Assessing the Knowledge, Attitudes and Practices of Street Food Vendors in the City of Johannesburg regarding Food Hygiene and Safety

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A mini-thesis submitted in partial fulfillment of the requirements for the degree of Masters in Public Health at the School of Public Health, University of the Western Cape.

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Supervisor**:** Prof Thandi Puoane

Assessing the Knowledge, Attitudes and Practices of Street Food Vendors in the City of Johannesburg regarding Food Hygiene and Safety

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food hygiene

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street food vendors

knowledge

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practices

training

hawkers

informal

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DECLARATION

I, Penelope Tracy Campbell, declare that this Master of Public Health thesis entitled: *Assessing the Knowledge, Attitudes and Practices of Street Food Vendors in the City of Johannesburg regarding Food Hygiene and Safety,* is my own work, that it has not been submitted for any degree or examination in any other university, and that all sources I have used or quoted, have been indicated and acknowledged by complete references.

_____

P T Campbell
May 2011

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ACRONYMS AND ABBREVIATIONS

CoA	Certificate of Acceptability
CDC	Centers for Disease Control
EHP	Environmental Health Practitioner
FAO	Food and Agriculture Organization of the United Nations
HACCP	Hazard Analysis & Critical Control Point
HAM	Health Action Model
KAP	Knowledge, Attitude & Practices
SFVs	Street Food Vendors
WHO	World Health Organization of the United Nations

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ABSTRACT

Introduction: Poor personal and environmental hygiene contribute significantly to food contamination and resultant foodborne diseases. It is assumed that by their nature, street food contamination is inevitable, yet millions of people depend on this source of nutrition and economic livelihood. Foodborne illness poses substantial health burdens and their impact on vulnerable populations is concerning. Education of food industry personnel in hygiene matters is recommended for improving safer food handling practices. Environmental Health Practitioners are, in terms of South African food safety law, authorized to train food handlers. There is, however, a lack of documentary evidence of improvements in food hygiene standards which can be directly related to education or training. This study is aimed to assess the extent of street food vendor information and education on food safety.

Aim: To determine the knowledge, attitudes and practices (KAP) of street food vendors, within the City of Johannesburg, with regard to food hygiene and safety.

Methods: A descriptive, cross-sectional study utilizing a quantitative research approach. Data was collected through face-to-face interviewing of street food vendors, with observations of general hygiene and cleanliness. Data was captured in Excel and imported into CDC Epi Info version 3.4.3 (2007) for analysis. Numerical data was analyzed using descriptive statistics and categorical data was analyzed using frequencies. Bivariate analysis was used to establish differences between regions with high and low proportions of street food vendors with regard to

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knowledge, practices and attitudes variables. Chi-square testing was used to assess statistical significance differences between high density and low density regions with the cut off point for statistical significance set at $p<0.05$.

Results: One hundred and fifty street food vendors (SFVs) participated in this study. Seventy seven percent entered the business due to unemployment. Sixty seven percent had been trained in food safety and eighty six percent were certified. Regions with a higher density of SFVs were more likely to have received training as opposed to regions with a lower density of SFVs and this was statistically significant $x^2=3.34$: $p<0.05$. Although most of the vendors could not list the 5 Keys to Safer Foods, their knowledge of the actual behaviours associated with each key is acceptable. Attitude towards food safety was also positive since all questions had greater than 71% agreement on the attitude to specific food safety behaviours. In relation to self reported practices, SFVs from high density regions and trained SFVs were more likely to practice food separation to prevent cross contamination and this was statistically significant. Trained SFVs were more likely to have stands or stalls that met hygiene standards as observed by the EHPs and this was found to be statistically significant.

Conclusion: This study indicates that street food vendors have adequate information regarding food safety principles and their attitudes to food safety can be regarded as attuned to the need to ensure safe practices in food preparation. The practices assessed in this study also indicate that street food vendors can provide food safely although attention needs to be given to some practices and regulatory compliance. Training can be regarded as essential to ensure food safety.

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DEFINITION OF TERMS

Certified: Informal traders who are regulated, i.e. they comply with Food Safety Regulations relating to food premises and have been issued a Certificate of Acceptability.

Certificate of Acceptability: Certification issued to owners of premises on which food is to be handled as per the regulatory requirements of the Health Act of 1977, Act 63 of 1977. CoAs are issued to owners of premises on which food will be handled once an Environmental Health Practitioner has inspected the premises and found them to be compliant and suitable for the preparation of food in terms of the Regulations published under the Health Act of 1977, viz Regulations Governing General Hygiene Requirements for Food Premises and the Transport of Food, Regulations 918 of 1999.

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Environmental Health Practitioners (EHPs): Trained professionals, competent to enforce, amongst others, Food Safety legislation in South Africa. For law enforcement, they are authorized as Inspectors. In other countries the terms Environmental Health Officers (EHOs) or Health Inspectors may also be used.

Five (5) Keys to Safer Foods: Essential food safety messages or principles linked to behaviours that, if adopted and practiced, will reduce the probability of foodborne illness.

Food Safety: The assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use.

Food Hygiene: All conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain.

Formal food vendor: Person involved in food preparation, distribution or selling thereof in the mainstream sector e.g. restaurants, hospitals, catering establishments, food factories etc.

HACCP approach: Food Safety Management plan that utilizes an assessment of Hazards, analysis thereof and identification and implementation of Critical Control Points.

Informal food vendor: Person involved in food preparation, distribution or selling thereof in the "non-mainstream" sector such as street food vendors or hawkers.

Matriculation: Highest certificate attained after spending a minimum of 12 years at school.

Potable water: Water that is considered suitable for human consumption (drinkable) as per the WHO Drinking water Guidelines, 2006.

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Registered: Informal traders who are legally operating by complying to business/trade regulations.

Street Foods: Ready-to-eat foods prepared and/or sold by vendors and hawkers in streets and other similar public places.

Street Food Vendors: Entrepreneurs selling ready-to-eat foods and beverages.

Ward: A local government demarcation of municipal area into manageable, politically affiliated units. A number of wards may be grouped together as management regions to effectively manage Environmental Health functions.

CHAPTER 1: INTRODUCTION

Background

The street food industry plays an important role in cities and towns of many developing countries both economically and in meeting food demands of city dwellers (Cress-Williams, 2001). It also contributes substantially to household food spending and provides an income to many female-headed households. It is estimated that street foods contribute up to 40% of the daily diet of urban consumers in developing countries (Consumers International, undated). This global phenomenon is not uncommon to South Africa with estimates of employment generated by this sector between 6-20% (Mathee, Schirnding, Byrne, DeBeer, Letlape, Hobbs, Swanepoel, 1996). Martins & Anelich estimate that in 1999, private households in South Africa spent R 4 399, 4 million on food bought for consumption away from home (Martins & Anelich, 2000). Approximately 47% of this (equivalent to R 2 071, 9 million) was spent on meals and snacks in hotels, restaurants or on street foods (Martins & Anelich, 2000).

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Street foods are defined by the Food and Agricultural Organization (FAO) as ready-to-eat foods and beverages prepared and sold by vendors and hawkers in streets and other similar public places (FAO, 1997). Foods are therefore prepared in an informal setting and street food vendors are classified as informal food vendors. Street food vendors are thus exposed to climate and temperature, unsafe water supplies, sanitation and pests. The foods are often prepared under unsanitary

conditions and stored for long periods in unsuitable conditions before selling. It is known that poor personal and environmental hygiene contribute significantly to food contamination and resultant foodborne diseases (Mathee *et al*, 1996; Bryan, Michanie, Alvarez, and Paniaywa, 1988). Street foods are perceived to be a major contributory factor, as in most instances, food is prepared in unsanitary conditions by people not trained in proper food handling techniques (WHO, 1984). For example, during the outbreak of cholera in Peru in 1991, street food was reported as a possible avenue for its spread. Priority sanitary actions were taken to reinforce street food control programmes (Codjia, 2000). Foodborne disease outbreaks are common in South Africa, but are rarely reported (Smith, Gouws, Hoyland, Sooka, Keddy, 2007). Although food poisoning is a notifiable disease, the Department of Health reports that "food related and other diarrhoeal illnesses are conditions that are clinically mild and are less likely to be reported as people are less likely to seek medical attention." (Department of Health, 2009). The Department of Health published statistics relating to food poisoning in 2006. The report looked at number of reported foodborne illnesses and fatalities between 2001 and 2005. A total number of 1886 foodborne illnesses and 51 food borne illness related deaths were reported to the Department of Health. The majority of cases were reported from the Eastern Cape followed by KwaZulu-Natal and Limpopo respectively (Department of Health, 2006). Data on foodborne illness in the study area is this limited. Despite this, the preparation and handling of street food by the typical vendor can result in potential significant health risks for the South African consumer and there is special cause for concern, because of the health risks that are related to unsafe food (WHO, 1996). Health risks are

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significant in South Africa with its high HIV and AIDS prevalence, where in patients that are immuno compromised, a simple foodborne illness may be potentially fatal (Department of Health, 2009).

It is recognized internationally that these informal street food supply systems, which provide low-cost nutrition, should be managed and encouraged to develop, but with the emphasis on food safety (Consumers International, undated). In 1996, WHO recommended that member countries should ensure that street food vending is regulated and that measures are taken to ensure the education of street food vendors in hygienic food preparation principles (WHO, 1996). One of the major initiatives around street foods and their safety has been the FAO Street Food Project and in 1999, the South African Department of Health embarked on such a project with legislative and education components (Department of Health, 2001; Kidiku, 2001). One of the activities of the project was the implementation of a training programme (Department of Health, 2001). A baseline assessment focused on the quality and safety of street foods, the socioeconomic background of vendors and their customers, as well as vendors' facilities and aspects relating to the preparation of street foods, was conducted (Martins & Anelich, 2000). These findings resulted in the development of a training manual. Information sessions and workshops were conducted for Environmental Health Practitioners (EHPs) employed by the three major local authorities viz Cape Town, Durban and City of Johannesburg (Department of Health, 2001). The aim was to present the research findings and the

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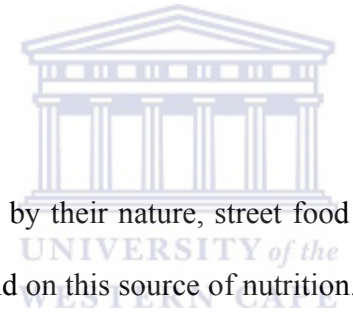
training manual and to encourage the EHPs to address street food safety (Department of Health, 2001).

The City of Johannesburg has been particularly proactive in taking measures to address street food vending and aims to have all street food vendors registered and trained on food hygiene and safety (Chakravarty, 2001; Kidiku, 2001). However, it has been expressed that there is uncertainty as to the effectiveness of the training in improving knowledge and practices about food hygiene and safety (Personal Communication with D Hammond, 20 February 2008).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Problem Statement

There is an assumption that by their nature, street food contamination is inevitable, yet millions of people depend on this source of nutrition. Education of food industry personnel in hygiene matters has been recommended as a means of improving food handling practices and thus the safety of food. There is, however, a lack of documentary evidence of improvements in food hygiene standards which can be directly related to education or training. It is thus imperative that an assessment be conducted to assess what information street food vendors have, in relation to food safety. Such an assessment has potential to identify areas that require strengthening or attention in the training programme with regard to ensuring the safety of street foods, especially for vulnerable groups. Additionally, legislative changes that may be necessary in light of such an assessment could be suggested. This study is

therefore aimed at assessing the knowledge, attitudes and practices of street food vendors regarding food hygiene and safety.

Study Setting

The City of Johannesburg is a sprawling, highly urbanized metropolitan municipality, centrally situated in the Gauteng Province. It is the largest city in South Africa with a population of 3, 2 million (approximately 1 million households), representing 7, 2% of the South African population. The city is the primary focal point for commerce, retail and industry within the country and remains the top contributor to the Gross Domestic Product.

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Purpose of the Research

This study is important to describe the knowledge, attitudes and practices of street food vendors in an urban setting, with regard to food hygiene and safety. Through such research, gaps in food safety/hygiene knowledge amongst street food vendors can be identified in order to underpin the development of more specifically targeted and effective training programme for such groups. Consumer confidence and regulatory control in street food vending can thus be achieved and the detrimental effects of food poisoning incidents on the consumers as well as the city would be minimized. The ability of street food vendors to prepare safe foods could still be questionable with the perception sustained that street food vendors pose a health risk for all customers. In light of the important contribution that street food vendors

make to the economy and food security/nutrition of many South Africans, information generated from this study may assist regulatory authorities with regard to policy and approaches to street food vendors. This supports the policy of the Government, to ensure that the foods sold on the streets or any other public place is safe, and of good quality.

The next chapter will describe the literature that is related to the research study.

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CHAPTER 2: LITERATURE REVIEW

A review of the literature to explore the studies that have looked at food safety and hygiene training with particular emphasis on street food vendors was conducted. The rationale to undertake a knowledge, attitudes and practices study is also briefly explored.

Knowledge, Attitudes and Practices (KAP)

The relationship between knowledge, attitudes and behaviour is often explained through the KAP model (Simelane, 2005). Knowledge accumulates through learning processes and these may be formal or informal instruction, personal experience and experiential sharing (Glanz & Lewis, 2002). It has been traditionally assumed that knowledge is automatically translated into behaviour (Glanz & Lewis, 2002). However behaviour change theorists and experiences in the HIV field, have indicated that knowledge alone does not translate into appropriate behavior modification (UNAIDS 2004, Shisana & Simbayi, 2002, Glanz & Lewis, 2002). Knowledge however is not insignificant and it is found to be vital in the cognitive processing of information in the attitude-behaviour relationship (Simelane, 2005).

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Attitude involves evaluative concepts associated with the way people think, feel and behave (Keller, 1998). It comprises a cognitive, emotional and a behavioural

component implying what you know, how you feel and what you do (Keller, 1998). It has also been postulated that attitudes may influence one's intention to perform a given behaviour or practice (Rutter & Quine, 2003). They are thus correlated with behaviour, for instance if a person has a positive attitude towards appropriate handwashing, they are more likely to wash their hands (Simelane, 2005). However, some social scientists have argued that KAP surveys are not necessarily adequate or sufficient to provide information especially for programmatic planning. It is argued that critical elements relating to a variable may not be captured in the use of a questionnaire and that in depth information gathering using qualitative methods may be additionally beneficial in eliciting information, as surveys fail to explain the logic behind the behaviour (Launiala, 2009). Another concern is that there is an assumption that there is direct relationship between knowledge and behaviour. In health related studies, however, it has been found that knowledge is not the only factor that influences treatment seeking practice and in order to change behaviour, health programmes need to address a number of issues including socio-cultural, environmental, economical and structural factors (Launiala, 2009). Behaviourists further add that a number of factors can influence one or more of the KAP variables such as self esteem, self efficacy and misconception (Ajzen, 2002, Keller, 1998, Glanz & Lewis, 2002). A few studies have looked at this aspect of behaviour change, including behavioural models in food handler training, and are discussed later.

