety systems with trained and experienced personal to drive their investments. These results show that focus should be more directed towards the Mini stores which were generally the most unhygienic of all the establishments but the Super stores demonstrated better knowledge and practice compared to the other establishments. Seaman (2010: 386) noted that smaller stores are disadvantaged in terms of expertise and that even their quality of training is not comparable to larger stores.

Greater focus on personal hygiene training was given to the FHs but not all of the FHs demonstrated good knowledge and practice with regard to hand washing as more than half of them did not consider an alcohol base sanitizer as a requirement for hand washing. All the establishments, however, did not have all the required items for effective hand washing and in fact none of the establishments had all the required items for effective handwashing, meaning that although the respondents may be trained on personal hygiene they are not practicing the theme, as the resources are not made available.

The presence of rodents at the establishments is both a food safety hazard and an economic hazard as rodents destroy merchandise; however, pest control was given the least attention of all the food safety training for the Mngrs/Sups which is the reason pests such as rats, birds and monkeys were tolerated at some of the establishments.

Commonly, although respondents had the correct knowledge, operational pressure sometimes overtakes good practice and this was observed with regard to the receiving of goods, where some establishments communicated that defective goods are accepted when needed urgently and also some foods are reused and reworked and sold at reduced prices. The results suggest that overall knowledge is satisfactory, practice is moderately acceptable and needs improvement and observation shows that the Mini stores are a food safety hazard.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The purpose of the study was to investigate the food hygiene, food safety, food handling practices and knowledge of Food Handlers in a food retail company in Durban in order to inform management of the standards of food hygiene, food safety, food handling and knowledge that are practised in the different establishments within the company outside of audit results and scores that could be manipulated. Twenty establishments from the selected retail stores were visited (seven Mini stores, five Hyper stores and eight Super stores), questionnaires were administered to the Mngrs/Sups and the FHs by trained field workers and observations were conducted by the researcher at each establishment. The areas of focus were the Deli/hot food serving departments, the receiving areas and the storage areas that service the Deli department. Food safety topics used in this investigation comprised of general management practices, food safety training, personal hygiene, cleaning, receiving and storage knowledge and practice and in addition observations were done in some disciplines.

The conclusions, limitations and main findings of the study will be presented in this chapter.

5.2 Limitations of the study

- Not all of the selected establishments were willing to accommodate the researcher on the day that the researcher had planned to visit, therefore some of the establishments made appointments for the researcher to visit on a more suitable date which defeated the purpose of collecting data during surprise visits.
- Some of the establishments denied access to the researcher making it difficult to reach the intended number of establishments within the same store categories thus there were less Mini stores than other store categories.
- Having the researcher present influenced the respondents' behaviour, and because the researcher had to ask for permission upon arrival it gave the service areas a chance to prepare for the researcher. Some of the respondents went into "audit mode" as the visit was announced, with others using the opportunity to express their dissatisfaction with new management in the hope that the researcher would cascade the information to the Organization's head office. This made it difficult to elicit accurate information which would accurately reflect the prevailing status quo at the establishments.
- The researcher was denied access to carry out observation in some areas as the host stated that some areas were "for management only", for example, the receiving area at one of the Mini stores.

- There was a limited population group since the study population was mainly situated in central Durban and close surroundings, therefore these results cannot be generalized for the whole of Durban and the KwaZulu-Natal region.
- In order to obtain a true reflection of behaviour, the researcher intended to do observations around peak production times but was unable to do so as at some establishments the researcher was administering questionnaires and could only make observations later in the day and at some establishments due to production pressure the manager requested the researcher and field workers to stop the investigation process.

5.3 Main findings

The respondents were predominantly female and most of them had obtained some form of education with the exception of a few who had never gone to school. It was noted that there were more FHs with higher education qualifications than Mngrs/Sups. The majority of the respondents had been with the company for a relatively long period and almost all the Mngrs/Sups had previous work experience. All of the Mngrs/Sups monitor the FHs to ensure they are working hygienically and ensured that FHs wore proper PPE. Written policies that reinforced food safety were available at the establishment and were predominately displayed on posters which mostly addressed personal hygiene issues.

Training material had been provided for effective training in the form of training notes and a DVD for all of the establishments but the majority of the establishments that have training material only had the training notes and not the DVD although the organization encourages the use of both methods for accuracy in training as the DVD presents visual training and real-life scenarios that FHs can more easily relate to, thus making it more interactive and impactful. Training was predominantly given to Mngrs/Sups as opposed to FHs but the FHs displayed satisfactory knowledge. The majority of the Mngrs/Sups were last trained just before this study took place and the FHs stated that training was ongoing. Observed behaviour did not, however, tie up with the self-reported practice and knowledge at some of the establishments. Data shows that respondents working in the Super stores were more knowledgeable and demonstrated remarkable food safety practices. The correlation between training and knowledge that should be demonstrated in good practice was evident for the Super stores and the majority of the Hyper stores. The Mini stores, however, were deemed the most unhygienic of all the stores and the infrastructure (space constraints) and the lack of management support was evident in the lack of good food safety practices.

Personal hygiene was the main focus for the FHs and although the majority of the FHs were trained on personal hygiene a few of them did not know which items should be available at designated hand washing stations to enable effective hand washing but the knowledge on when to wash hands was well expressed but some of the FHs stated that an alcohol base sanitizer was not an important item for hand washing. The Mngrs/Sups themselves showed they had only moderate knowledge on the items that should be available for hand washing but it was better than the knowledge of the FHs; however, items that were listed correctly

were not always available at all the establishments. Lack of resources was found to be a general issue within the establishments and although the respondents knew the right practice, implementation was limited because of the lack of resources. Proper handwashing practice was questionable as none of the establishments had all of the items needed for effective hand washing. The researcher attempted to demonstrate handwashing at some of the establishments that had designated hand wash stations but sanitizer and soap dispensers were generally empty and/or the disposable towels were depleted and had not been replaced. The vast majority of the respondents knew that food should not be handled when the FH is suffering from any type of health problem.

The correct cleaning chemicals were evident in most of the establishments although a minority of the respondents stated that any cleaning chemical could be used for cleaning. Cleaning and sanitization was practised at most of the establishments.

Expired food was found mostly in the Hyper stores and in the Mini stores the expired food items were packed on shelves ready to be sold to consumers, and some back-dating of expiry dates was also identified at one Mini store. None of the storage areas at the Hyper stores was satisfactory.

There was a lack of knowledge on temperature monitoring and more than half of the FHs stated that temperature monitoring was not important. Lack of training was identified as the root cause for the lack of appreciation for the subject matter as only half of the FHs were trained on temperature monitoring. Similarly, the Mngrs/Sups were responsible for temperature monitoring but not all of them were trained on this theme.

Compliance with the organizational requirements stipulated in the food safe file was most favourably observed in the Super stores.

Compared to previous studies done by other researchers, the respondents of the current study, both Mngrs/Sups and FHs, showed better results. Results suggest that generally the respondents have satisfactory knowledge which was fairly well demonstrated even though there was a lack of resources which hindered implementation

5.4 Conclusion

In order to ensure that food is safe for consumption it remains imperative that FHs are fully trained to ensure that food safety is not jeopardized throughout the process of the food chain, and it remains every stakeholder's responsibility to ensure that food safety standards are upheld "from farm to fork". Evidently the fact that some tasks are only the responsibility of the Mngrs/Sups has proved to be a disadvantage to the process of knowledge sharing and food safety practices as the lack of responsibility given to FHs for critical functions within the food chain has negatively affected most of the establishments.

A healthy food safety system requires the investment of time, money and discipline. A lack of resources limits the success of good food safety practices.

Data from this study shows that the organization has given the establishment owners enough support to implement a good food safety system, but establishments need to focus on providing quality training to all FHs and ensuring that departmental heads are fully equipped and experienced to be able to influence safe food practices and also establish working systems that are sustainable.

5.5 Recommendations

5.5.1 Recommendations for the Organization (Head Office)

- The organization should ensure that all the establishments have training material. The organization should also create a learning centre that the establishments can use to train new recruits as in that way all new employees will be trained with the same material and the same knowledge that has been set by the organization will be communicated.
- Although the organization works in voluntary trading, if a food-borne illness outbreak/case occurs the reputation of the retail organization would be challenged. It remains the organization's responsibility to ensure that each establishment abides by the food safety regulations as stipulated in the food laws of South Africa. With this said the organization should consider doing random spot checks at the establishments (unannounced food safety evaluations) in order to obtain a true reflection of the food safety standards practised in each establishment, and adopt the "mystery shopper' strategy as the findings from these visits can be combined with the scheduled food safety audits for better accuracy.
- It remains the organization's responsibility to ensure that the organization's branded products are of the best quality. The organization must therefore eliminate the repackaging of other brand name damages, as these damages are currently repackaged into the organization's branded packaging material and this behaviour was observed at a number of establishments. Empty branded packaging material should not be made available to the establishments as this behaviour could damage the brand name as the quality of the repackaged products remains, at best, questionable.