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Foodborne Diseases

Contaminated food and water have been known to be sources of illness in human societies since antiquity. Foodborne diseases are still among the most widespread health problems in the contemporary world. In rich and poor countries alike, they pose substantial health burdens, ranging in severity from mild indisposition to fatal illnesses. However, the burden of foodborne disease is not well defined globally, regionally or at country level (WHO Food Safety, undated). Estimates of the burden of foodborne disease are complicated by the fact that very few illnesses can be definitively linked to food. Often these links are only made during outbreak situations (Flint, Van Duynhoven, Angulo, DeLong, Braun, Kirk, Scallan, Fitzgerald, Adak, Sockett, Ellis, Hall, Gargouri, Walker, Braam, 2005). The extent of the problem is however unknown as foodborne diseases often go undetected or underreported. The current estimates of 1, 8 million deaths, only represent the tip of the iceberg (WHO Food Safety, undated). Studies determining the burden of acute gastroenteritis provide the basis for estimating the burdens due to food and specific pathogens commonly transmitted by food. Although acute gastrointestinal diseases are not all foodborne and foodborne diseases do not always result in acute gastroenteritis, food does represent an important vehicle for pathogens causing acute gastroenteritis (Flint *et al,* 2005). Obtaining global estimates is further complicated in that when data obtained from various countries are pooled to derive regional or global estimates, the influence of the study design and existing surveillance systems on those estimates have to be considered (Flint *et al,* 2005). In relation to study design it is evident that prospective and retrospective study designs yield different

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disease estimates. Prospective cohort studies have community and etiologic components, and retrospective study designs are cross-sectional surveys with or without supporting targeted studies. Prospective cohort studies, although expensive, provide community incidence rates that are pathogen specific. In cross sectional surveys, investigators ascertain the prevalence of self reported acute gastroenteritis among persons in the community during a set period of time. For example, in a retrospective study conducted in the United Kingdom, an incidence of 5.5 cases per person-year was calculated. However, a subsequent prospective study indicated a calculated incidence of almost 3 times that as calculated by the prospective study (Infectious Intestinal Diseases Study Team, 2000). The retrospective estimate of foodborne diseases burden was similar to previous estimates from retrospective studies conducted in the United Kingdom, Australia, Canada, Ireland, and the United States (Palmer, Houston, Lervy, Riberio & Thomas, 1996; Feldman & Banatvala, 1994; Flint *et al*, 2005). Conversely, the prospective estimates from the English study are similar to prospective estimates from a study conducted in the Netherlands (Infectious Intestinal Diseases Study Team, 2000; Wit de, Koopmans & Kortbeek, 2001). Reasons for the differences between study designs have been attributed to recall bias or telescoping (Infectious Intestinal Diseases Study Team, 2000). A more thorough examination of the effect of study design on disease estimates would be needed prior to a comparison of data from national studies. Inferences can be made regarding the enormity of the problem, when looking at estimates of the incidence of acute gastroenteritis during childhood, in that an important proportion of cases are caused by foodborne pathogens (Flint *et al*, 2005). The FAO estimates that as much

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as 70% of diarrhoeal diseases in developing countries are believed to be of foodborne origin (FAO, 1995). The World Health Organization (WHO) recognizes that foodborne diseases include a wide spectrum of illnesses which are a growing public health problem worldwide and are a major contributor to illness, compromised nutritional status, less resistance to disease and loss of productivity (WHO Food Safety, undated). The globalization of the food supply system has presented new challenges for food safety and has contributed to the international public health problem of foodborne disease. This is attributed to the growing industrialization and trade of food produce, rapid urbanization associated with increased food preparation/consumption outside the home and the emergence of new or antibiotic-resistant pathogens and food vehicles (WHO Food Safety, undated). To initiate and sustain efforts aimed at preventing foodborne diseases at national and international levels, the magnitude of the problem needs to be determined. In light of the data gaps relating to the true burden of foodborne diseases and its impact on development and trade, the WHO have embarked in 2010 on a Global Initiative to Estimate the Global Burden of Diseases in conjunction with multiple partners (WHO Food Safety, undated).

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The South African Department of Health has also recognized that foodborne disease outbreaks are under-reported. Since most diarrhoeal illness resolve within 24 to 48 hours without any medical attention, many food-related illnesses are not diagnosed and associated foodborne disease outbreaks are often not recognized (Department of Health, 2009). The Department of Health postulates that “when people do seek

medical attention health workers are less likely to report these less severe conditions", thus posing a challenge to the health care system to maintain the knowledge and resources to identify and respond to these outbreaks (Department of Health, 2009). The data available in South Africa, for 2001 to 2006, indicates that most outbreaks are reported in the provinces of Eastern Cape, KwaZuluNatal and Limpopo respectively (Department of Health, 2006).

Trade in Street Foods

Due to socioeconomic changes in many countries, the street food sector has experienced phenomenal growth in the past few decades. Urbanization and population growth are expected to continue and street-vended foods, which are largely but not exclusively an urban phenomenon, will expand accordingly (Atkinson, 1992). Street food trade has emerged as an economic activity and a source of income for the poor in many developing countries. Street foods are also considered essential for maintaining the nutritional status of the population (Maxwell, 2000). In a longitudinal study conducted in Ghana, street foods accounted for 19-27% of food expenses and provided 134-417 kcal per day per person (Ag Bendech, 2000). Street food vending assures food security for low-income urban populations and provides a livelihood for a large number of workers who would otherwise be unable to establish a business. The benefits of this trade extend throughout the local economy as often vendors buy their ingredients locally (Winarno & Allain, 1991). Various projects have shown that street food trade generates a large volume of business, involving large amounts of money and

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provides a competitive source of employment and income to millions of people. The FAO estimates that there are approximately 100,000 vendors in Malaysia whose collective total annual sales amount to over $2 billion (FAO, 1995). In a survey conducted in Accra, Ghana, the street food sector was shown to employ over 60 000 people with an estimated turnover of US$ 100 million (Tomlins, 2002).

Street foods are defined by the Food and Agricultural Organization (FAO) as ready-to-eat foods and beverages prepared and sold by vendors and hawkers in streets and other similar public places (FAO, 1997). The central characteristic of street foods in this definition is their retail location, namely, that they are sold on the street and it is this that categorizes them as part of the informal sector. To differentiate street food vendors from formal sector food establishments, such as restaurants, Tinker (1987) adds a further qualification that street foods are sold on the street from "pushcarts or baskets or balance poles, or from stalls or shops having fewer than four permanent walls" (Tinker, 1987). Thus those who manufacture and/or sell street foods are micro-entrepreneurs forming part of the so-called informal sector. In light of this, the informal sector is not enumerated by official data collecting agencies, and thus official statistics on the street food trade are virtually non-existent (Tinker, 1987).

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Street foods are a heterogeneous food category, encompassing meals, drinks, and snacks. They are mass consumer foods that are normally eaten without further processing or cooking. Street foods show variation in terms of ingredients, methods of processing, and consumption (Ekanem, 1998). Street food trade usually involves

both retail and production activities, although the sale of street foods is the most visible part of the trade. Most street foods have been processed to some extent, much of which may have occurred unseen off-street. Because of this, the trade should be seen as part of the whole food system, rather than just as a service or retail activity (Cohen, 1985; Weber, 1987).

Street Food Vendors

A number of studies have examined the characteristics of vendors and have found that street food vendors do not form a homogenous group, but differ according to various socio-economic and demographic criteria. With regard to mode of selling, vendors can be broadly classified into stationary and ambulatory. It has been found that stationary vendors, who sold their wares from small stalls, kiosks, and so forth, were the predominant type in most of the countries studied (Powell, Brodber, Wint & Campbell, 1990; Tinker, 1987). Ambulatory vendors refer to those that push carts around selling their products. Most vendors operate from selected strategic locations, including bus and train stations, markets and shopping areas, commercial districts, outside schools and hospitals, residential suburbs, factories, and construction sites. In some places, it appears that vendors have a regular clientele (Nasinyama, 1992). A common perception is that street food vendors tend to concentrate in downtown commercial areas, but various country studies have shown this to be the exception in all locations except in Bangladesh and Thailand (Tinker, 1987; FAO, 1989). In Nigeria, 23 percent of vendors were located in residential areas (FAO, 1992). It is also postulated that street-food vendors, owing to their lack of or no education as

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well as being poor, lack an appreciation for safe food handling. Consequently, this together with the surroundings that they are prepared and sold in, street food is perceived to be a major public health risk. (WHO, 1996; Leus, Mpeli, Venter, Theron, 2006).

Safety of Street Foods

The main health hazard associated with street foods is microbial contamination, although pesticide residues, transmission of parasites, the use of unpermitted chemical additives, environmental contamination and limited access to safe water have also been identified as possible hazards (Abdussalam & Kaferstein, 1993; Arambulo, Almeida, Cuellar & Belotto, 1994). The potential for the contamination of street foods with pathogenic micro-organisms has been well documented and several disease outbreaks have been traced to consumption of contaminated street foods (Abdussalam & Kaferstein, 1993). The risk of microbial contamination is dependent on the type of street food and how the food is prepared. Food risk is influenced by food type, pH, and method of preparation, water availability, handling, exposure temperature, and holding time (Mathee *et al*, 1996). In general, cereal and bakery products with low moisture content, products that have been adequately sugared, salted, or acidulated, and some fermented products are less likely to support bacterial growth as opposed to dairy, egg, and meat products. Dishes containing raw ingredients or made with ice are also high risk items (Arambulo, *et al*. 1994). Foods that are cooked immediately prior to consumption are safer than those which have been cooked and stored at ambient temperature (WHO, 1984). Other factors

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implicated in causing microbial contamination include poor food preparation and handling practices, inadequate storage facilities, the personal hygiene of vendors, and a lack of adequate sanitation and refuse disposal facilities (Abdussalam & Kaferstein, 1993). In Ghana, in a study that investigated the microbial quality of street foods sold in Accra, *Shigella sonnei*, enteroaggregative *Escherichia coli* and *Salmonella arizonae* were the pathogens isolated from some food samples (Mensah, Yeboah-Manu, Owusu-Darko & Ablordey, 2002). In Ethiopia, a similar study isolated *Bacillus spp., staphylococci* and *micrococci* as the dominant groups in some foods (Muleta & Ashenafi, 2001).

Much of the work done in South Africa has focused on the microbiological quality of street foods as health risk is related to the potential of food to support microbiological growth or the microbiological contamination. Martins (2006) conducted a formative assessment on 200 street food vendors and 800 consumers in greater Johannesburg investigating the socioeconomic background of vendors and their customers, as well as vendors' facilities and aspects relating to the quality and safety, including microbiological testing, of foods. The author found that street vendors did observe good hygienic practices in preparing, cooking and handling foods, even though they were not aware of the reasons for doing so (Martins, 2000). Additionally, food was not kept overnight (a potential opportunity for contamination) due to the lack of refrigeration facilities (Martins, 2000).

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In 1997, Mosupye and von Holy compared the microbiological quality and safety of street foods involving 51 ready to eat street foods, 18 dish water and 18 surface swab samples taken in Johannesburg to those sampled and tested in other countries. The authors concluded that the bacterial counts in Johannesburg were lower than that of other countries (Mosupye & von Holy, 1999).

The health risk from street foods may be no greater than that posed by foods or dishes from other sources such as in restaurants (Abdussalam & Kaferstein, 1993). Two studies conducted in India found that the microbial quality of street foods was equivalent to, if not better, than that of foods bought from hotels and restaurants (Bapat, 1992; Chakravarty, 1994). In South Africa, a comparative study found no significant difference between 116 formal and informal food vendors regarding microbiological food quality. With regard to potential risks, formal vendors had more vending experience, used some precautions in food preparation and had better hygiene practices (Mathee *et al,* 1996). However, whilst food from the informal vendors was hot, food from formal food vendors tended to be cool and 73% stored leftovers for sale the next day, both of which are potential risks for microbiological contamination (Mathee *et al*, 1996).

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Impact of Education of Food Industry Personnel in Hygiene Matters

Education of food industry personnel in hygiene matters has been recommended as a means of improving food handling practices, and thus, the safety of food (WHO, 1996; FAO 1997). This is attributed to the fact that human handling errors have been

responsible for most outbreaks of food poisoning in developing and developed countries (Clayton, Griffith, Peters & Price, 2002; Ehriri & Morris, 1996; Todd, Greig, Bartleson, & Michaels, 2007; Howes, McEwen, Griffiths, & Harris, 1996). For example, the hepatitis A virus can be introduced by unwashed hands of food handlers who are themselves infected. Therefore, good personal hygiene, as well as, sanitary handling practices in the food processing area are essential components of any prevention programmes for food safety (Clayton *et al*, 2002; Todd *et al*, 2007). The Centers for Disease Control (CDC) has identified five risk factors related to the human factor and preparation methods that contribute to the high prevalence of food-borne illness. These are improper holding temperatures, inadequate cooking, contaminated equipment, food from an unsafe source and poor personal hygiene (Incidence of Foodborne Illness, 2010). The WHO has developed the five keys to safer foods, a tool to enhance food safety behaviours that if followed, or adopted, can reduce foodborne illness occurrence. The five keys are specific behaviours each linked to these five risk factors that will likely reduce foodborne illness. The 5 Keys to Safer Foods are: keep clean, separate raw and cooked, cook thoroughly, keep food at safe temperature, use safe water and raw materials (WHO, 2007). There is, however, lack of documented evidence of improvements in food hygiene standards which can be directly related to education or training (Rennie, 1994). Furthermore, there is very limited information or studies conducted to assess the impact of education in the informal sector.

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Evaluations of the effectiveness of formal food hygiene education courses in the United Kingdom, United States, Saudi Arabia and Romania prior to 1994, have identified increased knowledge levels of course participants, and improvements in the relationship between food industry and enforcement personnel due to a resultant common understanding (Rennie, 1994). However, despite the increased knowledge, evidence of consequential improved food handling behaviour was not clearly demonstrable (Rennie, 1994). Regulatory agencies utilize inspections and education of food handlers as two methods of ensuring food safety in the formal sector. The effectiveness of food handler education and inspections in ensuring food safety has, however been questioned owing to the variation in implementation of these two measures in the United States of America. (Riben, Mathias, Wiens, Cocksedge, Hazelwood, Kirchener & Pelton, 1998). Riben *et al,* (1998) reviewed the training and inspection reports of the Boston Inspectional Services Department (ISD) in order to assess the effectiveness of inspections and training. The inspection records reflected scores obtained by restaurants that were inspected, or risk assessed using a standardized form that identified 42 types of violations including items defined as "critical" - likely to be associated with foodborne illness or "non-critical" – likely to play a minor role in causing illness. Scores were calculated by deleting points from a perfect inspection score of 100 (no noted violations). Thus inspection scores could range from 0 to 100. In 1988, a training program was initiated by the Boston ISD. Participation was mandatory for managers of restaurants with suspended licenses due to conditions found on inspection that constituted an immediate threat to health and for restaurants linked epidemiologically to cases of foodborne illness. Participation

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by restaurant managers outside these categories was voluntary. Riben and colleagues (1998) then analyzed the routine inspection records, following the training from 1989 to 1992 for three groups of restaurants: a mandatory group, a voluntary group and a control group (no staff attended the training). The authors looked at records before the training (baseline), one year after training and two years after training (Riben *et al,* 1998). The evidence regarding the effectiveness of food handler training in improving food safety was weak, but it appeared that some training resulted in improved inspection scores (Riben *et al,* 1998). It also appeared that inspections were beneficial as worse inspection scores were noted where no inspections were previously conducted (Riben *et al,* 1998).

A systematic review to investigate the effectiveness of food safety training as an intervention was conducted by Campbell and colleagues in Canada (Campbell, Gardener, Dwyer, Isaacs, Kruger & Ying Jy, 1998). The inclusion criteria for the studies were multiple; including study design (controlled trials, cohort, case-control, pre-test/post-test without control, cross-sectional, ecological and time series); studies with specific interventions (inspection-based, food handler training and community based education); study selection of participants(food handlers working in the formal environment) and study outcomes (changes in inspection scores, knowledge of food safety practices and violation of inspection criteria). Quality assessment of the 34 studies included on the basis of the inclusion criteria categorized and rated 1 study as strong, 14 were moderate and 19 were weak. Therefore, only 15 studies were included in the systematic review. Interventions from the 15 studies were grouped

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into three categories of public health interventions regarded as important to enhance food safety: inspections, food handler training, and community-based education (Campbell *et al,* 1998*)*. Findings from the systematic review suggest that these multiple public health interventions are effective in assuring food safety, since routine inspection of food service premises (at least one inspection per annum) was effective in reducing the risk of food-borne illness as determined through improved inspection scores; food handler training can improve the knowledge and practices of food handlers, particularly if combined with certification; and selected community-based education programs can increase public knowledge of food safety (Campbell *et al,* 1998).

In the United Kingdom, a time-series experimental study was conducted as a result of the identification of unsatisfactory conformance to food safety standards following inspections (Rudder, 2006). The aim of the study was to identify barriers to compliance in the 40 food retail businesses. Environmental Health Officers (EHOs) conducted risk assessments on food safety through inspections at the establishments and categorized the businesses according to their performance. Over a period of six months the businesses were offered advice, seminars and one to one support. Thereafter, a further risk assessment was done and Rudder (2006) reported that 65% of the businesses had improved their risk profile, 15% had remained the same, 10% had some deterioration and a further 10% had completely deteriorated (Rudder, 2006). The authors concluded that lack of knowledge and understanding of the principles of food safety coupled with language difficulties, were significant

barriers to promoting food safety and that supportive activities can make a significant impact on practices (Rudder, 2006).

Aware of the lack of studies and clarity on the impact of training on food safety behaviours within the food industry, Nieto-Montenegro, Brown and LaBorde (2008) undertook a study that looked at developing and assessing a pilot food safety educational material and training strategy for Hispanic workers using the Health Action Model (HAM) (Nieto-Montenegro, Brown and LaBorde, 2008). HAM takes into account the social and environmental factors around the worker that may impact on adoption of behaviours (Tones *et al,* 1990; Nieto-Montenegro *et al,* 2006). Seaman and Eves indicate that the Health Action Model gives the most thorough description of factors that may influence behaviour change following hygiene training (Seaman & Eves, 2006). The study conducted by Nieto-Montenegro *et al* in 2008 using the HAM, found that the educational lessons alone produced a significant increase in knowledge and hand washing after using the restroom. With supervisor re-enforcement after training, hand washing before work and after breaks also increased significantly although there was no effect with the monetary incentive (Nieto-Montenegro *et al,* 2008). This study showed that elements of knowledge and motivational systems are important and that training is enhanced by supervisory re-enforcement of the behavioural rules with the personnel. Its premise is similar to the type of study needed to assess the effectiveness of training of street food vendor training.

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Knowledge, Attitudes and Practices (KAP) on Food Safety and Foodborne Diseases

A study to assess knowledge, attitudes, and behavior concerning foodborne diseases and food safety issues amongst formal food handlers conducted in Italy found that the majority of food handlers who had attended a training course had knowledge and a positive attitude toward foodborne diseases control and preventive measures (Angelillo, Viggiani, Rizzo & Bianco, 2000). The positive attitude was not supported when asked about self-reported behaviours and when observed during food preparation for practice of hygienic principles. This was on the basis that only 21% used gloves when touching raw, unwrapped food. Predictors of the use of gloves were educational level and attending training courses. The authors suggested that emphasis should continue on improving knowledge and control of foodborne diseases amongst food handlers (Angelillo *et al*, 2000).

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In Malawi, a study on the KAP on food hygiene of caregivers also showed a poor relation between knowledge, behavioural and sanitary practices, as swabs from caregivers' hands and food tested positive for coliforms and *E Coli*. (Kalua, 2002). Furthermore in a study conducted in Mauritius on 50 street food vendors, it was reported that despite the efforts of Health Inspectors in promoting the risks of poor hygiene practices, and an awareness of hygienic conditions, the majority were not putting their knowledge into practice as they perceived their products to be of low risk. (Subratty, Beeharry, and Chan Sun, 2004). The authors attributed this to lack of knowledge and recommended a need to strengthen the educational programme (Subrattty *et al,* 2004).

Mukhola (1998) in assessing the factors influencing the safety and quality of street food in a rural area in Limpopo examined the knowledge, attitude and perceptions in both street food vendors and consumers. Her findings indicated that the majority of street food vendors and consumers had little information regarding the proper preparation and storage of food as well as environmental conditions that may be detrimental to health. Furthermore 64.4% of consumers thought that street food is sold under unacceptable conditions and these needed improvement (Mukhola, 1998).

Based on the literature reviewed, many of the studies have been conducted on the formal sector; there is limited information on the effectiveness of training conducted on street food vendors. It is therefore very important to explore the KAP of street food vendors in order to allow for a better understanding of these variables in street food vendors in relation to Food Safety.

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CHAPTER 3: METHODOLOGY

This chapter describes the research methodology. It comprises the study aim; objectives; study design chosen; definition of terms; the study population; sampling; data collection techniques and tools; validity and reliability; data analysis; study limitations and the ethical considerations regarding the study are explained.

Aim

The aim of the study was to assess the knowledge, attitudes and practices of the street food vendors in the City of Johannesburg with regard to food hygiene and food safety.

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Objectives

To describe the demographic characteristics of the street vendors.

To describe the knowledge of street food vendors with regard to food hygiene and safety.

To determine the attitudes of street food vendors toward food hygiene and safety.

To identify the practices of street food vendors with regard to food hygiene and safety.

Study Design

A descriptive study design utilizing a quantitative method to describe the knowledge, attitudes and practices of street food vendors. This design was chosen as it would provide information on the knowledge and attitudes and practices of the population under study. It made possible the collection of information from a large group and is relatively inexpensive and can be used in a short space of time.

Definition of Terms

Certified: Informal traders who are regulated, i.e. they comply with Food Safety Regulations relating to food premises and have been issued a Certificate of Acceptability.

Certificate of Acceptability: Certification issued to owners of premises on which food is to be handled as per the regulatory requirements of the Health Act of 1977, Act 63 of 1977. CoAs are issued to owners of premises on which food will be handled once an Environmental Health Practitioner has inspected the premises and found them to be compliant and suitable for the preparation of food in terms of the Regulations published under the Health Act of 1977, viz Regulations Governing General Hygiene Requirements for Food Premises and the Transport of Food, Regulations 918 of 1999.

Environmental Health Practitioners (EHPs): Trained professionals, competent to enforce, amongst others, Food Safety legislation in South Africa. For law enforcement, they are authorized as Inspectors. In other countries the terms Environmental Health Officers (EHOs) or Health Inspectors may also be used.

Five (5) Keys to Safer Foods: Essential food safety messages or principles linked to behaviours that, if adopted and practiced, will reduce the probability of foodborne illness.

Food Safety: The assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use.

Food Hygiene: All conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain.

Formal food vendor: Person involved in food preparation, distribution or selling thereof in the mainstream sector e.g. restaurants, hospitals, catering establishments, food factories etc.

HACCP approach: Food Safety Management plan that utilizes an assessment of Hazards, analysis thereof and identification and implementation of Critical Control Points.

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Informal food vendor: Person involved in food preparation, distribution or selling thereof in the "non-mainstream" sector such as street food vendors or hawkers.

Matriculation: Highest certificate attained after spending a minimum of 12 years at school.

Potable water: Water that is considered suitable for human consumption (drinkable) as per the WHO Drinking water Guidelines, 2006.

Registered: Informal traders who are legally operating by complying to business/trade regulations.

Street Foods: Ready-to-eat foods prepared and/or sold by vendors and hawkers in streets and other similar public places.

Street Food Vendors: Entrepreneurs selling ready-to-eat foods and beverages.

Ward: A local government demarcation of municipal area into manageable, politically affiliated units. A number of wards may be grouped together as management regions to effectively manage Environmental Health functions.

Setting

The City of Johannesburg is a sprawling, highly urbanized metropolitan municipality centrally situated in the Gauteng Province. It is the largest city in South Africa with a population of 3, 2 million (approximately 1 million households), representing 7,2% of the South African population and the city is the primary focal point for commerce, retail and industry within the country and remains the top contributor to the Gross Domestic Product. The city, as depicted in figure 1, is divided into seven (7) managerial areas or zones called regions. The study was undertaken in four (4) out of the seven (7) regions. One of the regions compromised the city centre and the areas around the stadia which were used for the FIFA 2010 Soccer World Cup. The second region was in the north and included a sprawling informal township. The last two regions were to the west of the city. The city and its regions can be seen in figure 1. The selection of the regions is discussed hereunder in Sampling Procedure.

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Figure 1: Map of City of Johannesburg Depicting the 7 Regions

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Study Population

The study population consisted of street food vendors selling cooked foods in the City of Johannesburg, who had undergone training in Food Hygiene/Safety and were certified. In light of the inclusion criteria, the lack of official statistics on SFVs as well as the swapping of EHPs, awareness of where the trained and certified SFVs were was not available. A random point was determined per region and the EHP initiated dialogue with the first SFV that was encountered to determine if the inclusion criteria were met. Thereafter, the next SFV was approached, thus purposeful sampling was employed

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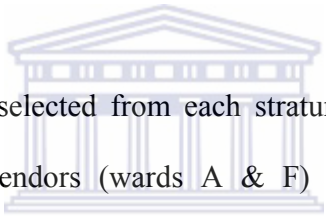
Sample Size

The targeted study sample for this study was 378 rounded to 400 in order to be representative and large enough to be able to draw valid conclusions, to give an adequate reflection of the study population and to cater for non-responses. By ensuring an appropriate sample design as well as a large enough sample size, sample error can also be decreased. The sample size was calculated using the statistical package, Epi Info version 3.4.3 (2007) on the assumption that 50% of this population knows and practice safe food practices. i.e. this is the estimate of the true proportion and a degree of error or desired range is +/- 5%. However due to practical reasons, as well as a number of factors including operational reasons, competing priorities and time constraints, only 150 street food vendors were recruited. The limitations of this will be discussed later and in chapter 5.

Sampling Procedure

The database of trained and certified street food vendors was used to determine the potential sample. Stratified random sampling was used. There are 7 wards/regions within the City. The wards/regions were grouped into two stratums; wards/regions with a high proportion of street food vendors (3) and wards/regions likely to have a low proportion of street food vendors (4). The regions were allocated to the two strata on the basis of the population demographics, regional characteristics and numbers of trained street food vendors in the regions as per the data base.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Two wards were randomly selected from each stratum, i.e. 2 wards with a large proportion of street food vendors (wards A & F) and two wards with a low proportion of street food vendors (wards B & C). In order to randomly obtain the two wards/regions from the three with a high proportion of street food vendors, the names of the wards/regions were written on individual pieces of paper. The papers were folded and shaken in a container. Thereafter a paper was withdrawn. The container was re-shaken and a further paper withdrawn. The process was repeated to select the wards/regions from the low proportion wards. Within each of these wards/regions 100 food vendors were to be randomly selected to be interviewed. Inclusion criteria: street food vendors registered (certified) and trained and operating a cooking vending service, who provide a cooked meal in the City of Johannesburg. Exclusion criteria: untrained and/or uncertified SFVs; trained and certified street food vendors who sell other foodstuffs that do not require cooking.

Data Collection Methods and Tools

The knowledge, attitudes and practices of street food vendors regarding food safety was determined by means of a face to face interview utilizing a semi-structured questionnaire. Two methods of data collection were used:

1. Interviews with street food vendors to collect data on knowledge and attitudes

Face to face interviews utilizing trained interviewers were carried out from 25 January to 25 February 2010 utilizing a standardized questionnaire. Interviews were conducted in English. The questionnaire was divided into five sections and comprised 47 questions. Data collected included general information such as products sold and demographic information; training and related information; knowledge and attitudes to regulatory measures; knowledge, attitude and practice to the tenants of food safety (clean, temperature control, cross contamination, safe ingredients). Possible answers were listed, e.g. Yes, No; True, False; Agree, Disagree etc and interviewers were required to circle the correct response. Street food vendors were interviewed at their stalls and the questionnaire took approximately 25 minutes to complete. The option to use a structured face to face interview approach as opposed to telephone or mailed interviews was seen as the most feasible given that a higher response is guaranteed, literacy levels are not called into question, and the clarifications can be done as necessary. This method does however have its shortcomings in that it is time consuming, costly and anonymity is not assured particularly if respondents are not comfortable with such techniques. In

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order to reduce bias, interviews were conducted by EHPs who were not associated with the street food vendors or had not been involved in their training, i.e. EHPs were swapped between regions.

2. Observations to collect data on practices related to food hygiene and safety

Data on availability of equipment for hygienic practice was collected from all sampled street vendors using an observation checklist. Seventeen critical elements to food safety and hygiene were listed on the observation checklist that formed the last part of the questionnaire. The EHPs had to assess if the equipment was available, e.g. a bowl or bucket for washing hands, soap, clean drying cloths etc. If these were available the answer, "Yes" was circled and if not available, "No" was circled by the EHP. Observations have limitations in that they may be regarded as being subjective. In order to address this, observations of equipment available were collected by EHPs, health professionals trained in food hygiene. This would then be used to conclude that if a water bucket and soap were available, that hand washing was done. However actual observation of food preparation would have been beneficial for this type of study so as to confirm whether the knowledge and attitudes expressed in the responses were in reality put into practice. However, due to the time implications this would create, this was not incorporated into the methodology.

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Tool Development

Owing to the lack of studies done in this sector, the data collection tool had to be developed and the training materials were used as a basis to develop some of the

questions. A tool developed by the WHO for the evaluation of the training was adapted for this purpose. Information from questionnaires used in documented studies on the formal sector was also utilized as well as general information in the literature review to formulate the questions.

The Questionnaire comprised questions to obtain information on demographical data such as age, level of education, date when trained; information on food hygiene and safety, buying and storing food, legislation, attitudes towards food safety and hygiene principles. The knowledge questions were dichotomous making allowance for yes/no or true/false answers. Data on the practices of street vendors were obtained through questions on how street food vendors handle foods, prevent cross contamination and the checklist to observe the cleanliness of the working area and the personal hygiene of the vendor. To assess the attitudes, a modified 3-point Likert scale was used ranging from agree to disagree and not sure. For cost convenience and for logistics, it was unnecessary to translate the questionnaire in light of the training conducted in English and the large variation in language use. (A third of the population reportedly speak English, an additional third speak Isizulu, whilst the final third speak one of the remaining nine languages). This may have an influence on the interpretation of the questions and the resultant information, although this was not considered problematic following the pilot study. Although a proportion of the food vendors indicated that they had no education, all the food vendors were conversant with English and were able to understand the questions. To ensure validity, the tool was shared with experts in the Food Safety environment, in

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particular those who have conducted research, were asked to peer review the instrument. To further assess the applicability of the tool to the local setting, a pilot study was carried out to verify clarity; understanding of the questionnaire and to determine amount of time required to complete the questionnaire. The pilot was conducted amongst ten randomly selected street food vendors in the Tshwane Metropolitan area. Minor adjustments were made to some of the questions for clarity and to improve understanding. The questionnaire took less than 30 minutes to complete. This took longer than the administration of the questionnaire by the EHPs as the validity of the questionnaire was checked with the SFVs.

A training session for the interviewers (EHPs) was held in November 2009. Topics covered included the rationale for the research, how it would assist the EHPs and the street food vendors, the feedback process and confidentiality including the swapping of EHPs. This was followed by an in-depth review of the questionnaire with role plays to allow for clarification by the EHPs on any of the questions. For operational reasons the data collection was postponed and all interviews were conducted from the 25 January to 29 February 2010.

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Validity and Reliability

In defining validity, it describes the properties of tests and measures. A test or measure is valid if the inferences made from it are appropriate, meaningful and useful. By including only certified SFVs in the sample, validity would be addressed as they would be in compliance to the minimum regulatory requirements, implying

that the premises on which they function had been assessed and found to be acceptable to produce food safely.

Validity is also focused on ensuring that chance, bias and confounding are addressed in the study design, sample, and data collection. In other words it is how reliable are the findings. Chance was to be addressed by ensuring that the sample size would be significantly large enough, that p-value will be set at a 95% Confidence level. However due to operational and other reasons the sample size had to be reduced to 200 with 50 randomly selected street food vendors interviewed per sampled ward. The statistical significance of the results will need to be interpreted with this in mind.

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Bias refers to the creation of a systematic error and there are a number of different opportunities for a systematic error to occur. These include Selection bias and Measurement or Instrument bias. Selection Bias refers to the representivity of the sample and this has been addressed by the random sampling employed in the study, as every ward/region had an equal opportunity of being selected and each street vendor had an opportunity of being selected in order to reduce this bias.