5.5.2 Recommendations for the establishments

- Hand wash buzzers should be compulsory at all establishments; this will work as a hand wash alert that will be scheduled to ring every 10-15 minutes to encourage the culture of hand washing. The effectiveness of this recommendation will rely on the discipline of the FHs and the kitchen leaders should ensure that it is followed by setting the example and by holding FHs accountable for compliance or the lack thereof.
- Two of the Super stores had a training room, which was used for ongoing training. The idea was excellent but should be leveraged as it was under-utilized. Each store or sub-store can have a food safety officer and this person can be scheduled to visit a number of stores in a week and be based at the training room. The responsibility of the food safety officer would be to identify gaps in knowledge

and practice and design training workshops and on-the-job training in order to upgrade the level of food safety in the establishment. The staff must be found to be competent to handle food through both assessment and implementation. The success of this initiative would be rated in the audit scores.

- The importance of some of the themes in food safety are sometimes only realized when an incident occurs and as previously mentioned in the reviewed literature, food safety measures should be proactive rather than reactive. The establishments should carry out random traceability studies where one establishment visits another establishment to conduct a traceability study. This would require full traceability of a cooked meal “from farm to fork”; and this would give the establishment training on incident investigation, the importance of food safety throughout the food chain and record keeping.
- When new employees are recruited food safety training should be compulsory and an assessment process must be implemented while the employee is on probation.
- The managers need to be evaluated on the level of food safety knowledge transferred in the establishments. In the same way that the managers monitor the FHs, the owners of the establishments should evaluate the level of knowledge FHs have that has been transferred by the managers. This could be in the form of interviews or in a situation where the FHs are given an opportunity to manage the food service areas under surveillance. FHs need to be trained on all sections of food safety as the majority were mostly trained on personal hygiene and although personal hygiene is important to food safety, food safety is broader than just personal hygiene.
- Establishment owners should focus on upgrading the food service preparation areas and food storage areas. A few stores were being renovated when data was collected, but the renovation was for the actual stores and serving areas of the stores but the preparation areas remained small. The focus seems to be on creating bigger stores and preparing more merchandise but still operating in smaller kitchens and cramped storage spaces. The focus should be on quality assurance.
- Additional suppliers other than those on the recommended supplier list need to be audited for quality assurance.
- Pest control is one of the major themes that all the establishments need to invest in. The owners of the establishments need to employ reputable pest control contractors to eliminate the infestation witnessed in some of the stores. Insect and rodent traps need to be installed, maintained and monitored for activity and it was obvious that most of the establishments need to invest in pest control specialists in order for them to be pest free.
- Managers need to be trained as auditors: this will assist with internal audits, and although this is not a food safety requirement it may alleviate the financial burden of regular external audits. The managers can conduct audits in their own establishments and other establishments thus reducing the frequency of the external audits which are costly. This may assist with regard to establishing good food safety procedures that would equip the establishments to be compliant both in and out of audit season.
- Managers could conduct “food safety toolbox talks”: this would be a platform for FHs to be educated on critical sections of food safety. Food-borne illness cases and food quality consumer complaints could

be shared; the team could then discuss preventative measures that could be adopted to prevent the incidents from happening. These "case studies" could be from other establishments or other countries or even be academic but this practice would bring about awareness and encourage conversation. These sessions could assist in creating a casual platform where managers could train, correct attitudes, share knowledge and correct behaviours on a weekly basis.

- Resources are needed in almost all of the establishments. In order to have effective food safety practices resources need to be provided, and owners need to invest in food safety for it to be a success. The lack of colour-coded equipment was evident in all of the stores. It is crucial that resources are made available, and the use of an equipment replenishing checklist could help as this will enable management to schedule replacement stock as and when it is needed as the sharing of cleaning equipment and cooking utensils is unacceptable but was prevalent in most of the establishments.

5.5.3 Recommendations for future research

- The collaboration between auditor scores and the results of this study together with microbiological testing (swabs and food sample testing) would increase food safety studies.
- A larger population group across the province would give a more accurate reflection of the standard of food safety within the organization.
- An evaluation of the effectiveness of the training material and training methods should be investigated.
- Observations should be done twice in the day including during peak production times and should include the night shift teams that prepare meals for the following day.
- A comparative study of the organization's competitors would also shed light on their standards of food safety and brand name reputation as positive results from the comparison could result in marketing claims that communicate the level of food safety of the organization.

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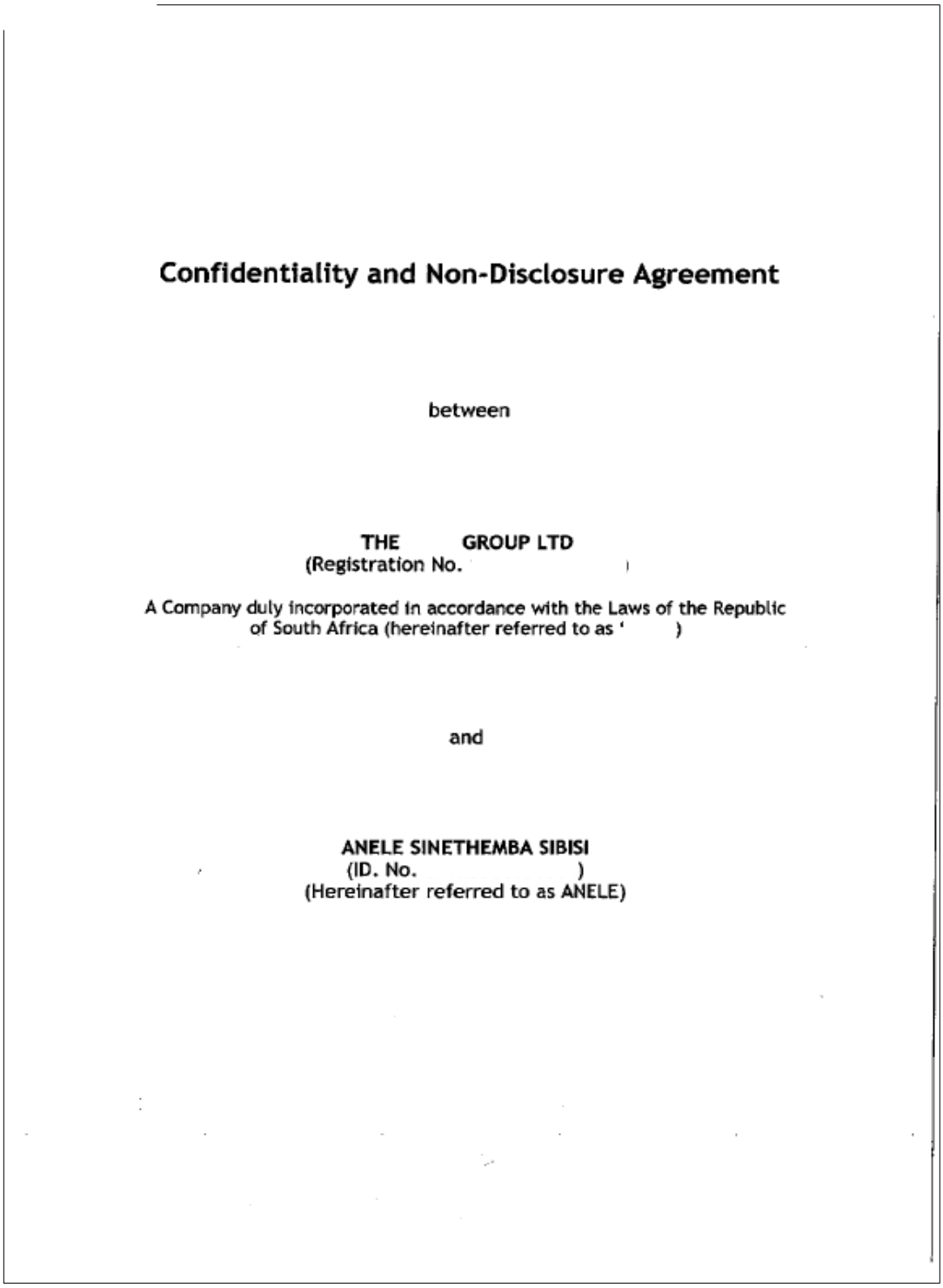
Annexures

Annexure A



Confidentiality and Non-Disclosure Agreement

between

THE GROUP LTD
(Registration No.)

A Company duly incorporated in accordance with the Laws of the Republic of South Africa (hereinafter referred to as ')

and

ANELE SINETHEMBA SIBISI
(ID. No.)
(Hereinafter referred to as ANELE)

1 **PREAMBLE**

The Group Ltd (') is giving ANELE information in order for her to research hygiene practices in owned and independently owned stores. In order for the scope of the work to be carried out, the parties will have to share; alternatively, the parties have already shared INFORMATION with each other (hereinafter collectively referred to as 'INFORMATION').