Measurement bias is linked to the instrument and data collection methods. Although a closed ended questionnaire is advantageous in this type of study design and can be used to elicit specific information in an efficient manner, the short coming of using closed ended questions is that they limit the range of participant responses and thus introduce bias or invalidity. This is a known short coming of KAP surveys and was

somewhat addressed by asking the interviewers not to read the list offered but illicit responses from the SFVs. It would have been ideal to include open ended questions and look at qualitative data analysis, however the recommendations of the faculty was to focus on one type of study approach in light of this being a mini thesis. Bias was further reduced in that data collectors (EHPs) did not administer the questionnaire within areas that they have jurisdiction, i.e. they were swapped across the regions. EHPs were trained prior to conducting the study and although there was a delay between the training and the administering of the questionnaire, a brief refresher discussion was held a week before the data collection commenced.

Face and content validity was ensured through the peer review of the questionnaire; ensuring that questions were consistent with the training material and the questionnaire was piloted to test the definitions and to ensure that ambiguity is addressed. Face validity was also controlled for by asking the SFVs in the pilot study if they understood the questions and the scales, hence the pilot study took longer to administer. The testing threat to internal validity was reduced as a result of the survey being unannounced. To ensure construct validity it would have been ideal to compute Pearsons correlations between each item and the total score of items within the same construct. This was however not achievable within the limitations of a mini theses and should be explored should a dissertation be attempted.

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To ensure reliability or the consistency of measurement, during the data collection period the questionnaire was administered to a repeat sample of 5% in order to ascertain if the same answers would be achieved.

Data Management, Processing and Analysis

Prior to data entry, and during the data collection period, questionnaires were checked by trained supervisors. The completed data was captured in Excel and imported into CDC Epi Info version 3.4.3 (2007) for analysis. Data cleaning and sample duplicate entry was used to assure data quality due to possible capturing errors. Questionnaires were filed for ease of verification. The observational data was categorized or coded to facilitate statistical analysis. All numerical data was analyzed using descriptive statistics and will be presented in chapter four. Categorical data was analyzed using frequencies and bivariate analysis was used to establish differences between regions with a high and low proportions of street food vendors with regard to knowledge, practices and attitudes variables. Chi-square testing was used to assess statistical significance differences between high density and low density regions with the cut off point for statistical significance set at $p<0.05$. Where cells had a value with less than 5, Fisher's exact test had to be used for testing significance.

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Response Rate

Two of the randomly selected street food vendors refused to cooperate. The first totally refused to participate during the informed consent process and the second, refused to continue when the questionnaire related to the KAP variables was administered. Both indicated that they would loose selling opportunities by continuing with the interview/questionnaire. The response rate was thus 98,7%.

Adjustments to the Study

There was a deviation from the sample originally envisaged. The sample had to be reduced in light of the operational requirements of the City of Johannesburg and was reduced to 200 (50 per ward). The study was designed such that a sample could be drawn from wards/regions with fewer street food vendors in order to assure that representivity was dealt with. Despite this reduction, the reduced sample of 200 could not be achieved as only 150 street food vendors were available for interviews. This may possibly be attributed to the quality of the database and the information made available when drawing the sample population. The criterion of providing a cooked meal item was strictly adhered to as this criterion is regarded in the scientific literature as the high risk food commodity most likely to result in food poisoning and seven respondents were excluded on this basis. The training and certification inclusion criterion was not strictly adhered to as some SFVs that were either not trained or not certified were also included in the sample. The data analysis was adjusted for training in order to explore the KAP of trained and untrained street food

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vendors. The implications of these adjustments are discussed in the limitations section.

Ethical Considerations

Ethical approval for this study was obtained from the Higher Degrees Committee of the University of the Western Cape in September 2008.

Permission to conduct the study was obtained from the National Department of Health and the City of Johannesburg. Although not all the street food vendors belong to the association for hawkers, the chairperson was informed of the study.

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An information document (Annexure 1) explaining the rationale for the study, together with the consent form (Annexure 2) was presented to the respondents in one of the three predominantly spoken languages in the area, viz. English, Isizulu and Setswana. Written informed consent was obtained prior to conducting the study.

CHAPTER 4: RESULTS

In this chapter, the results of the data gathered, including the demographic characteristics will be presented.

Participants & Demographics

The demographic characteristics of the participants are presented in table 1. One hundred and fifty street food vendors working with cooked food participated in this study. The majority of the street food vendors (82%) were under 50 years of age. The level of education was generally spread across the variables with 38% having undergone general education (at least nine years of schooling). Interestingly, 13% respondents had no education and 27% had received a primary level of education with a further 20% having attained matriculation (minimum of 12 years at school). The vast majority of the respondents (95%) were the owners of the business and 47% had been in business for longer than 3 years, whilst 23% had been in business for a year or less. Just over 52% were the sole operators with 29% creating a job opportunity for an additional person. Seventy seven percent stated that the reason for participation in this type of business venture was unemployment.

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Table 1: Demographic Profile and Geographical Distribution of Street Food Vendors (n=150)

	Region 1 (n=48) (32%) n (%)	Region 2 (n=50) (33.3%) n (%)	Region 3 (n=42) (28%) n (%)	Region 4 (n=10) (6.7%) n (%)	Total N=150 (100%)
Age					
< 30	3 (6%)	10 (20%)	4 (10%)	3 (30%)	20 (13%)
31-40	10 (21%)	18 (36%)	15 (36%)	2 (20%)	45 (31%)
41-50	22 (46%)	15 (30%)	15 (36%)	4 (40%)	56 (38%)
51-60	7 (15%)	3 (6%)	8 (19%)	1 (10%)	19 (13%)
> 60	6 (12%)	4 (8%)	0 (0%)	0 (0%)	10 (6%)
Education					
None	3 (6%)	8 (16%)	8 (19%)	0 (0%)	19 (13%)
Primary	12 (25%)	14 (28%)	11 (26%)	4 (40%)	41 (27%)
Grade 8-11	20 (42%)	15 (30%)	16 (38%)	6 (60%)	57 (38%)
Matriculation	13 (27%)	10 (20%)	7 (17%)	0 (0%)	30 (20%)
Apprenticeship	0 (0%)	1 (2%)	0 (0%)	0 (0%)	1 (0.7%)
Diploma	0 (0%)	1 (2%)	0 (0%)	0 (0%)	1 (0.7%)
Degree	0 (0%)	1 (2%)	0 (0%)	0 (0%)	1 (0.7%)
Ownership					
Owner	45 (94%)	46 (92%)	41 (98%)	10 (100%)	142 (95%)
Length in Business					
≤1 yr	7 (15%)	12 (24%)	8 (19%)	8 (80%)	35 (23%)
≤ 2yrs	3 (6%)	7 (14%)	6 (14%)	0 (0%)	16 (11%)
≤ 3yrs	2 (4%)	15 (30%)	10 (24%)	1 (10%)	28 (19%)
≥ 3rs	36 (75%)	16 (32%)	18 (43%)	1 (10%)	71 (47%)
Reason for business					
To increase Income	1 (2%)	12 (24%)	5 (12%)	1 (10%)	19 (13%)
Unemployed	38 (79%)	33 (66%)	35 (83%)	9 (90%)	115 (77%)
Business Opportunity	6 (13%)	0 (0%)	1 (2%)	0 (0%)	7 (5%)
Job Creation					
Single Operation	7 (15%)	33 (66%)	28 (67%)	10 (100%)	78 (52%)
1 employee	21 (44%)	14 (28%)	21%(9)	0 (0%)	44 (29%)
2 employees	16 (33%)	2 (4%)	10%(4)	0 (0%)	22 (15%)
3 employees	4 (8%)	1 (2%)	1 (2%)	0 (0%)	6 (4%)

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Training and Regulatory Requirements

Table 2 indicates that of the 101 (67%) street food vendors who reported having received training in food safety, 71 (70%) were from regions with a high proportion of street food vendors (SFVs) and 30 (29.7%) were from regions with a low proportion of SFVs. The difference between regions with a high density of SFVs and regions with a low density of SFVs was significant x^2=3.34: p<0.05. Regions with a higher density of SFVs were more likely to have received training as opposed to regions with a lower density of SFVs. Information on the time frame prior to the study, that 101 (67%) SFVs had received training indicates that 57 (5%) were exposed to training within 12 months prior to the survey. It must also be borne in mind that 35 (23%) had indicated that they were in business for less than or equal to a year and have not been afforded the opportunity to be trained. Of these 11 (31%) had been trained whereas 24 (67%) had not been trained.

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Table 2: Respondent Responses to Having Received Training and Time Frame Prior to the Training

Exposure to training (n=150)			**Trained** n (%)	**Not trained** n (%)	**Total** n (%)
Regions with high proportion of SFVs (n=98)			71 (70.3%)	27 (55.1%)	**98 (65.3%)**
Regions with low proportion of SFVs (n=52)			30 (29.7%)	22 (44.9%)	**52 (34.7%)**
Total N (%)			**101 (67.3%)**	**49 (48.5%)**	**150 (100%)**
			x^2=3.34: p<0.05*		
Time frame prior to study that training was attended (n=101)	**<6mths** ***n (%)***	**6-12mths** ***n (%)***	**13-24mths** ***n (%)***	**>24mths** ***N (%)***	**TOTAL** ***n (%)***
Regions with high proportion of SFVs	20 (58.9%)	21(91.3%)	23 (82.1%)	7 (43.8%)	**71 (74.4%)**
Regions with low proportion of SFVs	14 (41.2%)	2 (8.7%)	5 (17.9%)	9 (56.3%)	**30 (25.6%)**
Total N (%)	**34 (33.7%)**	**23(22.7%)**	**28(27.7%)**	**16(15.9%)**	**101 (100%)**

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Table 3 demonstrates that 129 (86%) street food vendors were in possession of Certificate of Acceptability (CoA) - the regulatory requirement allowing them to work with food on the premises (street stall) they are preparing food from. Of these 84 (65%) were from regions with a high density of SFVs and 45 (35%) from regions with a low density of SFVs. Ninety one percent indicated that they knew why a CoA was important. Ninety five percent knew their Environmental Health Practitioner (EHP) with 96% confirming that they had been inspected by an EHP and 13% indicating that an EHP had taken food samples. Although regions having a higher density of SFVs were more likely to be aware of, and in compliance to regulatory requirements, there was no statistical significance in the knowledge and compliance to regulatory requirements by the SFVs in the different regions.

Table 3: Knowledge and Compliance to Regulatory Requirements (n=150)

In possession of a CoA	**Yes n (%)**	**No n (%)**	**Total**
Regions with high proportion of SFVs(n=98)	84 (65.1%)	14 (23%)	**98 (65.3%)**
Regions with low proportion of SFVs (n=52)	45 (34.9%)	7 (33.3%)	**52 (34.7%)**
Total	**129(86%)**	**21 (14%)**	**150 (100%)**
	x^2=0.02: p=0.45		
Know why CoA is important	**Yes n (%)**	**No n (%)**	**Total**
Regions with high proportion of SFVs(n=98)	86 (79%)	12 (21%)	**98 (65.3%)**
Regions with low proportion of SFVs (n=52)	50 (36.8%)	2 (14.3%)	**52 (34.7%)**
Total	**136 (90.7%)**	**14(9..3%)**	**150 (100%)**
	x^2=2.81: p=0.08		
Know who the EHP is	**Yes n (%)**	**No n (%)**	**Total**
Regions with high proportion of SFVs(n=98)	92 (64.3%)	6 (85.7%)	**98 (65.3%)**
Regions with low proportion of SFVs (n=52)	51 (35.7%)	1 (14.3%)	**52 (34.7%)**
Total	**143 (95.3%)**	**7 (4.7%)**	**150 (100%)**
	x^2=1.33: p=0.23		
EHP has conducted an Inspection	**Yes n (%)**	**No n (%)**	**Total**
Regions with high proportion of SFVs(n=98)	93 (64.6%)	4 (80%)	**98 (65.3%)**
Regions with low proportion of SFVs (n=52)	51 (35.4%)	1 (4%)	**52 (34.7%)**
Total	**144 (96.6%)**	**51 (3.4%)**	**150 (100%)**
	x^2=0.50: p=0.43		
EHP has taken food samples	**Yes n (%)**	**No n (%)**	**Total**
Regions with high proportion of SFVs(n=98)	14 (70%)	84 (64.6%)	**98 (65.3%)**
Regions with low proportion of SFVs (n=52)	6 (30%)	46 (35.7%)	**52 (34.7%)**
Total	**20 (13.3%)**	**130 (86.7%)**	**150 (100%)**
	x^2=0.22 p=0.33		

However, as noted in table 4, when the data on knowledge and compliance to regulatory requirements was adjusted for exposure to training, trained SFVs knew the EHP and this was statistically significant x^2=4.98: p< 0.05. Trained SFVs confirmed that the EHP had conducted an inspection and this was statistically significant x^2=5.16: p=0.04.

Table 4: Respondents exposure to Training and their Knowledge of Compliance to Regulatory Requirements (n=150)

In possession of a CoA	**Yes n (%)**	**No n (%)**	**Total**
Trained (n=101)	86 (66.7%)	15 (71.4%)	**101 (67.3%)**
Untrained (n=49)	43 (33.3%)	6 (28.6%)	**49 (32.7%)**
Total	**129 (86%)**	**21 (14%)**	**150 (100%)**
	x^2=0.18: p=0.44		
Know why CoA is important	**Yes n (%)**	**No n (%)**	**Total**
Trained (n=101)	94 (69.1%)	7 (50%)	**101 (67.3%)**
Untrained (n=49)	42 (30.9%)	7 (50.0%)	**49 (32.7%)**
Total	**136 (90.7%)**	**14 (9.3%)**	**150 (100%)**
	x^2=2.09:p=0.12		
Know who the EHP is	**Yes n (%)**	**No n (%)**	**Total**
Trained (n=101)	99 (69.2%)	2 (28.6%)	**101 (67.3%)**
Untrained (n=49)	44 (30.8%)	5 (71.4%)	**49 (32.7%)**
Total	**143 (95.3%)**	**7 (4.7%)**	**150 (100%)**
	x^2=4.98: p=0.04*		
EHP has conducted an Inspection	**Yes n (%)**	**No n (%)**	**Total**
Trained (n=101)	99 (68.8%)	1 (20%)	**101 (67.3%)**
Untrained (n=49)	45 (31.3%)	4 (80%)	**49 (32.7%)**
Total	**144 (96.6%)**	**5 (3.4%)**	**150 (100%)**
	x^2=5.16: p=0.04*		
EHP has taken food samples	**Yes n (%)**	**No n (%)**	**Total**
Trained (n=101)	14 (70%)	84 (64.6%)	**101 (67.3%)**
Untrained (n=49)	6 (30%)	46 (35.7%)	**49 (32.7%)**
Total	**20 (13.3%)**	**130 (86.7%)**	**150 (100%)**
	x^2=0.61 p=0.31		

Food Safety Knowledge

Table 5 shows that of the 69 (47%) street food vendors who were aware of the 5 Keys to Safer Foods, 57 (83%) were from regions with a high density of SFVs and 12 (17%) were from regions with a low density of SFVs. The difference in awareness between the regions was significant x^2=16.73: p < 0.05. SFVs from high density regions were more likely to be aware of the 5 Keys to Safer Foods. Adjusting the data for exposure to training still showed significant difference x^2=29.27: p < 0.05 with trained SFVs more likely to be aware of the 5 Keys to Food Safety.

Table 5: Participants Awareness of the 5 Keys (n=150)

Aware of 5 Keys*	**Yes n (%)**	**No n (%)**	**Total n (%)**
Regions with high proportion of SFVs (n=98)	57 (82.6%)	41 (50.6%)	**98 (65.3%)**
Regions with low proportion of SFVs (n=52)	12 (17.4%)	40 (49.4%)	**52 (34.7%)**
Total	**69 (46%)**	**81 (54%)**	**150 (100%)**
	x^2=16.73: p < 0.05*		
Awareness of 5 Keys adjusted for training	**Yes n (%)**	**No n (%)**	**Total n (%)**
Trained (n=101)	62 (89.9%)	39 (48.1%)	**101 (67.3%)**
Untrained (n=49)	7 (10.1%)	42 (51.9%)	**49 (32.7%)**
Total	**69 (46%)**	**81 (54%)**	**150 (100%)**
	x^2=29.27: p < 0.05*		

* **5 Keys to Safer Foods** are : Key 1:**Keep Clean**; Key 2: **Separate Raw & Cooked**; Key 3: **Cook Thoroughly**; Key 4: **Keep food at safe temperatures**; Key5: **Use safe water and raw materials** (please see annexure 3 for explanation on the 5 Keys to Safer Foods)

Despite the poor awareness of what the 5 Keys to Safer Foods are, respondents answered satisfactorily with regard to the principles that the 5 Keys to Safer Foods are aimed at, i.e. Food Safety. Table 6 shows the results of the components of the questionnaire that related to an in-depth knowledge of the 5 Keys or Food Safety

knowledge. Statistical significance was found in relation to hand washing x^2=14.62: p = 0.0001, cross contamination prevention x^2=11.86: p < 0.05 and appropriate temperature control with regard to the correct cooling of cooked meat x^2=22.46: p < 0.05. Table 6 illustrates that 97 (65%) were aware that chopping boards could cause cross contamination with 73 (75%) SFVs from high density regions more likely to indicate this as opposed to 24 (25%) from low density regions and this was statistically significant x^2=11.86: p < 0.05. Knowledge on the correct storage of foods to prevent cross contamination can be considered to be good as 133 (89%) correctly answered with SFVs from high density regions more likely to answer correctly (66%) as opposed to 34% from low density regions. This was however not significant x^2=0.09: p = 0.49.

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Temperature control received good to satisfactory answers as 125 (83 %) were aware that cooked foods need to be served hot. Of those that correctly answered 85 (68%) were from high density regions and 40 (32%) were from low density areas. Although SFVs from high density regions were more knowledgeable on this variable, this was not statistically significant x^2=2.34: p = 0.07. Regarding knowledge on leaving foods overnight to cool, 110 (73%) correctly indicated that this should not be done. SFVs from high density regions (76.4%) were more likely to know this as opposed to 24% from low density regions. This finding was statistically significant x^2=22.46: p < 0.05.

Of the 125 (83%) SFVs that knew that the correct times to wash hands, 90 (72%) were from high density regions and 35 (28%) were from low density regions. SFVs from high density regions were more likely to be aware of this important activity, and it was statistically significant x^2=14.62: $p < 0.05$. Cause for concern was that 76 (51%) believed that clean water can be determined through observation. SFVs from high density regions were more likely to indicate this (71%) as opposed to 29% of SFVs from low density regions.

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Table 6: Combined Table of Respondent's Knowledge of Selected Questions Regarding Food Safety (n=150)

Keep Clean(Key 1) – Correct Hand washing	**Yes n (%)**	**No n (%)**	**Total n (%)**
Regions with high proportion of SFVs (n=98)	90 (72.0%)	8 (32.0%)	98 (65.3%)
Regions with low proportion of SFVs (n=52)	35 (28.0%)	17 (68.0%)	52 (34.7%)
Total	**125 (83.3%)**	**25 (16.7%)**	**150 (100%)**
	x^2=14.62: p = 0.0001*		
Cross Contamination (Key 2) –Chopping Boards	**Yes n (%)**	**No n (%)**	**Total n (%)**
Regions with high proportion of SFVs (n=98)	73 (75.3%)	25 (47.2%)	98 (65.3%)
Regions with low proportion of SFVs (n=52)	24 (24.7%)	28 (52.8%)	52 (34.7%)
Total	**97 (64.7%)**	**53 (35.3%)**	**150 (100%)**
	x^2=11.86: p < 0.05*		
Cross Contamination (Key 2) –Storage	**Yes n (%)**	**No n (%)**	**Total n (%)**
Regions with high proportion of SFVs (n=98)	88 (66.2%)	10 (58.8%)	98 (65.3%)
Regions with low proportion of SFVs (n=52)	45 (33.8%)	7 (41.2%)	52 (34.7%)
Total	**133 (88.7%)**	**17 (11.3%)**	**150 (100%)**
	x^2=0.35: p = 0.28		
Cross Contamination (Key 2) –Wiping Cloths can spread germs	**Yes n (%)**	**No n (%)**	**Total n (%)**
Regions with high proportion of SFVs (n=98)	90 (65.7%)	8 (61.5%)	98 (65.3%)
Regions with low proportion of SFVs (n=52)	47 (34.3%)	5 (38.5%)	52 (34.7%)
Total	**137 (91.3%)**	**13 (8.7%)**	**150 (100%)**
	x^2=0.09: p = 0.49		
Temperature (Keys 3&4)-Cooked food must be served hot	**Yes n (%)**	**No n (%)**	**Total n (%)**
Regions with high proportion of SFVs (n=98)	85 (68.0%)	13 (52.0%)	98 (65.3%)
Regions with low proportion of SFVs (n=52)	40 (32.0%)	12 (48.0%)	52 (34.7%)
Total	**125 (83.3%)**	**25 (16.7%)**	**150 (100%)**
	x^2=2.34: p = 0.07		
Temperature (Keys 3&4)-Cooked meat cannot be left overnight	**Yes n (%)**	**No n (%)**	**Total n (%)**
Regions with high proportion of SFVs (n=98)	84 (76.4%)	14 (35.0%)	98 (65.3%)
Regions with low proportion of SFVs (n=52)	26 (23.6%)	26 (65.0%)	52 (34.7%)
Total	**110 (73.3%)**	**40 (26.7%)**	**150 (100%)**
	x^2=22.46: p < 0.05*		
Use Safe water (Key 5) - Safe water can be seen	**Yes n (%)**	**No n (%)**	**Total n (%)**
Regions with high proportion of SFVs (n=98)	54 (71.1%)	44 (59.5%)	98 (65.3%)
Regions with low proportion of SFVs (n=52)	22 (28.9%)	30 (40.5%)	52 (34.7%)
Total	**76 (50.7%)**	**74 (49.3%)**	**150 (100%)**
	x^2= 2.21: p = 0.07		

When data was adjusted by training versus no training, knowledge in prevention of cross contamination and temperature control remained statistically significant. Table 7 indicates that 118 (78%) knew that it was important to wash utensils to prevent cross contamination, of which 86 (73%) were trained and 32 (27%) were untrained. Trained SFVs were more knowledgeable regarding cross contamination and this was statistically significant x^2=7.69: p = 0.004. Interestingly, irrespective of exposure to training, 91% indicated that cleaning cloths can spread germs. Keeping food at safe temperatures was an important consideration for 110 (73%) respondents of whom 82 (75%) were trained and 28 (26%) were untrained. Trained SFVs were more knowledgeable on keeping food at safe temperatures x^2=9.69: p < 0.05.

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Table 7: Respondents Exposure to Training and Responses to Some Knowledge Questions (n=150)

Washing of utensil is important between use on raw and cooked foods			
	True n (%)	**False n (%)**	**Total n (%)**
Trained (n=101)	86 (72.9%)	15 (46.9%)	**101 (66.3%)**
Not Trained (n=49)	32 (27.1%)	17 (53.1%)	**49 (32.7%)**
Total	**118 (78.7%)**	**32 (21.3%)**	**150 (100%)**
	x^2=7.69: p = 0.004*		
The same cutting board should not be used for raw foods and cooked foods even if it looks clean			
	True n (%)	**False n (%)**	**Total n (%)**
Trained (n=101)	64 (66%)	37 (69.8%)	**101 (67.3%)**
Not Trained (n=49)	33 (34%)	16 (30%)	**27 (26.7%)**
Total	**97 (64.7%)**	**53 (35.3%)**	**150 (100%)**
	x^2=0.22: p = 0.32		
Wiping Cloths can spread microorganisms			
	True n (%)	**False n (%)**	**Total n (%)**
Trained (n=101)	93 (67.9%)	8 (7.9%)	**101 (67.3%)**
Not Trained (n=49)	44 (32.1%)	5 (8.7%)	**49 (32.7%)**
Total	**137 (91.3%)**	**13 (8.7%)**	**150 (100%)**
	x^2=0.22: p = 0.43		
Cooked meat cannot be left overnight			
	True n (%)	**False n (%)**	**Total n (%)**
Trained (n=101)	82 (74.5%)	19 (47.5%)	**101 (67.3%)**
Not Trained (n=49)	28 (25.5%)	21 (42.9%)	**49 (32,7%)**
Total	**110 (73.3%)**	**40 (26.7%)**	**150 (100%)**
	x^2=9.69: p < 0.05*		
Safe water can be seen			
	True n (%)	**False n (%)**	**Total n (%)**
Trained (n=101)	52 (68.4%)	49 (66.2%)	**101 (67.3%)**
Not Trained (n=49)	24 (31.6%)	25 (33.8%)	**49 (32.7%)**
Total	**76 (50.7%)**	**74 (49.3%)**	**150 (100%)**
	x^2=0.08: p = 0.39		

Food Safety Attitudes

Table 8 shows the attitudes of street food vendors toward the principles for the prevention and control of foodborne diseases. One hundred and twenty five (83%) agreed that frequent hand washing is necessary and worth the effort. Street vendors from high density areas (66%) were more likely to agree with this as opposed to 34% in the regions with a low proportion of SFVs. This was not found significant x^2=0.03 p = 0.44. Almost all the street food vendors (90%) agreed that keeping surfaces clean was important. Street vendors from high density regions were more likely to agree (68%) with this than SFVs from low density regions (32%). This proportional difference was found to be significant x^2=5.94 p = 0.02. The need to prevent cross contamination by separating raw and cooked foods was an attitude that 85% of SFVs had. Of these 70% were from high density regions and 30% from low density regions. The SFVs from high density regions were more likely to have this attitude. This proportion was found to be statistically significant x^2=8.20 p = 0.04. Keeping foods at the correct temperature was an attitude that was regarded positively. Seventy one percent agreed that it was unsafe to keep foods unrefrigerated for more than two hours. Of these, 71% were from high density regions and 29% from low density regions. SFVs from high density regions were more likely to have a positive attitude toward temperature control and this was significant x^2=6.53 p = 0.03. The findings were similar for the other temperature control variable of thawing food correctly.

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Table 8: Street Food Vendors Attitudes to Food Safety Principles (n=150)

Frequent hand washing is worth the time	**Agree n (%)**	**Not sure n (%)**	**Disagree n (%)**
Regions with high proportion of SFVs (n=98)	82 (65.6%)	7 (43.7%)	9 (100%)
Regions with low proportion of SFVs (n=52)	43 (34.4%)	9 (56.3%)	0 (0%)
Total (*n*=150)	**125 (83.3%)**	**16 (10.7%)**	**9 (100%)**
	x^2=0.03 p = 0.44		
Keeping surfaces clean reduces risk of illness	**Agree n (%)**	**Not sure n (%)**	**Disagree n (%)**
Regions with high proportion of SFVs (n=98)	93 (68.4%)	4 (30.8%)	1 (100%)
Regions with low proportion of SFVs (n=52)	43 (31.6%)	9 (69.2%)	0 (0%)
Total (*n*=150)	**136 (90.1%)**	**13 (8.7%)**	**1 (6.7%)**
	x^2=5.94 p = 0.02*		
Keeping raw and cooked foods separate helps to prevent illness	**Agree n (%)**	**Not sure n (%)**	**Disagree n (%)**
Regions with high proportion of SFVs (n=98)	89 (70.1%)	6 (31.6%)	3 (75%)
Regions with low proportion of SFVs (n=52)	38 (29.9%)	13 (68.4%)	1 (25%)
Total (*n*=150)	**127 (84.7%)**	**19 (12.7%)**	**4 (2.7%)**
	x^2=8.20 p = 0.04*		
It is unsafe to keep food un-refrigerated for more than 2 hrs	**Agree n (%)**	**Not sure n (%)**	**Disagree n (%)**
Regions with high proportion of SFVs (n=98)	76 (71%)	11 (40.7%)	11 (68.75%)
Regions with low proportion of SFVs (n=52)	31 (29%)	16 (59.3%)	5 (31.25%)
Total (*n*=150)	**107 (71%)**	**27 (18%)**	**16 (11%)**
	x^2=6.53 p = 0.03*		
Thawing food in a cool place is safer	**Agree n (%)**	**Not sure n (%)**	**Disagree n (%)**
Regions with high proportion of SFVs (n=98)	80 (70.2%)	14 (43.75%)	4 (100%)
Regions with low proportion of SFVs (n=52)	34 (29.8%)	18 (56.25%)	0 (0%)
Total (*n*=150)	**114 (76%)**	**32 (21.3%)**	**4 (2.7%)**
	x^2=4.91 p = 0.02*		

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As displayed in table 9, when data was adjusted for exposure to training, the statistical significance difference in relation to attitude was not found in any of the variables.

Table 9: Respondents Exposure to Training and Attitudes to Food Safety (n=150)

Frequent hand washing is worth the time			
	Agree n (%)	**Disagree n (%)**	**Total n (%)**
Trained (n=101)	87 (69.6%)	14 (56.0%)	101 (67.3%)
Not Trained (n=49)	38 (33.3%)	11 (30.6%)	49 (32.7%)
Total	**125 (83.0%)**	**25 (16.7%)**	**150 (100%)**
	x^2=1.74 p = 0.10		
Keeping surfaces clean reduces risk of illness			
	Agree n (%)	**Disagree n (%)**	**Total n (%)**
Trained (n=101)	93 (68.4%)	8 (57.1%)	101 (67.3%)
Not Trained (n=49)	43 (31.6%)	6 (42.9%)	49 (32.7%)
Total	**136 (90.7%)**	**14 (9.3%)**	**150 (100%)**
	x^2=0.72: p = 0.28		
Keeping raw and cooked foods separate helps to prevent illness			
	Agree n (%)	**Disagree n (%)**	**Total n (%)**
Trained (n=101)	88 (69.3%)	13 (56.5%)	101 (67.3%)
Not Trained (n=49)	39 (30.7%)	10 (43.5%)	49 (32.7%)
Total	**127 (84.7%)**	**23 (15.3%)**	**150 (100%)**
	x^2=1.43: p = 0.12		
It is unsafe to keep food un-refrigerated for more than 2 hrs			
	Agree n (%)	**Disagree n (%)**	**Total n (%)**
Trained (n=101)	74 (69.2%)	27 (62.9%)	101 (67.3%)
Not Trained (n=49)	33 (30.6%)	16 (38.1%)	49 (32,7%)
Total	**107(71.3%)**	**43 (28.7%)**	**150 (100%)**
	x^2=1.21: p = 0.55		
Thawing food in a cool place is safer			
	Agree n (%)	**Disagree n (%)**	**Total n (%)**
Trained (n=101)	76 (66.7%)	25 (69.4%)	101 (67.3%)
Not Trained (n=49)	38 (33.3%)	11 (30.6%)	49 (32.7%)
Total	**114 (76.0%)**	**36 (24.0%)**	**150 (100%)**
	x^2=0.09 p = 0.39		

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Table 10 shows the attitudes of the street food vendors to EHPs. Almost all SFVs (98.7%) thought that the EHP is important for the street vendor business. However, only 74.7% felt that training conducted by the EHP was important for their business. This was most likely to be the attitude of SFVs in high density regions. The difference between the two groups was statistically significant x^2=9.47: p<0.05.

Table 10: Attitudes of Street Food Vendors to Environmental Health Practitioners (n=150)

	The EHP is important for the business		**Training by the EHP is important for the business**	
	Yes n (%)	**No n (%)**	**Yes n (%)**	**No n (%)**
Regions with high proportion of SFVs	96 (64.9%)	1 (50%)	81 (72.3%)	17 (44.7%)
Regions with low proportion of SFVs	52 (35.1%)	1 (50%)	31 (27.7%)	21 (55.3%)
Total (n=150)	**148 (98.7%)**	**2 (1.3%)**	**112 (74.7%)**	**38 (25.3%)**
	X^2=1.54: p = 0.65		x^2=9.47: p = 0.0014*	

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In table 11, when data was stratified by exposure to training, participants who had been exposed to training indicated that training would be beneficial for their business and this was statistically significant x^2=81.2: p< 0.05.