Due to the fact that this research is part of ANELE's Masters Program, acknowledges that ANELE will be able to publish her research in her Masters dissertation and other related academic journals on completion of her studies. The publication will however not include the names of the stores used or the name of The Group Ltd.

2 **INTRODUCTION**

2.1 a company duly incorporated in accordance with the laws of the Republic of South Africa.

2.2 In order for ANELE to research the hygiene factors, and ANELE will be obliged to exchange INFORMATION with each other. This INFORMATION is considered by the parties to be of a proprietary, secret and confidential nature.

2.3 For the purposes of this agreement, the party disclosing such INFORMATION shall be referred to as 'the disclosing party' and the party receiving such INFORMATION shall be referred to as the 'receiving party'.

2.4 The parties wish to record the terms and conditions upon which they are prepared to disclose such INFORMATION to one another.

3 **THE INFORMATION**

INFORMATION shall, for the purposes of this agreement, include, without limitation, any technical, commercial, scientific information know-how, trade secrets, processes, machinery, designs, drawings, technical specifications, minutes of meetings, strategy information and

data in whatever form, communicated to the receiving party or acquired by the receiving party from the disclosing party during the course of the discussions contemplated in 2.2 above.

4 DISCLOSURE OF INFORMATION

4.1 The parties agree to disclose the INFORMATION to one another.

4.2 The parties acknowledge that the INFORMATION is valuable, special and unique asset proprietary to the disclosing party.

4.3 The parties agree that they will not, during the course of their discussions with one another or, thereafter, disclose the INFORMATION to any third party for any reason or purpose whatsoever without the prior written consent of the disclosing party, save in accordance with the provisions of this agreement.

4.4 Notwithstanding anything to the contrary contained in this agreement the parties agree that the INFORMATION may be disclosed by the receiving party to its professional advisors, agents and consultants; providing that the receiving party takes whatever steps are necessary to procure that such professional advisors, agents and consultants agree to abide by the terms of this agreement to prevent the unauthorised disclosure of the INFORMATION to third parties.

4.5 The receiving party agrees:

4.5.1 not to utilise, exploit or in any other manner whatsoever use the INFORMATION disclosed pursuant to the provisions of this agreement for any purpose whatsoever without the prior written consent of the disclosing party;

4.5.2 that the unauthorised disclosure of the INFORMATION to a third party may cause irreparable loss, harm and damage to the disclosing party. Accordingly, the receiving party indemnifies and holds the disclosing party harmless against any loss, action, expense, claim, harm or damage, of whatever nature, suffered or sustained by the

disclosing party pursuant to a breach by the receiving party of the provisions of this agreement.

5 **TITLE**

All INFORMATION disclosed by the disclosing party to the receiving party is acknowledged by the receiving party;

5.1 to be proprietary to the disclosing party, and

5.2 not to confer any rights of whatever nature to such INFORMATION to the receiving party.

6 **RESTRICTIONS ON DISCLOSURE AND USE OF THE INFORMATION**

6.1 The receiving party may disclose the INFORMATION only to its officers, employees and professional advisors and then only on a strictly need-to-know basis.

6.2 The receiving party undertakes not to use the INFORMATION for any purposes other than;

6.2.1 that for which it is disclosed; and

6.2.2 in accordance with the provisions of this agreement.

7 **STANDARD OF CARE**

The parties agree that they shall protect the INFORMATION disclosed pursuant to the provisions of this agreement using the same standard of care that each party applies to safeguard its own proprietary, secret or confidential INFORMATION and that the INFORMATION shall be stored and handled in such a way as to prevent unauthorised disclosure thereof.

8 **RETURN OF INFORMATION**

8.1 The disclosing party may, at any time, request the receiving party to return any material containing, pertaining to or relating to

INFORMATION disclosed pursuant to the terms of this agreement and may, in addition request the receiving party to furnish a written statement to the effect that, upon such return, the receiving party has not retained in its possession, or under its control, either directly or indirectly, any such material.

8.2 As an alternative to the return of the material contemplated in 8.1 above, the receiving party shall, at the insistence of the disclosing party, destroy such material and furnish the disclosing party with a written statement to the effect that all such INFORMATION has been destroyed.

8.3 The receiving party shall comply with the request, in terms of this clause 8 within 7 days of receipt of such a request.

9 EXCLUDED INFORMATION

The obligations of the parties pursuant to the provisions of this agreement shall not apply to any INFORMATION that;

9.1 is known to or in possession of the receiving party prior to disclosure thereof by the disclosing party;

9.2 is or has become publicly known, otherwise than pursuant to a breach of this agreement by the receiving party;

9.3 is developed independently of the disclosing party by the receiving party in circumstances that do not amount to a breach of the provisions of this agreement;

9.4 is disclosed by the receiving party to satisfy the order of a court of competent jurisdiction or to comply with the provisions of any law or regulation in force from time to time; provided that in these circumstances, the receiving party shall advise the disclosing party to take whatever steps it deems necessary to protect its interests in this regard; provided further that the receiving party will disclose only that portion of the INFORMATION which it is legally required to disclose and the receiving party will use its reasonable endeavour to protect the

confidentiality of such INFORMATION to the widest extent possible in the circumstances;

9.5 is disclosed to a third party pursuant to the prior written authorisation from the disclosing party';

9.6 is received form a third party in circumstances that do not result in a breach of the provisions of this agreement.

10 TERM

This agreement shall commence upon the last date of signature by the parties ('the effective date') to this agreement and shall continue until such time as the relationship between and ANELE is terminated.

11 ARBITRATION

Any dispute arising out of or in connection with the provisions of this agreement shall be referred to arbitration and determined in accordance with the Arbitration Act of 1965, as amended from time to time.

12 REPRESENTATIONS AND WARRANTIES

12.1 Each party represents and warrants that it has the authority necessary to enter into this agreement and to do all things necessary to procure the fulfilment of its obligations in terms of this agreement.

12.2 The disclosing party warrants that:

12.2.1 disclosure of the INFORMATION to the receiving party will not result in a breach of any other agreement to which it is a party;

12.2.2 will, to the best of its knowledge and belief, not infringe the rights of any third party; and the disclosing party hereby indemnifies and holds the receiving party harmless against any liability for third party claims on such a basis.

13 **ADDITIONAL ACTION**

Each party to this agreement shall execute and deliver such other documents and do such other acts and thing as may be necessary or desirable to give effect to the terms and provisions of this agreement.

14 **AMENDMENTS**

No amendment, interpretation or waiver of any of the provisions of this agreement shall be effective unless produced in writing and signed by both the parties.

15 **ENFORCEMENT**

The failure to enforce or to require the performance at any time of any of the provisions of this agreement shall not be construed to be a waiver of such provision, and shall not affect either the validity of this agreement or any party hereof or the right of any party to enforce the provisions of this agreement.

16 **HEADINGS**

The headings of the clauses of this agreement are used for convenience only and shall not affect the meaning or construction of the contents of this agreement.

17 **ENTIRE AGREEMENT**

This agreement contains the entire agreement of the parties with respect to the subject matter of this agreement and supersedes all prior agreements between the parties, whether written or oral, with respect to the subject matter of this agreement.

18 **GOVERNING LAW**

This agreement and the relationship of the parties in connection with the subject matter of this agreement shall be governed and

determined in accordance with the laws of South Africa.

19 **SUBMISSION**

The parties hereby submit to the non-exclusive jurisdiction of the Durban and Coastal Local Division of the High Court of South Africa.

20 **POSTAL ADDRESSES**

20.1 Any written notice in connection with this agreement may be addressed;

20.1.1 in the case of:

address:

Telefax no:

and shall be mark

20.1.2 in the case of: ANELE SIBISI

addres

20.1.3 telefax no:

and shall be marked for the attention of Anele Sibisi.

20.2 The notice shall be deemed to have been duly given:

20.2.1 seven (7) days after posting, if posted by registered post to the party's address in terms of this sub-clause;

20.2.2 on delivery, if delivered to the party's physical address in terms of either this sub-clause or the next sub-clause dealing with service of legal documents;

20.2.3 on dispatch, if sent to the party's then telefax number and confirmed by registered letter posted no later than the next business day.

20.3 A party may change that its address by notice in writing to the other party. No notice shall be necessary in respect of a new or changed telefax number.

21 ADDRESS FOR SERVICE OF LEGAL DOCUMENTS

21.1 The parties choose the following physical addresses at which documents in legal proceedings in connection with this agreement may be served (i.e. their *domicilia citandi et executandi*)

21.1.1

21.1.2 ANELE SIBISI

21.2 The parties to this agreement undertake to give notice, in writing, to one another where there are any changes or contemplated changes in the physical addresses of either.