Table 11: Respondents Exposure to Training and Attitude to Ehps (n=150)

	The EHP is important for the business		**Training by the EHP is important for the business**	
	Yes n (%)	**No n (%)**	**Yes n (%)**	**No n (%)**
Trained	100 (67.6%)	1 (50%)	98 (87.5%)	3 (7.9)
Untrained	48 (32.4%)	1 (50%)	14 (12.5%)	35 (92.1%)
Total (n=150)	**148 (98.7%)**	**2 (1.3%)**	**112 (74.7%)**	**38 (25.3%)**
	X^2=2.04: p = 0.33		x^2=81.2: p = 0.0000*	

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Practices Relating to Food Safety Principles

Table 12 displays the practices of street vendors as self reported behaviours to the researchers. Eighty nine percent (89%) of respondents always observed the practice of separating raw and cooked foods to prevent cross contamination, of these 64% were from the regions with a high density of SFVs and 36% from low density regions. SFVs from high density regions were more likely to practice food separation to prevent cross contamination. This finding was significant x^2=25.16: p < 0.05. A further 8.7% of all SFVs reportedly practiced this most times and 2% indicated that they never practice this behaviour. Ensuring that fresh and quality ingredients are bought was always done by 87% of the respondents, with 9% practicing this sometimes. Although SFVs from high density regions were more likely to inspect food ingredients, the finding was not significant x^2=0.28 p = 0.30.

Table 12: Reported Practices of Street Vendors Regarding Food Safety Behaviours (n=150)

I separate raw and cooked food during storage					
	Always ***n (%)***	**Most Times** ***n (%)***	**Sometimes** ***n (%)***	**Not Often** ***n (%)***	**Never** ***n (%)***
Regions with high proportion of SFVs (n=98)	86 (64.2%)	10 (76.9%)	0 (0%)	0 (0%)	2 (66.7%)
Regions with low proportion of SFVs (n=52)	48 (35.8%)	3 (23.08%)	0 (0%)	0 (0%)	1 (33.3%)
Total	**134 (89.3%)**	**13 (8.7%)**	**0 (0%)**	**0 (0%)**	**3 (2%)**
	x^2=25.16 p < 0.05*				
I inspect food for freshness to ensure quality ingredients					
	Always ***n (%)***	**Most Times** ***n (%)***	**Sometimes** ***n (%)***	**Not Often** ***n (%)***	**Never** ***n (%)***
Regions with high proportion of SFVs (n=98)	86 (66.1%)	10 (66.7%)	2 (40%)	0 (0%)	0 (0%)
Regions with low proportion of SFVs (n=52)	44 (33.9%)	5 (33.3%)	3 (60%)	0 (0%)	0 (0%)
Total	**130 (86.7%)**	**15 (10.0%)**	**5 (3.3%)**	**0 (0%)**	**0 (0%)**
	x^2=0.28 p = 0.30				

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When data was stratified for exposure to training, participants who had been exposed to training were more likely to separate raw and cooked food during storage and this was statistically significant x^2=16.86, p< 0.05 (table 13).

Table 13: Respondents Exposure to Training and Practices (n=150)

I separate raw and cooked food during storage			
	Always &Most Times n (%)	**Sometimes *n (%)***	**Total N (%)**
Trained (n=101)	98 (72.6%)	3 (20%)	**101 (67.3%)**
Not Trained (n=49)	37 (27.4%)	12 (80%)	**49 (32.7%)**
Total	**135 (90.0%)**	**15 (10.0%)**	**150 (100%)**
	x^2=16.86 p <0.05*		

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Street food vendors were asked to produce their Certificates of Acceptability (CoAs). A CoA indicates that their premises have been inspected by the EHP. CoAs are issued to owners of premises(location/site) on which food will be handled once an EHP has inspected the premises and found them to be compliant and suitable for the preparation of food in terms of the Regulations Governing General Hygiene Requirements for Food Premises and the Transport of Food, Regulations 918 of 1999 (Department of Health, undated). Eighty six percent (86%) of the street food vendors produced the Certificate of Acceptability (CoA) indicating that the premises/facilities were suitable for the preparation of food. However not all the facilities were adequately equipped on the basis of the observational findings conducted by the EHPs as indicated in Table 14. Although the Certificate of Acceptability is specific for the structural aspects, conditions relating to food

preparation should also be considered when issuing the CoA. Cause for concern is that, from observation, only 63% had covered the food items they were selling.

Table 14: Observation Findings of the EHP with Regard to Inspection of the Premises (n=150)

	Regions with high proportion of SFVs (n=98)	**Regions with low proportion of SFVs (n=52)**	**TOTAL (n=150) n (%)**
	Yes *n (%)*	Yes *n (%)*	
A water container to carry water	81 (83.5%)	46 (88.5%)	127 (85.2%)
A bowl or bucket for washing hands	80 (82.5%)	43 (82.7%)	123 (82.6%)
Clean hand drying towels	68 (72.3%)	40 (76.9%)	108 (74%)
Nail brush	4 (4.1%)	2 (3.8%)	6 (4%)
Soap for hand washing	79 (81.4%)	38 (73.1%)	117 (78.5%)
A bowl or bucket for washing dishes and utensils	78 (80.4%)	39 (75%)	117 (78.5%)
Soap powder or liquid to wash dishes	78 (80.4%)	38 (73.1%)	116 (77.6%)
Cleaning cloths	88 (90.7%)	37 (71.2%)	125 (83.9%)
Bleach/Jik	50 (51.5%)	20 (38.5%)	70 (47%)
Broom and or mop	61 (62.9%)	16 (30.8%)	77 (51.7%)
Rubbish bags from your local council	79 (81.4%)	30 (57.7%)	109 (73.2%)
Cooler box	70 (72.2%)	43 (82.7%)	113 (75.8%)
Apron	88 (90.7%)	46 (88.5%)	134 (89.9%)
Doek/Scarf	80 (82.5%)	44 (83.2%)	124 (83.2%)
Pots with lids or a cover for cooked food	89 (91.8%)	38 (73.1%)	127 (85.2%)
Cloths to cover all food	60 (61.9%)	34(65.4%)	94 (63.1%)
Plastic table cloth	49 (50.5%)	35 (67.3%)	84 (56.4%)

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When the observational findings were adjusted for training, a number of correlations were found as depicted in table 15. SFVs who had been trained were more likely to have a water container to carry water and this was statistically significant x^2=7.05:

p<0.005. Trained SFVs were also more likely to have a container for washing utensils, as well as soap. This was found to be statistically significant for both variables x^2=8.06: p<0.05 and x^2=11.29: p=0.0004. In relation to effective waste removal, trained SFVs were more likely to have been supplied with rubbish bin bags and this was significant x^2=3.22: p<0.05. With regard to protective clothing, trained SFVs were more likely to be wearing aprons and this was statistically significant x^2=7.20: p<0.05.

Table 15: Observational Findings Adjusted for Exposure to Training (n=150)

A water container to carry water	**Yes n (%)**	**No n (%)**	**Total**
Trained (n=101)	80 (63.0%)	21 (91.3%)	**101 (67.3%)**
Untrained (n=49)	47 (37.0%)	2 (8.7%)	**49 (32.7%)**
Total	**127 (84.7%)**	**23 (15.3%)**	**150 (100%)**
	X*^{2}=7.05: p=0.003		
A bowl or bucket for washing dishes and utensils	**Yes n (%)**	**No n (%)**	**Total**
Trained (n=101)	72 (61.5%)	29 (87.9%)	**101 (67.3%)**
Untrained (n=49)	45 (38.5%)	4 (12.1%)	**49 (32.7%)**
Total	**117 (78.0%)**	**33(22.0%)**	**150 (100%)**
	X*^{2}=8.06:p=0.002		
Soap powder or liquid to wash dishes	**Yes n (%)**	**No n (%)**	**Total**
Trained (n=101)	70 (60.3%)	31 (91.2%)	**101 (67.3%)**
Untrained (n=49)	46 (39.7%)	3 (8.8%)	**49 (32.7%)**
Total	**116 (77.3%)**	**34 (22.7%)**	**150 (100%)**
	X*^{2}=11.29: p=0.0004		
Rubbish bags from your local council	**Yes n (%)**	**No n (%)**	**Total**
Trained (n=101)	78 (71.6%)	23 (56.1%)	**101 (67.3%)**
Untrained (n=49)	31 (28.4%)	18 (43.9%)	**49 (32.7%)**
Total	**109 (72.7%)**	**41 (27.3%)**	**150 (100%)**
	X*^{2}=3.22: p=0.04		
Apron	**Yes n (%)**	**No n (%)**	**Total**
Trained (n=101)	95 (70.9%)	6 (37.5%)	**101 (67.3%)**
Untrained (n=49)	39 (29.1%)	46 (35.7%)	**49 (32.7%)**
Total	**134 (89.3%)**	**16 (10.7%)**	**150 (100%)**
	X*^{2}=7.20 p=0.006		

Summary of Results

The results presented in this chapter show that despite a poor ability to list the 5 keys to safer foods, in general SFVs were knowledgeable on the principles of ensuring safe food. Regions with a high density of SFVs were more knowledgeable and more likely to be trained than SFVs from low density regions. A significant statistical difference was found between SFVs that were trained versus those untrained. Additional statistical significance was found in relation to knowledge on hand washing, cross contamination prevention and appropriate temperature control with regard to the correct cooling of cooked meat. Regarding attitudes to food safety principles, the respondents displayed a good to satisfactory attitude with SFVs from high density regions were more likely to have positive attitude to food safety principles and this was statistically significant. In relation to self reported practices, SFVs from high density regions and trained SFVs were more likely to separate food to prevent cross contamination and this was statistically significant. Cause for concern is that only 86% were certified and that only 63%used had covered the food items. Trained SFVs were more likely to have stands or stalls that met hygiene standards as observed by the EHPs.

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CHAPTER 5: DISCUSSION AND LIMITATIONS

This chapter compares the current study's findings with published literature. It also attempts to describe the strengths and the weaknesses of the data. The findings of the study provide information on the knowledge, attitudes and practices of street food vendors in the City of Johannesburg.

This study aimed to investigate the knowledge, attitudes and practices of street food vendors regarding food safety. It was indicated in the literature review that although studies have looked at knowledge, attitudes and practices of food handlers regarding food safety, a vast majority have focused on the food handlers in the formal situation, such as established restaurants. The rationale to undertake this study was to assess these factors in the informal sector as improper street food preparation may pose a significant risk to the consumer by virtue of the conditions in which they are prepared.

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Studies in developing countries have consistently shown that low educational levels and lack of employment are the most important factors contributing to street vending entrepreneurship. This study has shown the educational profile of street food vendors to be similar to results found in other countries (Chukuezi, 2010; Mensah *et al,* 2002; Donkor, Kayang, Quaye & Akyeh, 2009; Muinde & Kuria, 2005; Omemu & Aderoju, 2008; Choudhury, Mahanta, Goswami, Mazumder & Pegoo, 2010; Abdalla, Suliman & Bakhiet, 2009). In a descriptive study conducted in Nigeria, the

profile of the vendors was very similar to the findings of this study in that 14% of the food vendors did not have any form of education (13% in this study), 5% had primary school education (27% in this study), 52% had secondary school education (58% in this study) although a far larger proportion (29% in this study) had a tertiary (college) education (Chukuezi, 2010). Other studies in Ghana, Nigeria, Kenya, India and Sudan described similar education profiles although tertiary education has not been as high as this Nigerian study for their street vendor population (Mensah *et al,* 2002; Donkor, Kayang, Quaye & Akyeh, 2009; Muinde & Kuria, 2005; Omemu & Aderoju, 2008; Choudhury, Mahanta, Goswami, Mazumder & Pegoo, 2010; Abdalla, Suliman & Bakhiet, 2009).

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Regulation of street food vendors has been regarded as one of the interventions together with training that could support the street food sector (WHO, 1996). By regulating street food vendors, they are to be inspected as is the case with formal vendors/restaurants. If conditions are favourable, they are registered with the EHPs and are legally allowed to prepare and sell food in terms of the applicable legislation (Regulations Governing General Hygiene Requirements for Food Premises and the Transport of Food, GNR. 918 of 1999). They would also then be exposed to training programmes as they would be known and can be scheduled for training. Although certification and training were inclusion criterion in this study, this study found that only 86% were certified and that 67% of SFVs reported having received formal training. Only two other studies have documented certification of SFVs. In the Sudan, it was reported that 64% of street food vendors were certified and 0% in India (Abdalla *et al,* 2009; Choudhury *et al,* 2010). With regard to training, the large

proportion of untrained (33%) street food vendors in this study is concerning as it implies, that despite a regulation on training in existence, street food vendors have been certified or registered with the municipality to prepare and sell food without undergoing any training. The findings of this study are slightly better than the findings of two studies conducted in Nigeria that investigated the food safety knowledge and practices of street food vendors in two different geographical locations. Chukuezi (2010) reported that only 5% of SFVs had been exposed to formal training whereas Omemu *et al* (2008) findings established this at 12% of street food vendors (Chukuezi, 2010; Omemu *et al,* 2008).

The main health hazard associated with food borne diseases and street food is microbial contamination. The WHOs Five Keys to Safer Food (WHO, 2007) are recognized as a standard way of producing and maintaining safe food. Maximum adoption of these food safety keys and their associated behaviours ensure consumer protection against food health hazards (WHO, 2007). Although the majority of street food vendors in this study were not able to name the 5 Keys to Safer Foods, the knowledge of these principles was considered acceptable when they were asked on specific behaviours relating to the principles. For example, regarding Key 1 (Keep Clean), which relates to general cleanliness and hand washing, 84% knew that handwashing was important and 93% knew the importance of washing raw ingredients. In relation to Key 2 (separate raw and cooked food), 89% knew that raw and cooked food should be stored separately in the refrigerator, and 91% knew that wiping cloths can spread germs. When looking at the critical temperature issues covered by Key 3 (Cook food thoroughly) and Key 4 (Keep food at safe

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temperatures), 73% knew that cooked meat should not be left out of the fridge overnight and 83% knew that hot (cooked) foods should be served piping hot. When data was stratified by training, it was surprising to find no difference in knowledge between trained and untrained vendors although trained vendors provided more correct answers (69.9%). The finding that the food vendors were not able to specifically name the 5 Keys to Safer Food, may be attributed to the training. The principles or behaviours that are addressed in the 5 Keys may have been presented in the training as food safety principles rather than 5 Keys for safer food. Given that the 5 Keys were introduced by the WHO in 2007 (WHO, 2007), this may be particularly true for those street food vendors that had been trained prior to 2008, which is two years or more prior to the survey being conducted. The percentage of street food vendors who had received their training more than 24 months prior to the study was 30%. A shortcoming of this study was that the researcher did not do any verification of the training records to ascertain if indeed the specific 5 Keys training package was being utilized by the City of Johannesburg or whether they have just continued to utilize and teach only the principles of the 5 keys to safer food as part of the training curriculum for street food vendors. This should be investigated in future studies. The ability of the vendors to be able to provide correct answers for the actual behaviours was far better than being able to list the 5 keys as they are not stand alone messages and the knowledge of the actual behaviours indicates that they are far more likely to be put into practice.

The feacal-oral route is recognized as the most important mode of transmission for pathogenic microbes from food handlers to food (WHO, 1984). Keeping clean is

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one of the five keys that aim to promote good hygiene practices and cleanliness such as hand washing. In this study, 83% of street food vendors correctly indicated that hands should be washed after using the toilet and before handling food. Other studies conducted have not asked a similar question, i.e. to obtain the most critical times that hands should be washed. Abdalla and colleagues (2009) reported that 74% of the street vendors indicated that hands should be washed due to being contaminated and 92% gave "after using the toilet" as a reason for hand washing (Abdalla *et al*, 2009). However 38% indicated that hands should be washed when handling raw foods and 46% indicated that they should be washed continuously whilst handling foods. Seventy eight percent (78%) indicated that hands should be washed with soap and water with 8% indicating that they should be washed in hot water (Abdalla *et al*, 2009). In this study the attitude of street food vendors to hand washing confirmed the findings of Abdalla *et al*, in that 83% fully agreed that frequent hand washing was important. It can be said that the food vendors in this study have excellent knowledge and a positive attitude regarding hand washing. However, the perception by 52% of the food handlers that clean water can be easily identified with a naked eye is a concern and may need to be further explored in order to determine whether this is due to the proximity of tapped drinkable (potable) water in this study area or misconception about microbes. The perception that uncontaminated water may be detected with the naked eye is concerning, as with a perception like this, people may drink contaminated water on the basis of sight, whilst exposing themselves to deadly infections such as cholera. From a food safety perspective, this would be concerning when foods that do not have a heat step are washed in water perceived to be clean

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e.g. salads. Additionally hand washing, utensil washing and surface cleaning would also be hazardous if water perceived to be clean was used.

Time and temperature abuse and cross contamination are well documented in a number of retrospective studies that investigated the cause of food poisoning (Park, Kwak & Chang, 2010; WHO, undated; Bas, Ersun & Kivanc, 2006). The growth potential of microbes is enhanced or increased through time and temperature abuse and cross contamination (WHO, undated). Cross-contamination occurs when harmful micro-organisms are spread between food, surfaces and equipment. For example, if raw chicken is prepared on a chopping board and the board is not washed or insufficiently cleaned before preparing a ready-to-eat meal such as a salad or sandwiches, harmful bacteria can be spread from the chopping board to the ready-to-eat meal (WHO, undated). Cross-contamination can also occur if raw meat is stored above ready-to-eat meals as the raw meat juices can drip down on to the meals and contaminate them. Additionally the prevention of cross contamination through the separation of raw and cooked foods during storage and preparation is an additional important consideration. In the findings from this study the correct knowledge regarding cross contamination during preparation was reported by only 65% of the respondents which although satisfactory, is concerning, since major outbreaks are often associated with cross contamination (Park *et al*, 2010; WHO, undated; Bas *et al,* 2006). However, from a risk perspective, the risk posed by cross contamination during food preparation in these food handlers may not be high since very few prepared salad accompaniments. Knowledge that correct storage of food and clean

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wiping cloths could prevent cross contamination was very good. Eighty nine percent and 91% respectively gave correct responses. This was confirmed when attitude was assessed as 85% fully agreed with the statement that "keeping raw and cooked food separate may prevent illness". Eighty nine (89%) knew that cooked foods should be stored separately from raw foods. In an intervention study conducted in Ghana, the knowledge of the street food vendors with regard to this was reportedly much higher at 99% although only 27% reportedly practiced this (Donkor *et al*, 2009). In this study, 71% reported always practicing this behaviour. The higher level of knowledge in the Ghana study may be attributed to the fact that it was an intervention study. Participants were exposed to a baseline assessment, trained on food safety principles and then questioned on aspects of the food safety training. The participants may have been assessed within a short period after the training while in this study the assessment was conducted within varying time frames of the SFVs receiving training.

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Time and temperature abuse may occur when foods are not cooked adequately to the correct temperature and immediately served thereafter (WHO, undated; Incidence of Foodborne Illness, 2010). It may also occur when food not served immediately is cooled and stored inappropriately. If such food or left-overs are not adequately and sufficiently reheated, time and temperature abuse may occur (WHO, undated; Incidence of Foodborne Illness, 2010). Temperature abuse may also occur when food is held at the incorrect holding temperature for too long a period such as in the buffet type foodservice (WHO, undated; Incidence of Foodborne Illness, 2010). When

asked about storage of food, many of the vendors indicated that they did not need storage as they "bought enough to cook" and "cooked enough to sell", thus time and temperature abuse as well as cross contamination between raw and cooked foods were unlikely to occur in relation to these SFVs. In the study conducted by Chukuezi (2010), 43% of street food vendors had leftover food for serving the next day and yet only 33% of the vendors had refrigerators for storage. This may possibly be a reason why street foods in other developing countries may cause illness and have high microbial counts. In this study a cause for concern is that only 65% knew that cooked food needed to be adequately reheated. It may be possible that this is not a behaviour required to be practiced in this sector in South Africa as the focus is on the "cook enough to sell" concept. There is an indication that they do not prepare foods in advance and therefore do not conceptualize the need to reheat foods. Mosupye *et al (*1998) as well as Mukhola, (1998) concluded that the reasons for the low microbial counts from food vendor samples analyzed could be attributed to the food being prepared on the spot and sold to consumers whilst still warm and that most (82%) vendors did not take leftover food to the market. (Mosupye *et al,* 1998; Mukhola, 1998). This is one of the behaviours known to contribute to foodborne illness and there is a need to ensure that street food vendors are clear on this aspect in the event that they are called upon by communities to cook in for other reasons such as for funeral preparations. Data from the Department of Health indicates that community events such as funerals are increasingly featuring Food Poisoning Outbreaks and investigations thereof suggest that time and temperature abuse were the cause.

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This study found that many vendors have sufficient knowledge to ensure hygienic handling of food. In addition, 81% of SFVs displayed a positive attitude towards the five principles of food safety. The knowledge was in some instances applied into safe practices. Although samples of food were not collected to verify these safe practices it can be suggested that on the basis of previous studies done on microbial contamination that the low microbial contamination found was due to the high level of knowledge and practices of street food vendors with regard to food safety.

Although only personal hygiene and surroundings were observed in this study, the findings are at an acceptable level, perhaps confirming that hygienic and sanitation conditions have improved and that street food vendors in an urban environment are still capable of producing relatively safe food with low bacterial counts, as per the findings of von Holy and Makhoane (2006) and Leus *et al* (2006). This would need to be confirmed by microbiological sampling and testing with study designs similar to that employed by von Holy & Makhoane (2006) and Leus *et al* (2006). The observational findings in this study are consistent with the findings of Martins (2006) who reported that street vendors do observe good hygienic practices in preparing, cooking and handling foods (Martins, 2006). The survey conducted in 1999 in Johannesburg showed that high hygiene standards were maintained by most vendors during preparation and serving of food.

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Food safety is also dependant on personal and environmental hygiene. Due to the nature of street foods literally being prepared and served on the street, the physical conditions / preparation area are exposed to the natural elements. They have been further differentiated from the formal sector (restaurants etc) by Tinker (1987) adding a further qualification that street foods are sold on the street from "pushcarts or baskets or balance poles, or from stalls or shops having fewer than four permanent walls". Muinde *et al* (2005) confirmed in their study that such sites do not give proper protection of street foods from dust and smoke from vehicles. Dust has potential to carry many microbes that may be pathogenic if left to settle on prepared foods. Hence it is important that food is covered to protect it from such exposure (Muinde *et al,* 2005). In Sudan, Abdalla *et al,* (2009) found that 38% of vendors sold food with no covering (Abdalla *et al,* 2009). Based on observations, the current study found that 63% of street food vendors had cloths or alternative covering items to cover the foods being served. Chukuezi (2010) reported similar findings with 10% of the vendors storing food for serving in the open (Chukuezi, 2010). He furthermore found that 43% did not use aprons and 52% wore no hair covering. Consistent with this are the findings of Muinde *et al, (2005)* who found that 81.3% of the vendors did not use aprons and 65% did not cover the hair while Mensah *et al (*2002) found that 54% wore hair coverings (Muinde *et al,* 2005; Mensah *et al*, 2002). In a study conducted in Bloemfontein in 2006, 71% of street food vendors observed, wore head coverings during food preparation (Leus *et al*, 2006). In contrast to the above findings, this study in revealed that 90% wore aprons and 83% wore head coverings. In terms of the legislation, the regulations governing the

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general hygiene requirements for food premises and the transport of food (R.918 of 1999), anyone preparing food should wear protective clothing such as aprons and head coverings such as nets or scarves (doeks) (Department of Health, undated). The reasons that the food handlers conformed to this requirement was not explored in this study. One would expect that it could be linked to the certification and or training. However since the proportion that wore aprons is more that the 86% of certified street food vendors, it cannot be attributed to this. It also cannot be associated with training as only 67% reported receiving training. The high proportion of vendors wearing aprons and head coverings may be due to a cultural norm or value that requires food to be handled with an apron and head covering. Additionally head coverings may be as a result of certain cultural requirements requiring the heads of married women to be covered.

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In conclusion, one hundred and fifty street food vendors participated in this study. Seventy seven percent entered the business due to unemployment. Sixty seven percent had been trained in food safety and eighty six percent were certified. Although most of the vendors could not list the 5 Keys to Safer Foods, their knowledge of the actual behaviours associated with each key was good. Attitude towards food safety was also positive since 81% percent strongly agreed with seven principles relating to food safety. Seventy one percent reported always observing the practice to ensure the prevention of cross contamination with a further eleven percent practicing this most times. The findings of the study have however, not been compared to actual observations of food preparation practices and or sampling of

food items to assess for levels of microbial contamination. By including these aspects in the methodology, the challenges with self reported behaviours can be addressed so as to ascertain if food is safely prepared.

Limitations & Suggestions for Future Work

The study attempted to describe the knowledge, attitudes and practices of street food vendors utilizing a quantitative approach. Such studies have their limitations as discussed in the literature review. A number of issues especially attitudes and practices could perhaps be better described and explored utilizing exploratory qualitative techniques, observation of food preparation as well as microbiological testing of food samples. Certainly the exploratory research regarding key behaviours of temperature control and prevention of cross contamination need to be further explored.

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A major limitation was the inability to achieve the sample size. Due to operational reasons the sample was reduced from the planned 400 to 200. However, the inclusion criteria of trained and certified could also not be adhered to and these criteria were thus relaxed with the inclusion of street food vendors who had either not been trained or were not certified. The influence of training on knowledge was however investigated by adjusting the analysis to assess if trained street food vendors were more knowledgeable.

Another limitation is the omission to collect data on gender. This would have been an important variable to assess whether gender had any impact on the SFVs knowledge, attitudes or practices. This should be considered in future studies.

Self reported behaviour has its limitations. Observations also have limitations in that they may be regarded as being subjective. However actual observation of food preparation would have been beneficial for this type of study so as to confirm whether the knowledge and attitudes expressed in the responses were in reality put into practice. Credence could also be given to the practices of the street food vendors through actual observation of food handling practices as opposed to reported practices. Additionally, the positive practices could have been substantiated by microbial investigations by microbial sampling and analysis of food samples for pathogenic contamination and preparation surfaces for process hygiene.

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The assumption was made that the database of trained street food vendors was comprehensive and reflected the number of trained food vendors in the city. As the proposed sample could not be achieved both in trained and untrained food vendors, it is questionable whether this database is accurate.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

Street food vendors are ubiquitous and a conspicuous presence in most cities. They are regarded as potential conduits of foodborne disease as a result of the conditions in which food is prepared, yet in many developing countries, the street food trade provides an important source of both food and income. It would seem that much of the bias against street foods is unfounded and based on prejudice rather than on empirical data. This study has shown that street food vendors have adequate information with regard to the 5 principles of food safety. The knowledge about clean water does however require further investigation. The attitude of street food vendors to food safety can also be regarded as attuned to the need to ensure safe practices in food preparation. Whether this is converted into practice requires further exploration in future studies, with triangulation of methods. The influence of training was evident in some street vendors. Trained vendors had more knowledge in some of the 5 keys principles and had a more positive attitude than the untrained street food vendors. Age, education level and length of time in the business, were not factors determining the knowledge, attitude and practices of SFVs.

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It can be concluded that these street food vendors practice the 5 key behaviours required to ensure food safety and that possibly the health risk posed by street foods may be no greater than the risk posed by foods from other sources. The study provides the City of Johannesburg with information regarding the knowledge,

attitudes and practices of street food vendors as well as information regarding on who is trained and certified. Potential next steps would be to review their database, review the requirements for certification and ensure that all street food vendors are trained and certified. Due to the limitations discussed, these study findings cannot be generalized.

Recommendations

Current regulations regarding the general hygiene of premises and the transportation of foods, R918 of 1999 should be reviewed and strengthened to focus on a risk based approach. Perhaps this should include a clause indicating that certification is dependant not only on the premises but also that food handlers/owners should receive proper training, as part of the certification process.

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Training conducted should focus on an understanding of the rationale for the behaviours as knowledge is not always translated into practices or behaviours. This will require a re-orientation of EHPs on how and what they teach food handlers/street food vendors. It is recommended that Environmental Health Practitioners (EHP's) should make use of the Five Keys to Safer Food behavioural methodology as a guide for training purposes, on principles of good hygiene practices.

One of the identified limitations in this study was that, the system of data capturing regarding trained and certified street food vendors was either not functional or very

difficult to access. It is recommended that the City of Johannesburg regularly update the database to ensure that it reflects the current situation and not a cumulative total as is currently the case. Modernization of information capturing and inspection could be one avenue that should be explored as real-time information and inspection can be done with internet based software and GPS co-ordinates can be plotted.

The other limitations of the study regarding the lack of exploratory work in this area should be addressed through further studies in this area.

Further exploratory studies need to be undertaken to understand the reasons for satisfactory knowledge on cross contamination yet a positive attitude finding towards cross contamination.

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The FAO/WHO should look at developing a standardized tool that could be used to evaluate the 5 Keys to Safer Foods such that studies such as these can have general basis of comparison as it was difficult to be able to compare the findings of this study with other work done in the street food environment.

This study shows that there is a need for additional research in the arena of street food vendors and the possible risks they may pose with regard to food safety.

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APPENDICES

Appendix 1: Participant Information Sheet

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SCHOOL OF PUBLIC HEALTH

Private Bag X17 ● **BELLVILLE** ● 7535 ● South Africa
Tel: 021- 959 2809, Fax: 021- 959 2872

Participant Information Sheet:
Knowledge, attitudes and practices of street food vendors

I am a student studying at the University of the Western Cape for a Masters Degree. I am trying to gather information on the knowledge, attitudes and practices of street food vendors towards food safety and food hygiene in the City of Johannesburg. We would like to you to participate in this study.

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Why are we doing this?

Training and education to prevent food-borne illness has been identified by the health department as an important element of ensuring Food Safety. Very little is known about the impact of training on Street food vendors' attitudes, practices and knowledge. The aim of this study therefore is to assist us in finding out about the information that street food vendors have on food safety and food hygiene in order to identify any gaps in the training.

Who are the participants?

The participants are trained, certified street food vendors operating in the City of Johannesburg.

What do we expect from the participants in this study?

An Environmental Health Practitioner will ask questions about your knowledge, practices and attitudes towards food safety. This will take approximately 20 minutes. A questionnaire will be completed during the interview. Prior to this your written consent will be obtained. All

information collected is confidential and only the researchers will have access to it. The environmental officer will also look at how you prepare and store all food that you sell.

What can participants expect?

Once we have finalized the research report, a meeting will be held and the results will be presented to you.

Can you withdraw from the study?

Certainly you may withdraw from the study at any time or refuse to participate. Your participation is entirely voluntary and you do not need to give a reason should not wish to participate. There are no benefits to participating in the study other than the enhancement of the lives of customers and yourselves in your community. Neither your political affiliation, 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 Ms P Campbell on 072 373 6441

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

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THANK YOU

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SCHOOL OF PUBLIC HEALTH

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Tel: 021- 959 2809, Fax: 021- 959 2872

Ipheshana elinikeza ulwazi kobandakanyekayo:
Ulwazi, isimo sokuziphatha kanye nendlela yokwenza izinto ngabathengisi bokudla emgwaqeni

Ngingumfundi okumanje wenza izifundo zeMasters Degree eUniversity of the Western Cape eKapa. Ngisemkhankasweni wokuzama ukuthola imininingwane ngolwazi, indlela yokuziphatha kanye nendlela abathengisi bokudla emgwaqeni abaziphatha ngayo, ekubhekeleni ukuphepha nokuhlanzeka kokudla eDolobheni laseGoli. Sicela ukuthi nawe uzibandakanye nalolucwaningo.

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Sikwenzelani lokhu?