22 COSTS

Any costs, including attorney and own client costs, incurred by either party arising out of the breach by the other party of any of the provisions of this agreement shall be borne by the party in breach.

23 SEVERABILITY

In the event of any one or more of the provisions of this agreement being held for any reason to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision of this agreement, and this agreement shall be construed as if such invalid, illegal or unenforceable provision was not

a part of this agreement, and the agreement shall be carried out as nearly as possible in accordance with the original terms and intent.

Signed at [redacted] on this the 17 day of Dec 2013.

As witness

Signed at DUT on this the 12 day of NOV 2013.

As witness

Annexure B

11 July 2014

Dear Retailer

Student visiting stores

Please kindly accommodate Masters student Anele Sibisi in your store to conduct short interviews with staff regarding their understanding of food hygiene within the store. Your store was selected randomly.

The interviews will form part of her Master's Degree and the results will benefit The Group. The results will assist us in understanding service department staff's knowledge of food safety and hygiene.

Your co-operation will be much appreciated.

Yours sincerely,

Group Retail Operations Director and Guild Chairman

Annexure C

Participant Information Sheet - Manager

Address: Department of Food and Nutrition Consumer Sciences
P.O. Box 1334, Durban 4000

Tel. (031) 373-2322

Fax (031) 373-2795

Participant Information Sheet:

Title of the study: Food hygiene, safety, handling practices and knowledge of food handlers in a food retail company in Durban, KwaZulu Natal, South Africa

Researcher: Ms Anele Sinethemba Sibisi; BTech: Consumer Science; Food and Nutrition

Supervisor: Prof Carin Napier: DTech Food Service Management

Thank you for taking time to read through this document. My name is Anele Sibisi; I am a student studying at Durban University of Technology (DUT) for a Master's Degree. I am trying to gather information on the food safety knowledge, and hygiene practices of food vendors. I would like to invite you to participate in this study. The information presented in this letter will explain in detail what this study is about therefore please take time to read all the information. Please be sure that you are satisfied and understand all information presented and if you require further clarity please ask. Your participation is voluntary and you are free to withdraw from the study at any point.

Why is this project important?

Food handlers are responsible to ensure that the conditions and measures present in any food preparation area are hygienic thus ensuring that the consumer will not in any way be harmed by the food. A lot of research has been done about food safety and food handling practices in other countries but there is limited research that has been conducted on the food handlers in food retail companies in South Africa. In my attempts to gather data it was important that I approach your establishment. The aim of the study is to determine the current food hygiene and safety knowledge of food handlers and the food handling practice observed in the establishment in order to advice management on the current standards so that interventions may be introduced to keep standards at an acceptable level. Management will thereafter aim to ensure that all food handlers are knowledgeable in regards to food hygiene and food safety in order to make informed food handling practice decisions with regards to assured food safety for all consumers of the establishment.

Who are the participants?

The participants are all the managers/supervisors of the each establishment within the borders of KwaZulu Natal and the food handlers that work in the same department.

What do we expect from the participants in this study?

The researcher will approach all the managers/supervisors of the establishment to explain the study, issue an information letter and obtain written consent. Data will be collected through an interview using a questionnaire with the managers/supervisors and the food handlers working in the same department. The questionnaire will be structured in four parts: General Management characteristics of managers/supervisors, food hygiene and safety knowledge and self-reported food handling practices. An observation checklist to account for general food handling practices and hygiene will be completed. This will take approximately 30 minutes.

What can participants expect?

Once we have finalized the research report, the results will be presented to you.

Can you withdraw from the study?

Your establishment was one of the establishments that were randomly selected to participate in the study. However you may withdraw from the study at any time or decline to participate. Your participation is entirely voluntary and you do not need to give a reason should you not wish to participate. There are no financial benefits to participating in the study, there are no risks associated with taking part in the study other than providing the company with information in order to create interventions to bring standards to an acceptable level. Neither your employment nor level of services will be affected by the participation or refusal to participate in the study.

Do you have any further Questions?

More information can be obtained from or The Supervisor Prof Carin Napier at 031 373 2326.

Persons to Contact in the Event of Any Problems or Queries:

Supervisor: Prof. Carin Napier 031 373 2326

Researcher: Ms Anele Sibisi on 0877422165

The Institutional Research Ethics administrator: 031 373 2900.

Complaints can be reported to the DVC: TIP, Prof F. Otieno on 031 373 2382 or dvctip@dut.ac.za.

If you are willing to participate in the study, please read and sign the consent form. Thank you.

Annexure C

INFORMATION LETTER - FOOD HANDLER

Dear Food handler

Thank you for allowing me to explain to you my research study for your consideration

Title of the Research Study:

Food hygiene, safety, handling practices and knowledge of food handlers in a food retail company in Durban, KwaZulu Natal, South Africa

Principal Investigator/s/researcher:

Anele Sinethemba Sibisi, B. Tech: Consumer Sciences Food and Nutrition

Co-Investigator/s/supervisor/s:

Professor Carin Napier

Why is it important to do this study?

There is a real concern around the increased number of reports linked food related illnesses, food poisoning outbreaks have been directly linked to food mishandling. Food hygiene is having good hygienic conditions throughout the food handling process that will provide food that is safe for the costumer to eat. Food safety is the assurance that the food the customer will eat will not cause any harm to their health and wellbeing. The aim of this study is to look into the food hygiene, safety, food handling and knowledge standards that exist in a food retail company in Durban, KwaZulu Natal South Africa.

18 stores and a total of 252 staff members in Durban and South Coast of KwaZulu Natal will be included in the study. This will help in gathering enough information to complete my research project in my effort to complete my M.Tech qualification.

What will it involve?

- The company has been approached to get permission to do the study in all their KwaZulu Natal stores.
- Permission from each store will be requested from the store owner/manager for the study to be undertaken.
- I will need you to sign a consent form to indicate that you agree to participate in the study after I explained all the procedures to you
- If you agree you will be asked to complete 2 questionnaires in an interview situation it could take up to 30 minutes.

- An observation checklist will also be done which will be done at the same time as the other questionnaire. The questionnaires will include:
- A Food handler's questionnaire that will attempt to gather your basic food hygiene and safety knowledge.
- A manager's questionnaire that will attempt to gather the manager's basic food hygiene and safety knowledge and management information.
- We will also conduct an observation of your food handling practice while you are working.

Risks or Discomforts to the Participant: Participation is voluntary and you can withdraw at any time with no penalty. Please note this is not an audit or anything of that nature. Your results will not be linked to your name because no names will be used only participant numbers/codes will be used. No other discomfort has been foreseen.

Benefits to the participant: please remember that the information will be presented of the store as a whole and no individuals will be highlighted. The anonymous results of the study will be shared with the company after the study has been concluded with the hope that interventions can be planned for any identified problems. If you have any personal food questions or concerns we are prepared to come back to you after the data collection to assist you.

Please note the following:

- Participation is voluntary and you can withdraw at any time with no penalty.
- No pay will be given to any of the participants for taking part in the study.
- It won't cost you anything to participate in this study.
- You will be given a participant number so no names will be used in the study**.**
- This is not an audit or a problem finding exercise, your job will not be in any risk and your store will not be shut down because of this study.

Research-related Injury:

For any questions or concerns please feel free to contact my supervisor or our Ethics committee

Persons to Contact in the Event of Any Problems or Queries:

Supervisor: Prof. Carin Napier

Researcher: Anele Sibisi 0834431115

Supervisor contact: 031 373 2326 carinn@dut.ac.za

The Institutional Research Ethics administrator: 031 373 2900.

Complaints can be reported to the DVC: TIP, Prof F. Otieno on 031 373 2382 or dvctip@dut.ac.za.

ANNEXURE D

INSTITUTIONAL RESEARCH ETHICS COMMITTEE (IREC) CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, _____ (name of researcher), about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: _____,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____	_____	_____	_____
Full Name of Participant	**Date**	**Time**	**Signature / Right Thumbprint**

I, _____ (name of researcher) herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

_____	_____	_____
Full Name of Researcher	**Date**	**Signature**
_____	_____	_____
Full Name of Witness (If applicable)	**Date**	**Signature**

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TECHNOLOGY

Institutional Research Ethics Committee
Research and Postgraduate Support Directorate
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23 April 2018

Ms A S Sibisi

Dear Ms Sibisi

Food hygiene, safety, handling practices and knowledge of food handlers in a food retail company in Durban, KwaZulu Natal, South Africa
Ethics Clearance Number: IREC 017/14

The Institutional Research Ethics Committee acknowledges receipt of your Safety Monitoring and Annual Recertification report.

I am pleased to inform you that the study has been approved to continue.

Please note that ethical approval has been extended till **5 March 2020**, if the research is not complete within this time, you will be required to apply for recertification three months before the expiry date.

Yours Sincerely

Professor J K Adam
Chairperson: IREC

DUT DURBAN UNIVERSITY OF TECHNOLOGY
2018 -04- 23

ANNEXURE F

Permission to use data

--- On **Tue, 5/7/13, ANELE SIBISI <*mahlase3@yahoo.com*>** wrote:

From: ANELE SIBISI <mahlase3@yahoo.com>
Subject: Permission to use questionnaires
To: meakerj@gmail.com
Date: Tuesday, May 7, 2013, 4:26 PM

Hi Jill
My name is Anele Sibisi, currently doing my Mtech through DUT and my supervisor is Carin Napier.
I would like to use some of your questionnaires from your study (An observational cross sectional investigation of food service management and general management practices in school running the National School Nutrition programme in the formal and informal areas of PMB, KZN, and SA.) as templates for my study.

Kind Regards
Miss Anele Sinethemba Sibisi

Sent from Samsung Mobile
Jill Meaker <meakerj@gmail.com> wrote:
Dear Anele

Thank you for your email. I did reply to your previous request but you obviously did not receive the communication.

You are welcome to use the questionnaires, with reference. I would also appreciate some feedback on how useful they were.

All the best for your study.

Kind regards
Jill

DUT DURBAN UNIVERSITY OF TECHNOLOGY

MANAGERS QUESTIONNAIRE

Information to be obtained from the Owner/Manager of the Establishment

INTERVIEW DATE: _____/_____/_____ DD/MM/YY	BUSINESS NAME/NO:
INTERVIEWER'S NAME:	BUSINESS ADDRESS:

Please insert the interviewee's answers to the following questions by placing a tick (√) in the right hand side of each question. Where a sentence is needed, please insert answers in the lines provided underneath each question.

SECTION 1: GENERAL

1. Indicate your position in the establishment (please tick appropriate answer)

Owner	
Manager	
Supervisor	

2. How long have you been Managing the Business/department/establishment?

< One year	
One to two years	
Two to three years	
Three or more years	

3. Gender

Male	
Female	

4. Age of respondent

<30	
30 and above	

5. What is your highest level of education?

No education	
Std 1/ Grade 1-3	
Std 2-5/ Grade 4-7	
Std 6-9/ Grade 8-11	
Matric/ Std 10/ Grade 12	
Apprenticeship	
Post-matric Diploma obtained from a Technikon	
University Degree	

6. Do you have previous experience in food service? (Obtained before you worked in current position)

Yes	
No	

7. Do you have a menu?

Yes	
No	

8. Why does the establishment use a menu?

Economical	
Locally accepted foods	
Locally available foods	
Customer's preferred food	
Other (please specify)	

9. Where does the establishment get water from?

Outside tap (i.e. running water	
Kitchen tap (i.e. running water)	
Water tank (Jojo tank)	
Water truck	
Other (please specify)	

10. What power supply is used to prepare the food?

Electricity	
Gas	
Fire	
Other (please specify)	

11. How many employees including you does the department have?

12. How often do you monitor your staff regarding their duties?

Daily	
Weekly	
Monthly	
Once a team	
Seldom	
Never	

13. Do you delegate any of the monitoring duties to any staff members?

Yes	
No	

14. If yes, to whom

Food handler	
Managers assistant	
Supervisor	
Other (please specify)	

15. Are there written policies and procedures regarding each of the following? (Answer all options)

15.1 Receiving	
15.2 Storage	
15.3 Serving	
15.4 Hygiene	
15.5 Administration	

15.6 Other (please specify)

SECTION 2: TRAINING

16. Upon your appointment, as part of your induction, did you get specific food safety training?

Yes	
No	

17. Which induction material was used for training?

Store Safe file	
Store Safe DVD	
Store Safe File and DVD	
Other (please specify)	

18. Has any training about food safety and hygiene been provided to you?

Yes	
No	
Don't know	

19. Have you received training regarding the following? (Tick appropriate answer)

19.1 Personal Hygiene	
19.2 Purchasing Practices	
19.3 Labeling	
19.4 Receiving Practices	
19.5 Food Storage	
19.6 Food Preparation	
19.7 Merchandising	
19.8 Cleaning Practices	
19.9 Pest Control	
19.10 Temperature Monitoring	
19.11 Allergens	
19.12 Documentation and Record keeping	
19.13 Other (please specify)	

20. If you have received training, where did you receive the training from? (Answer all options)

20.1 Department of Education	
20.2 Department of Health	
20.3 Another cook/handler	
20.4 Previous employer	
20.5 Through an institution as part of studies	
20.6 Current Organisation of employment	

20.7 Other (please specify)

21. When last was training conducted? (Select one)

Ongoing	
Last week	
Last month	
Last term	
Last year	
Never	

22. How frequently is training conducted? (Select one)

Ongoing	
Weekly	
Monthly	
Once a term	
Once a year	
Never	

23. Do you or your workers have any further specific training needs? If so, please specify the three most important training needs you have

	Training needed		Type of training needed
	Yes	No	
Yourself (Manager)	a)	b)	
Your workers	a)	b)	

SECTION 3: PERSONAL HYGIENE & FOOD SAFETY KNOWLEDGE

24. Do you ensure that the correct PPE is worn by the staff?

Yes	
No	

25. Is there adequate number of hand washing facilities provided for the number of employed staff?

Yes	
No	
Don't Know	

26. Staff is regularly supervised to work hygienically?

Yes	
No	
Don't Know	

27. When is a food handler not allowed to handle food or enter a food prep area? (please select more than one answer)

27.1 Suffering from illness and disease that can be transmitted through food	
27.2 Having infected wounds and skin infection	
27.3 Vomiting and or nausea	
27.4 Flu, coughing and sneezing	
27.5 Diarrhea	

28. Do you have a designated hand washing station?

Yes	
No	

29. Why is hand washing important?

_____

_____

_____

30. What items should be available in your hand washing station for effective hand washing? (please Tick to select more than one answer)

30.1 Antibacterial hand soap	
30.2 Disposable paper Towel	
30.3 Open/Pedal Bin	
30.4 Cold water	
30.5 Alcohol based Hand sanitiser	
30.6 Hot and cold water	
30.7 Open bin	
30.8 Hand soap (off the shelf)	
30.9 Hand cloth	

31. When should your hands be washed (select more than one answer)

31.1 Before you start your work	
31.2 Between tasks	
31.3 After using the toilet	
31.4 After handling waste	
31.5 After handling raw food	
31.6 After removing gloves	
31.7 After every break	
31.8 After eating and drinking	
31.9 After cleaning duties	

32. Are food handler's allowed to wear jewellery in a food prep area

Yes	
No	

33. State whether the following statements are True or false (please select with a tick)

Statement	True	False
33.1 Clean as you go is important		
33.2 It is acceptable to defrost meat over night in a sink filled with hot water		
33.3 Frying oil needs to monitored and checked daily		
33.4 Correct chopping boards need to be used to eliminate cross contamination		
33.5 Utensils must be placed in a bucket containing sanitizer solution between use		
33.6 Packaging needs to be clean		
33.7 No wooden equipment may be used		
33.8 It is acceptable to top up new oil with old oil		
33.9 It is acceptable to give employees used old oil to take home		
33.10 The deep fryer needs to be covered when not in use		
33.11 White chopping boards are used for Dairy		
33.12 Blue chopping boards are used for Fish		
33.13 Red chopping boards are used for Meat		
33.14 Yellow chopping boards are used for Raw chicken		
33.15 Brown Chopping boards are used for Cooked Chicken		
33.16 Green Chopping boards are used for fruits and vegetables		
33.17 After handling eggs, chicken and red meat it is important to wash your hands, sanitize the equipment and surface area used.		
33.18 Wash fruits and vegetables before eating/ preparing		
33.19 Keeping kitchen surfaces clean reduces the risk of illness		
33.20 Keeping raw and cooked food separate helps to prevent illness		
33.21 Thawing food can be done on the counter		

33.22 I think it is unsafe to leave cooked food out of the refrigerator for more than two hours		
33.23 Cooked foods do not need to be thoroughly reheated		
33.24 Cooked meat can be left out at room temperature to cool overnight before refrigerating		
33.25 Separate utensils/ containers should be used for raw products and cooked foods?		

34. How frequently are utensils washed? (Tick all relevant options)

During preparation	
After the food is ready	
After the work is finished	

35. Are there enough cleaning tools to clean the kitchen? e.g. brooms, mop, cloths, sponge etc.

Yes	
No	

36. How frequently is the stove cleaned? (Tick all relevant options)

During preparation	
After the food is ready	
After the work is finished	
No stove	

37. How are cooking utensils washed? (Tick the correct answer)

Hot water & detergent	
Cold water & detergent	
Water only	
Hot water, detergent and sanitizer	

38. How often is the preparation area cleaned? (Tick all relevant options)

During preparation	
After the food is ready	
After the work is finished	

39. Are the work areas ever sanitized?

Yes	
No	

40. If yes, how often? (Select one)

Frequently	
Daily	
Weekly	
Seldom	

41. Wiping cloths can spread microorganisms

Yes	
No	

42. State whether the following statements are True or false (please select with a tick)

Statement	True	False
42.1 Any cleaning chemical can be used in the kitchen		
42.2 Every area has its own colour coded cleaning equipment		
42.3 sanitizing is not important when you are cleaning with hot water		
42.4 You can always clean at the end of food prep		
42.5 All cleaning equipment must be stored away from food		
42.6 Brushes and mops can be kept in a bucket with used water in-between use		
42.7 Disposable clothes are used for cleaning		
42.8 Clothes need to be in a sanitizer solution in a bucket in between use		
42.9 Chopping boards need to be washed, soaked in a sanitizer solution and placed in a clean rack to dry		
42.10 Fridges must be cleaned weekly		

43. What colour cleaning equipment do you use in your area?

Colour	Yes	No
Blue		
Red		
Green		
White		
Yellow		
Brown		

44. When is deep cleaning done in the kitchen?

_____

_____

_____

SECTION 4: STORAGE

45. Where are the perishable food supplies stored? (Mark all relevant options)

Kitchen	
Designated store room	
Cooler boxes	
Storage containers	
Other (please specify)	

46. Where are the non – food supplies stored? (Mark all relevant options)

Kitchen	
Designated store room	
Cooler boxes	
Storage containers	
Other (please specify)	

47. Is there a regular cleaning schedule for the storage areas?

Yes	
No	

48. How often is the storage area cleaned?

Less than once a week	
Once a week	

49. How often is the stock checked for quality and expiry dates? (Select one)

Not checked	
Once a month	
Twice a month	
< Once a week	
> Once a week	
Every day of the week	

50. I think it is important to throw away foods that have reached their expiry date

Agree	
Not sure	
Disagree	

51. How often is the stock- take done? (Select one)

Not done	
Once a month	
Twice a month	
< once a month	
Once a week	
Twice a week	
Three times a week	
Four times a week	
Every day of the week	

52. Is stock rotation in place?

Yes	
No	

53. If yes, how is this done? (Select one)

Delivery dates	
Expiry dates	
Correct storage on delivery	
First in First out	
Other (specify)	

54. I separate raw food and cooked food during storage

Most times	
Sometimes	
Never	

55. State whether the following statement are True or false (please select with a tick)

Statement	True	False
55.1 food must not be stored with chemicals		
55.2 Food can be stored on the floor		
55.3 When opened food must be covered and date marked		
55.4 Food must be stored at correct temperatures		
55.5 Raw and cooked food can be stored together		
55.6 Expiry dates are important		
55.7 Food in the refrigerator can be stored in cardboard boxes		
55.8 In the refrigerator raw food can be stored with above cooked food		

55.9 Defrost food should be stored at the bottom shelf to prevent it from dripping		
55.10 Foods in the freezer need to be covered in order to prevent freezer burn		
55.11 Foods can stay in the freezer indefinitely		
55.12 The freezer temperature should be at least -23 degrees Celsius		

SECTION 5 RECEIVING

56. Does your establishment use the organizations recommended supplier list for all your products

Yes	
No	
Don't know	

57. If No, specify below

Food item	Supplier
Chicken	
Fish	
meat	
maize	
Bread	
Fruit and vegetables	
Groceries	

58. Are there contracts with the additional suppliers

Yes	
No	

59. Is there a planned delivery schedule?

Yes	
No	

60. How are the perishable foods delivered?

Open truck	
Closed truck	
Car	
Other (please specify)	

61. How is the non-perishable food delivered?

Open truck	
Closed truck	
Car	
Other (specify)	

62. Who delivers the supplies?

Commercial supplier	
Local community member	
Both a & b	
Other (specify)	

63. Where do you store your perishable products? (Interviewer explains the term perishable).

Fridge/freezer	
Cooler box	
Newspaper	
Other (specify)	

64. Is the food of adequate quality?

Yes	
No	

65. How is the quality of the food assessed? (Tick all relevant options)

Brand	
Expiry date	
Grade	
Visually	

66. Who receives the deliveries?

Owner	
Manager/supervisor	
Food handler	
Other (specify)	

67. Is it the same person every day?

Yes	
No	

68. Do you have a food specification manual to check the quality of food against?

Yes	
No	

69. Do you check the delivery note/ invoice?

Yes	
No	

70. Are all the food items checked?

Yes	
No	

71. If yes, how (mark all relevant options)

Weighed	
Counted	
Weighed and counted	
Other (please specify)	

72. When should products be rejected when receiving? (mark all relevant options)

72.1 Temperature out of spec	
72.2 Frozen food not frozen	
72.3 Packaging damaged and product exposed	
72.4 Signs of mould and food spoilage	
72.5 Packaging blown	
72.6 Cans dented	
72.7 No visible expiry date on product	
72.8 Product has passed its sell by date/ best before date/use-by date	

SECTION 6: FOOD HOLDING, SERVING AND WASTAGE

73. How long is the food held after cooking and before serving?

Less than 15 minutes	
15- 30 minutes	
30-45 minutes	
More than 45 minutes	

74. How is the food kept warm?

75. At what temperature do you keep the food warm?

76. How do you check the temperature?

77. Is there adequate space for serving / portioning of food?

Yes	
No	

78. Are there adequate food serving utensils?

Utensil	Yes	No
78.1 Ladles		
78.2 Measuring equipment		
78.3 Serving spoons		
78.4 Tongs		
78.5 Serviettes		

79. What happens to leftover cooked food?

Thrown away	
Donated to charity/school	
Taken home	
Kept for the next day	
Food handlers eat it	
Other (please specify)	

80. How much left over food do you throw away after every day which was not served or sold?

None	
Less than a quarter	
Half	
More than half	
Don't know	

81. Is left over food reheated and served the next day?

Yes	
No	

82. If yes, how is it reheated?

On the stove	
In the microwave	
In the food warmer	

Other (please specify)

83. State whether the following is true or false?

Statement	True	False	Don't know
83.1 Each dish must be served with individual, clean utensil			
83.2 There must be no evidence of expired stock			
83.3 Food must be sold at correct Temperature			
83.4 Food must be protected from contamination			
83.5 Display units must be clean and free pest free			
83.6 Product core temperature must be monitored			
83.7 Temperature recordings are not important			
83.8 Fridge and freezer temperature's must be monitored and recorded			
83.9 Bacteria in food can multiply if the food is kept at incorrect temperatures			
83.10 Bain Maries can be used for reheating food			
83.11 Hot food that has not been served in 4hours must be thrown away			
83.12 Old cooked food can be mixed with new cooked food the next day			

84. Is there a designated rubbish area?

Yes	a)
No	b)

85. If yes, do you separate your waste?

Yes	
No	
sometimes	
Other (please specify)	

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FOOD HANDLERS QUESTIONNAIRE

Information to be obtained from the Food Handler of the establishment

INTERVIEW DATE: _____/_____/_____ DD/MM/YY INTERVIEWER'S NAME:	PARTICIPANT CODE:

Please insert the interviewee's answers to the following questions by placing a tick (√) in the right hand side of each question. Where a sentence is needed, please insert answers in the lines provided underneath each question.

SECTION 1: GENERAL

1. list your top three duties as Food handler in the establishment

1.1
1.2
1.3

2. How long have you been working as a food handler in this department?

< 1 year	
1 to two years	
Two to three years	
Three or more years	

3. Gender

Male	
Female	

4. Age of respondent

<30	
30 and above	

5. What is your highest level of education?

No education	
Std 1/ Grade 1-3	
Std 2-5/ Grade 4-7	
Std 6-9/ Grade 8-11	
Matric/ Std. 10/ Grade 12	
Apprenticeship	
Post-matric Diploma obtained from a Technikon	
University Degree	

6. Do you have previous experience in food service? (Obtained before you worked in current position)

Yes	
No	

7. Do you have a recipe for all the food that is cooked?

Yes	
No	

8. Why does the establishment use a menu?

Economical	
Locally accepted foods	
Locally available foods	
Customer's preferred food	
Other (please specify)	

9. Where does the establishment get water from?

Outside tap (i.e. running water	
Kitchen tap (i.e. running water)	
Water tank (Jojo tank)	
Water truck	
Other (please specify)	

10. What power supply is used to prepare the food?

Electricity	
Gas	
Fire	
Other (please specify)	

11. How often are you monitored regarding their duties?

Daily	
Weekly	
Monthly	
Once a team	
Seldom	
Never	

12. Are there written policies and procedures regarding each of the following? (Answer all options)

12.1 Receiving	
12.2 Storage	
12.3 Serving	
12.4 Hygiene	
12.5 Administration	
12.6 Other (please specify)	

SECTION 2: TRAINING

13. Upon your appointment, as part of your induction, did you get specific food safety training?

Yes	
No	

14. Which induction material was used for training?

Store Safe file	
Store Safe DVD	
Store Safe File and DVD	
Other (please specify)	

15. Has any training about food safety and hygiene been provided to you?

Yes	
No	
Don't know	

16. Have you received training regarding the following? (Tick appropriate answer)

16.1 Personal Hygiene	
16.2 Purchasing Practices	
16.3 Labeling	
16.4 Receiving Practices	
16.5 Food Storage	
16.6 Food Preparation	
16.7 Merchandising	
16.8 Cleaning Practices	
16.9 Pest Control	
16.10 Temperature Monitoring	
16.11 Allergens	
16.12 Documentation and Record keeping	
16.13 Other (please specify)	

17. If you have received training, where did you receive the training from? (Answer all options)

17.1 Department of Education	
17.2 Department of Health	
17.3 Another cook/handler	
17.4 Previous employer	
17.5 Through an institution as part of studies	
17.6 Current Organisation of employment	
17.7 Other (please specify)	

18. When last was training conducted? (Select 1 answer)

Ongoing	
Last week	
Last month	
Last term	
Last year	
Never	

19. How frequently is training conducted? (Select 1)

Ongoing	
Weekly	
Monthly	
Once a term	
Once a year	
Never	

20. Do you have any further specific training needs? If so,please specify the three most important training needs you have

20.1
20.2
20.3

SECTION 3: PERSONAL HYGIENE& FOOD SAFETY KNOWLEDGE

21. Do you ensure that you have the correct PPE worn at the beginning of your shift?

Yes	
No	

22. Is there adequate number of hand washing facilities provided in your work area?

Yes	
No	
Don't Know	

23. When are you not allowed to handle food or enter the food preparation area? (Please tick to select more than 1 answer)

23.1 Suffering from illness and disease that can be transmitted through food	
23.2 Having infected wounds and skin infection	
23.3 Vomiting and or nausea	
23.4 Flu, coughing and sneezing	
23.5 Diarrhea	

24. Do you have a designated hand washing station?

Yes	
No	

25. Is frequent hand washing during food preparation worth the extra time

Yes	
No	
Don't know	

26. What items should be available in your hand washing station for effective hand washing? (Please tick to select more than 1 answer)

26.1 Antibacterial hand soap	
26.2 Disposable paper Towel	
26.3 Open/Pedal Bin	
26.4 Cold water	
26.5 Alcohol based Hand sanitiser	
26.6 Hot and cold water	
26.7 Open bin	
26.8 Hand soap (off the shelf)	
26.9 Hand cloth	

27. When should your hands be washed? (Select more than 1 answer)

27.1 Before you start your work	
27.2 Between tasks	
27.3 After using the toilet	
27.4 After handling waste	
27.5 After handling raw food	
27.6 After removing gloves	
27.7 After every break	
27.8 After eating and drinking	
27.9 After cleaning duties	

28. Are food handler's allowed to wear jewellery in a food preparation area

Yes	
No	

29. Why?

_____

_____

_____

_____

30. How frequently are utensils washed? (Tick all relevant options)

During preparation	
After the food is ready	
After the work is finished	

31. State whether the following statements are True or false (please select with a tick)

Statement	True	False
31.1 Clean as you go is important		
31.2 It is acceptable to defrost meat over night in a sink filled with hot water		
31.3 Frying oil needs to monitored and checked daily		
31.4 Correct chopping boards need to be used to eliminate cross contamination		
31.5 Utensils must be placed in a bucket containing sanitizer solution between use		
31.6 Packaging needs to be clean		
31.7 No wooden equipment may be used		
31.8 It is acceptable to top up new oil with old oil		
31.9 It is acceptable to give employees used old oil to take home		
31.10 The deep fryer needs to be covered when not in use		
31.11 White chopping boards are used for Dairy		
31.12 Blue chopping boards are used for Fish		
31.13 Red chopping boards are used for Meat		
31.14 Yellow chopping boards are used for Raw chicken		
31.15 Brown Chopping boards are used for Cooked Chicken		
31.16 Green Chopping boards are used for fruits and vegetables		
31.17 After handling eggs, chicken and red meat it is important to wash your hands, sanitize the equipment and surface area used.		
31.18 Wash fruits and vegetables before eating/ preparing		
31.19 Keeping kitchen surfaces clean reduces the risk of illness		
31.20 Keeping raw and cooked food separate helps to prevent illness		
31.21Thawing food can be d1 on the counter		
31.22 I think it is unsafe to leave cooked food out of the refrigerator for more than two hours		
31.23 Cooked foods do not need to be thoroughly reheated		
31.24 Cooked meat can be left out at room temperature to cool overnight before refrigerating		
31.25 Separate utensils/ containers should be used for raw products and cooked foods?		

32. Are there enough cleaning tools to clean the kitchen? e.g. brooms, mop, cloths, sponge etc.

Yes	
No	

33. How frequently is the stove cleaned? (Tick all relevant options)

During preparation	
After the food is ready	
After the work is finished	
No stove	

34. How are cooking utensils washed? (Tick the correct answer)

Hot water & detergent	
Cold water & detergent	
Water only	
Hot water, detergent and sanitizer	

35. How often is the preparation area cleaned? (Tick all relevant options)

During preparation	
After the food is ready	
After the work is finished	

36. Are the work areas ever sanitized?

Yes	
No	

37. If yes, how often? (Select 1 answer)

Frequently	
Daily	
Weekly	
Seldom	

38. Wiping cloths can spread microorganisms

Yes	
No	

39. What colour cleaning equipment do you use in your area?

Colour	Yes	No
Blue		
Red		
Green		
White		
Yellow		
Brown		

40. State whether the following statements are True or false (please select with a tick)

Statement	True	False
40.1 Any cleaning chemical can be used in the kitchen		
40.2 Every area has its own colour coded cleaning equipment		
40.3 sanitizing is not important when you are cleaning with hot water		
40.4 You can always clean at the end of food prep		
40.5 All cleaning equipment must be stored away from food		
40.6 Brushes and mops can be kept in a bucket with used water in-between use		
40.7 Disposable clothes are used for cleaning		
40.8 Clothes need to be in a sanitizer solution in a bucket in between use		
40.9 Chopping boards need to be washed, soaked in a sanitizer solution and placed in a clean rack to dry		
40.10 Fridges must be cleaned weekly		

41. When is deep cleaning d1 in the kitchen?

_____

_____

_____

SECTION 4: STORAGE

42. Where are the perishable food supplies stored? (Mark all relevant options)

Kitchen	
Designated store room	
Cooler boxes	
Storage containers	
Other (please specify)	

43. Where are the non – food supplies stored? (Mark all relevant options)

Kitchen	
Designated store room	
Cooler boxes	
Storage containers	
Other (please specify)	

44. Is there a regular cleaning schedule for the storage areas?

Yes	
No	

45. How often is the storage area cleaned?

Less than once a week	
Once a week	

46. How often is the stock checked for quality and expiry dates? (Select one)

Not checked	
Once a month	
Twice a month	
< Once a week	
> Once a week	
Every day of the week	

47. I think it is important to throw away foods that have reached their expiry date

Agree	
Not sure	
Disagree	

48. How often is the stock- take done? (Select one)

Not done	
Once a month	
Twice a month	
< once a month	
Once a week	
Twice a week	
Three times a week	
Four times a week	
Every day of the week	

49. Is stock rotation in place?

Yes	
No	

50. If yes, how is this done? (Select one)

Delivery dates	
Expiry dates	
Correct storage on delivery	
First in First out	
Other (specify)	

51. I separate raw food and cooked food during storage

Most times	
Sometimes	
Never	

52.State whether the following statement are True or false (please select with a tick)

Statement	True	False
52.1 Food must not be stored with chemicals		
52.2 Food can be stored on the floor		
52.3 When opened food must be covered and date marked		
52.4 Food must be stored at correct temperatures		
52.5 Raw and cooked food can be stored together		
52.6 Expiry dates are important		
52.7 Food in the refrigerator can be stored in cardboard boxes		
52.8 In the refrigerator raw food can be stored with above cooked food		
52.9 Defrost food should be stored at the bottom shelf to		

prevent it from dripping		
5210 Foods in the freezer need to be covered in order to prevent freezer burn		
5211 Foods can stay in the freezer indefinitely		
5212 The freezer temperature should be at least -23 degrees Celsius		

SECTION 5 RECEIVING

53. Is there a planned delivery schedule?

Yes	
No	

54. Who receives the deliveries?

Owner	
Manager/supervisor	
Food handler	
Other (specify)	

55. How is the quality of the food assessed? (Tick all relevant options)

Brand	
Expiry date	
Grade	
Visually	

56. Is the food of adequate quality?

Yes	
No	

57. Are all the food items checked?

Yes	
No	

58. If yes, how (mark all relevant options)

Weighed	
Counted	
Weighed and counted	
Other (please specify)	

59. Who delivers the supplies?

Commercial supplier	
Local community member	
Both a & b	
Other (specify)	

60. When should products be rejected when receiving? (Tick all relevant options)

60.1 Temperature out of spec	
60.2 Frozen food not frozen	
60.3 Packaging damaged and product exposed	
60.4 Signs of mould and food spoilage	
60.5 Packaging blown	
60.6 Cans dented	
60.7 No visible expiry date on product	
60.8 Product has passed its sell by date/ best before date/use-by date	

SECTION 6: FOOD HOLDING, SERVING AND WASTAGE

61. How long is the food held after cooking and before serving?

Less than 15 minutes	
15- 30 minutes	
30-45 minutes	
More than 45 minutes	

62. How is the food kept warm?

63. At what temperature do you keep the food warm?

64. How do you check the temperature?

65. Is there adequate space for serving / portioning of food?

Yes	
No	

66. Are there adequate food serving utensils?

Utensil	Yes	No
66.1 Ladles		
66.2 Measuring equipment		
66.3 Serving spoons		
66.4 Tongs		
66.5 Serviettes		

67. What happens to leftover cooked food?

Thrown away	
Donated to charity/school	
Taken home	
Kept for the next day	
Food handlers eat it	
Other (please specify)	

68. Is left over food reheated and served the next day?

Yes	
No	

69. If yes, how is it reheated?

On the stove	
In the microwave	
In the food warmer	
Other (please specify)	

70. State whether the following is true or false?

Statement	True	False	Don't know
70.1 Each dish must be served with individual, clean utensil			
70.2 There must be no evidence of expired stock			
70.3 Food must be sold at correct Temperature			
70.4 Food must be protected from contamination			
70.5 Display units must be clean and free pest free			
70.6 Product core temperature must be monitored			
70.7 Temperature recordings are not important			
70.8 Fridge and freezer temperature's must be monitored and recorded			
70.9 Bacteria in food can multiply if the food is kept at incorrect temperatures			
70.10 Bain Marles can be used for reheating food			
70.11 Hot food that has not been served in 4hours must be thrown away			
70.12 Old cooked food can be mixed with new cooked food the next day			

71. Is there a designated rubbish area?

Yes	
No	

72. If yes, do you separate your waste?

Yes	
No	
Sometimes	
Other (please specify)	

THANK YOU

ANNEXURE I

OBSERVATION CHECKLIST

OBSERVATION	YES	NO	N/A	COMMENTS
GENERAL / MANAGEMENT				
1. Is the store safe file available in the working area?	Y	N		
2. Is the area in a good state of repair, clean and good housekeeping evident?	Y	N		
3. Is there evidence of monitoring procedures?	Y	N		
4. Is there evidence of policies and procedures? (ask)	Y	N		
5. Is there a working thermometer in kitchen?	Y	N		
6. Is there service learning agreement.	Y	N		
7. Is the establishment clear of any pest	Y	N		
8.Is there electric pest control devices	Y	N		
RECEIVING				
9. Is the delivery date written onto the product?	Y	N		
10. Is the delivery vehicle inspection checklist available and used? (*checks for cleanliness and pests*)	Y	N		
11. Is a Supplier Receiving Check sheet used? (*record food temperature and the vehicle temperature*)	Y	N		
12. Is the receiving area protected/ covered?	Y	N		
13. Is the receiving area in good housekeeping?	Y	N		
STORAGE				
14. Are all the products stored according to the storage procedure?	Y	N		
15. Is food stored with chemicals, packaging or waste?	Y	N		
16. Are the storage areas kept locked?	Y	N		
17. Open products, have they been resealed and date marked?	Y	N		
18. Is there adequate space in the storage areas?	Y	N		
19. Is the food stored in original packaging?	Y	N		
20. Are the products clearly labeled?	Y	N		
21. Are there expiry dates on food items?	Y	N		
22. If products are transferred to storage containers, is the expiry date recorded?	Y	N		
23. Are any foods that are past their expiry date used?	Y	N		
24. Are all containers covered?	Y	N		
25. Is any of the food old or stale?	Y	N		
26. Is there any evidence of decay in the fresh produce?	Y	N		
27. Are the storage areas in good hygienic condition?	Y	N		
28. Are the storage areas neatly arranged?	Y	N		
29. Is any food stored directly on the floor?	Y	N		
30. Are return products labeled correctly	Y	N		
31. Are there cardboard boxes storing food in the refrigerator?	Y	N		
32. Are raw and cooked foods stored separately in the fridge? (*Raw food below cooked food*)	Y	N		

33. Is there evidence of freezer burn on the products in the frozen storage?	Y	N		
34. Is the stock sheet kept? (ask)	Y	N		
35. Is the old stock of food used before the new stock (FIFO)? (ask)	Y	N		
36. Is there any evidence pest (rodents/insects) infestation?	Y	N		
37. Are there any unpleasant odours in the storage areas?	Y	N		
FOOD PREPARATION				
38. Is there adequate space for food preparation?	Y	N		
39. Is there adequate space for portioning?	Y	N		
40. Is there evidence of any wooden equipment?	Y	N		
41. Are there coloured chopping boards and knives used?	Y	N		
42. Are there adequate food preparation utensils?	Y	N		
43. Are the utensils placed in a sanitizer solution bucket in between use?	Y	N		
44. What fuel source is used for cooking? (e.g. wood, gas, electricity)				
45. Is the internal temperature of the food checked?	Y	N		
46. Is the frying oil monitored?	Y	N		
47. Is the correct defrosting practice following?	Y	N		
48. Is clean as you go practiced?	Y	N		
HOLDING				
49. Is the food served immediately following cooking?	Y	N		
50. How long is the food held between cooking and serving?				
51. Is the food kept warm at this time?	Y	N		
52. If yes, how is the food kept warm?				
53. Is the internal temperature checked?	Y	N		
54. If yes what temperature monitoring method is used?				
SERVING				
55. Are there adequate food serving utensils?	Y	N		
56. Are there adequate eating utensils?	Y	N		
57. Is the food stations covered?	Y	N		
58. Is the temperature of the food checked before serving?	Y	N		
59. If yes, if there is nonconformance what is done?				
60. Is the food served labeled correctly according to the company? requirements (*refer to Store Safe file*)	Y	N		
61. Is the serving area in a good state of repairs and housekeeping?	Y	N		
62. Is cooked food kept separately from raw food items?	Y	N		
WASTE				
63. Is all the prepared / cooked food served?	Y	N		
64. If not, is the left-over food stored properly?	Y	N		
65. Is left over food reused/reworked?	Y	N		
66. If yes, Is the internal temperature of reheated food checked? (ask)	Y	N		
67. Is there any food thrown away?	Y	N		
68. Is there a designated rubbish bin for food?	Y	N		
69. Are the dust bins covered?	Y	N		
70. Are the dust bins clean?	Y	N		

71. Is there waste lying outside the dustbins?	Y	N		
72. Is the waste removed regularly/ no dirt buildup?	Y	N		
HYGIENE	Y	N		
73. Are the kitchens utensils clean?	Y	N		
74. Is the kitchen equipment clean?	Y	N		
75. Are there correct cleaning chemicals available?	Y	N		
76. Are there adequate cleaning supplies e.g. cloths, scourers, etc?	Y	N		
77. Are the work areas clean?	Y	N		
78. Is the area cleaned frequently during preparation?	Y	N		
79. Is the area sanitized following food preparation?	Y	N		
80. Is there water available for cleaning?	Y	N		
81. Is the hand wash basin available?	Y	N		
82. If yes, is it accessible and clean?	Y	N		
83. Is there water available for the food handlers to wash their hands?	Y	N		
84. Is there antibacterial soap available for hand washing?	Y	N		
85. Is there a hand sanitizer?	Y	N		
86. Is there a disposable paper towel and pedal bin?	Y	N		
87. Do the food handlers wash their hands regularly?	Y	N		
88. Are the food handler's overalls/ clothes (PPE) clean?	Y	N		
89. Are the food handlers wearing the correct PPE for their function?	Y	N		
90. Do the servers wash their hands before serving?	Y	N		
91. Are the food handlers wearing gloves when they serve?	Y	N		

Additional notes and comment?

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ANNEXURE J

3 July 2018

To whom it may concern

Re: Dissertation prepared by Ms. Anele Sibisi

This letter serves to confirm that as requested by Prof Carin Napier I have recently edited the Dissertation entitled: **Food hygiene, food safety, food handling practices and knowledge of food handlers in a food retail company in Durban, KwaZulu-Natal, South Africa.**

To the best of my knowledge the work is now free of spelling, grammatical and linguistic errors and reads well. Where applicable I also made suggestions for specific corrections to the content. Due to time constraints the author is, however, responsible for implementing my final corrections.

I am a qualified and experienced editor and proof reader.

Michael Vermeer
Editor, Proofreader

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