Ukuqeqesha nokufundisa ukuze abantu bavikelekeke ezifweni ezibangwa ukudla, kubonwe ngumnyango wezempilo njengento ebaluleke kakhulu ekuqiniseni uKuphepha Kokudla. Kuncane kabi okwaziwayo ukuthi ukuqeqeshwa kwabantu abathengisa ukudla emgwaqeni kungaba nomphumela ongakanani ekushintsheni indlela labobantu abathengisa emgwaqeni abaziphatha ngayo, indlela abenza ngayo izinto kanye nolwazi lwabo nje jikelele. Inhloso ke yalolucwaningo ukusisiza thina ukuthi sithole ulwazi ukuthi bazi kangakanani abathengisi emgwaqeni ngokuphepha kokudla kanye nokuhlanzeka kokudla, yikhona sizobona ukuthi kukuphi ngempela lapho ukuqeqeshwa kuzodingeka khona.

Ngobona ababandekanyekayo kulokhu?

Ababandekanyekayo kulokhu ngabathengisi bokudla emgwaqeni, abathengisa eDolobheni laseGoli iCity of Joburg, abaqeqeshiwe futhi banezitifiketi zalokhu .

Yikuphi esikulindele kulababantu ababandekanyekayo?

UMhlaziyi WezeMpilo (iEnvironmental Health Practitioner) uzobuza imibuzo ngolwazi lwakho, indlela owenza ngayo izinto kanye nendlela oziphatha ngayo wena, leyomibuzo iphathelene nokuphepha kokudla. Lokhu kuzothatha cishe imizuzu engama 20. Iphepha lemibuzo lizogcwaliswa uma ubuzwa imibuzo. Uzonikeza wena imvume kuqala ngaphambi kokuthi ubuzwe imibuzo. Yonke imininingwane ezotholakala kulokhu izogcinwa iyimfihlo, ngabacubungulayo kuphela abazokwazi ukufinyelela kuyo. Umhlaziyi wezempilo yena uzobheka nje ukuthi wena ukulungisa futhi ukugcine kanjani ukudla lokho okuthengisayo.

Yini engalindelwa yilabo ababandekanyekayo?

Uma ucwaningo lolu seluqediwe labhalwa phansi, kuzobizwa umhlangano lapho uzonikezwa khona imiphumela.

Ungahoxa kulolucwaningo uma usufuna?

Yebo. Umuntu angahoxa kulolucwaningo uma esefuna, noma enqabe uma engafuni uzibandakanya. Ukuzihlanganisa kwakho nalolucwaningo kungukuthanda kwakho, futhi asikho isidingo sokuthi unike izizathu zokuthi kungani ungafuni ukuzibandakanya. Akukho mhlomulo otholakalayo ngokuzibandakanya nalolucwaningo ngaphandle nje kokuthi sibhekela ukwenza ngcono impilo yabantu abathenga kuwe kanye neyakho emphakathini. Ukuthi wena uvela kuliphi iqembu lepolitiki, noma usebenza kuphi nokuthi msebenzi muni owenzayo ngeke kucaphazeleke ngenxa yokuzibandakanya nokungazibandakanyi kwakho kulolucwaningo.

Usenayo eminye imibuzo?

Eminye imininingwane oyifunayo uma ikhona, iyatholakala ku Ms P Campbell kunombolo 072 373 6441.

Uma uthanda ukuthi uzibandakanye nalokhu, sicela ukuthi ufunde bese usayina ifomu yokuvuma.

SIYABONGA

UNIVERSITY OF THE WESTERN CAPE

School of Public Health

Private Bag X17 ● **BELLVILLE** ● 7535 ● South Africa
Tel: 021- 959 2809, Fax: 021- 959 2872

Letlakala la Tshedimošo ka Batšeakarolo

Tsebo, maitshwaro le mekgwa ya barekiši ba mebileng

Nna ke moithuti wa Lengwalo la Masters ka Unibesithing ya Kapa Bodikela. Ke leka go kgoboketša tshedimošo ka ga tsebo, maitshwaro le mekgwa ya barekiši ba dijo tša mebileng mabapi le polokego le hlweko ya dijo mo Toropongkgolo ya Joburg. Re ka thaba ge o ka tšea karolo mo dinyakišišong tše.

Ke ka lebaka la eng re dira se?

Lefapha la tša Maphelo le lemogile gore thuto le tlhahlo di bapala karolo ye bohlokwa go thibela malwetši a go hlolwa ke dijo le go netefatša Polokego ya Dijo. Batho ga ba na tsebo yeo e lekanego ka ga bohlokwa bja tlhahlo, maitshwaro le mekgwa ya barekiši ba dijo tša mebileng. Ka fao, maikemišetšo a dinyakišišo tše ke go thuša go hwetša tshedimošo yeo barekiši ba dijo tša mebileng ba nago le yona mabapi le polokego le hlweko ya dijo, gore re tle re kgone go bona moo go hlokegago tlhahlo.

Batšeakarolo ke bomang?

Batšeakarolo ke barekiši ba dijo tša mebileng ya Toropokgolo ya Joburg bao ba hlahlilwego ebile ba filwego disetefikeite.

Re lebeletše eng go tšwa go batšeakarolo mo dinyakišišong tše?

Mošomedi wa tša Maphelo a Tikologo o tla go botšiša ka ga tsebo, maitshwaro le mekgwa ya gago mabapi le polokego ya dijo. Se se tla tšea nako yeo e ka bago metsotso e masomepedi(20). Ka nako yeo o tla be a le gare a tlatša dikarabo mo letlakaleng la dipotšišo. Mohlankedi o tla hloka tumelelo ya gago ya go ngwalwa

pele ga ge a ka thoma ka dipotšišo. Tshedimošo ka moka yeo e tlago kgoboketšwa e tla ba khupamarama gomme e tla šomišwa fela ke banyakišiši.. Mohlankedi yo o tla lebelela gape tsela yeo o apeago dijo tšeo o di rekišago le ka moo o di bolokago ka gona.

Batšeakarolo ba ka letela eng?

Ge re feditše go ngwala pego ya dinyakišišo tše, go tla ba le kopano gomme dipoelo tša dinyakišišo tše di tla hlagišwa moo.

A o ka ikgogela morago mo nyakišišong ye?

O ka ikgogela morago nako ye nngwe le ye nngwe goba wa gana go tšea karolo mo dinyakišišong tše . Go tšea karolo ga gago ke ka thato ya gago ebile ga go hlokagale gore o fe lebaka ge o sa rate go tšea karolo. Ga go moputso wo o tlago fiwa batšeakarolo ka ntle ga gore dinyakišišo tše di tla kaonafatša bophelo bja gago mmogo le bja bareki ba gago mo tikologong yeo o lego go yona. Go tšea karolo ga gago mo dinyakišišong tše ga go tlo ama mokgahlo wa gago wa sepolotiki, mošomo goba ditirelo tša gago.

A e ka ba o sa na le dipotšišo tše dingwe gape?

Tshedimošo ka botlalo e ka hwetšwa go Ms P Campbell go 0723736441

Ge e le gore o ka thabela go tšea karolo mo dinyakišišong tše, hle bala o be o saene letlakala le la tumelelano.

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KE A LEBOGA

Appendix 2: Consent Form

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SCHOOL OF PUBLIC HEALTH

A WHO Collaborating Centre for Research and
Training in Human Resources for Health

Private Bag X17 ● **BELLVILLE** ● 7535 ● South Africa
Tel: 021- 959 2809, Fax: 021- 959 2872

CONSENT FORM

Knowledge, attitudes and practices of street food vendors

The study has been described to me in language that I understand and I freely and voluntarily agree to participate. My questions about the study have been answered. I understand that my identity will not be disclosed and that I may withdraw from the study without giving a reason at any time and this will not negatively affect me in any way.

Participant's name……..

Participant's signature…….
Date……

Should you have any questions regarding this study or wish to report any problems you have experienced related to the study, please contact the study coordinator:

Study Coordinator's Name: Ms Penelope Campbell 072 373 6441

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Private Bag X17 ● **BELLVILLE** ● 7535 ● South Africa
Tel: 021- 959 2809, Fax: 021- 959 2872

IFOMU YOKUVUMA

Ulwazi, isimo sokuziphatha kanye nendlela yokwenza izinto ngabathengisi bokudla emgwaqeni

Ngiluchazelwe lolucwaningo ngolimi engiluzwayo, kanti ngivuma nogokwami futhi ngikhululekile ukuzibandakanya nalo. Imibuzo yami ebenginayo mayelana nalolucwaningo iphendulekile. Ngiyaqonda futhi ukuthi igama lami ngeke livezwe kulolucwaningo, nokuthi ngingahoxa noma yingasiphi isikhathi uma ngifuna kanti lokhu ngeke kungikhinyabeze noma ngaliphi uhlobo..

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Igama lobandakanyekayo ……..

Isignesha yobandakanyekayo …….
Usuku ……

Uma ukukhona noma yiyiphi imibuzo onayo eqondene nalolucwaningo, noma ufuna ukubika inkinga noma izinkinga mayelana nalo, sicela uthintane nomuntu oqoqela ndawonye nalolucwaningo:

Igama lomuntu oqoqela ndawonye lolucwaningo: Ms Penelope Campbell 0723736441

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LETLAKALA LA TUMELELANO
Tsebo, maitshwaro le mekgwa ya barekiši ba dijo tša mebileng

Dinyakišišo tše di tlišitšwe go nna ka polelo yeo ke e kwešišago gomme ke ka thato ya ka ge ke dumela go tšea karolo. Ke hweditše dikarabo go dipotšišo tša ka ka dinyakišišo tše. Ke kwešiša le gore ga go a swanelega gore go tšweletšwe leina la ka le gore ge ke rata nka ikgogela morago mo dinyakišišong tše nakong ye nngwe le ye nngwe ntle le go fa lebaka gomme se se ka se nhlolele mathata ka tsela efe goba efe.

Leina la Motšeakarolo

Mosaeno wa Motšeakarolo

Tšatšikgwedi

Ge o na le dipotšišo dife goba dife mabapi le dinyakišišo tše goba o rata go bega mathata ao o kopanego le ona mabapi le dinyakišišo tše, hle ikgokaganye le motsamaiši wa dinyakišišo tše.

Leina la Motsamaiši wa Dinyakišišo: Ms Penelope Campbell 0723736441

Appendix 3: WHO 5 Keys to Safer Food Manual

FIVE KEYS TO SAFER FOOD MANUAL

DEPARTMENT OF FOOD SAFETY, ZOONOSES AND FOODBORNE DISEASES
WORLD HEALTH ORGANIZATION

INTRODUCTION

Unsafe food has been a human health problem since history was first recorded, and many food safety problems encountered today are not new. Although governments all over the world are doing their best to improve the safety of the food supply, the occurrence of foodborne disease remains a significant health issue in both developed and developing countries.
It has been estimated that each year 1.8 million people die as a result of diarrhoeal diseases and most of these cases can be attributed to contaminated food or water. Proper food preparation can prevent most foodborne diseases.

The World Health Organization (WHO) has long been aware of the need to educate food handlers about their responsibilities for food safety. In the early 1990s, WHO developed the *Ten Golden Rules for Safe Food Preparation,* which were widely translated and reproduced. However, it became obvious that something simpler and more generally applicable was needed. After nearly a year of consultation with food safety experts and risk communicators, WHO introduced the Five Keys to Safer Food poster in 2001. The Five Keys to Safer Food poster incorporates all the messages of the *Ten Golden Rules for Safe Food Preparation* under simpler headings that are more easily remembered and also provides more details on the reasoning behind thesuggested measures.

The Five Keys to Safer Food Poster

The core messages of the Five Keys to Safer Food are: (1) keep clean; (2) separate raw and cooked; (3) cook thoroughly; (4) keep food at safe temperatures; and (5) use safe water and raw materials. The poster has been translated into more than 40 languages and is being used to spread WHO's food hygiene message throughout the world.

[1] Mead, P.S., et al, *Food-Related Illness and Death in the United States* Emerging Infectious Diseases, Vol 5, No. 5, 1999.

The Five Keys to Safer Food Manual

The Five Keys to Safer Food Manual is divided into two sections. Section One is Background Material and Section Two is the Five Keys to Safer Food. Section Two elaborates the core food safety information provided in the WHO Five Keys to Safer Food poster and suggests how to communicate these messages. When presenting the material on the Five Keys to Safer Food it is important that this core information and rational (i.e. why) remain the same as that presented in the poster.
The information in Section One: Background Material is not meant to be presented in its current format. The trainer has flexibility on how and when to discuss the points provided in this section. The trainer should identify points within this section that are applicable to the audience and integrate these points into the presentation of the material in section two. In both sections information is divided into two columns. The first column contains basic information that should be presented to all audiences. The second column contains additional information which is not designed to be presented to the audience, but is designed to aid the trainer in answering questions. For some sections, the manual also presents "Considerations and suggestions for the trainer", i.e. ways to adapt the material for
different audiences and different locations. When adapting the manual to prepare a training session, the following points and questions should be considered.

- Who is the audience (e.g. school children, young adults, home food handlers, food workers)?
- Will the audience understand the level of language used?
- Have enough visual cues been incorporated to accommodate those who might not understand the language?
- Is the material of an appropriate length to capture and hold the audience's attention?
- Are instructions clear, concise and easy to follow?
- Is the material presented in an interesting way that is easy to remember and understand?

- Does the material reinforce the core information?
- Have examples of local foods been incorporated?
- Are local food practices discussed?
- Does the material reflect local facilities (i.e., running water, refrigerators, etc.)?

Although the information provided in the Five Keys to Safer Food Manual will be adapted for each audience, the concepts of the core information should remain the same as that in the WHO Five Keys to Safer Food poster.

Evaluation

All aspects of the Five Keys to Safer Food training material should be evaluated. Included in the manual are two evaluation forms: one for the organizer and/or trainer and one for the participant. The evaluation form for the organizer and/or trainer evaluates the demographics of the audience and the suitability of the adaptation process and whether or not the training session achieved its goal. The evaluation form for the participants evaluate the impact of the training session on food safety knowledge, attitude and behaviours. It is recommended that the participants complete one evaluation form before the training session and one evaluation form after the training session.

Glossary

A glossary of terms used in the manual is provided for reference.

Resources

This section contains additional information for the organizer, trainer and participants. In addition to this manual, WHO intends to develop supplemental materials targeted to different audiences including school children and women as well as other supplemental materials on different food safety topics. When developed this information will be available at the web site: **www.who.int/foodsafety/consumer/5keys/en/index.html**
WHO aims to improve the exchange and reapplication of practical food safety knowledge among Member States by having them exchange experiences and tested solutions. A section of the WHO Food Safety web site was designed to enable countries and partners to access the different tools produced in different parts of the world. One can actively contribute to the success of delivering the Five Keys to Safer Food public health message and prevent foodborne disease by exchanging ideas, materials and experiences on this web site.

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Every day people all over the world get sick from the food they eat. This sickness is called foodborne disease and is caused by dangerous microorganisms and/or toxic chemicals. Most foodborne disease is preventable with proper food handling. Foodborne Disease:

- Is a problem in both developing and developed countries;
- Is a strain on health care systems;
- Severely affects infants, young children, elderly and the sick;
- Creates a vicious cycle of diarrhoea and malnutrition; and
- Hurts the national economy and development and international trade.

Considerations and suggestions for the trainer

For simpler language, use the terms “germ” for microorganisms and “poisons” for toxic chemicals.

Microorganisms are very small living things, so small that they cannot be seen with the naked eye. There are three different types of microorganisms: the good, the bad and the dangerous.
Good microorganisms are useful. They:
- Make food and drinks (e.g. cheese, yoghurt, beer and wine);
- Make medicine (e.g. penicillin); and
- Help digest food in the gut.

Bad microorganisms, or spoilage microorganisms, do not usually make people sick, but they cause our food to smell bad, taste horrible and look disgusting. Dangerous microorganisms make people sick and can even kill. These are called “pathogens”. Most of these microorganisms do not change the appearance of the food.Microorganisms are so small that it takes 1 million to cover the head of a pin.
Bacteria, viruses, yeasts, moulds and parasites are all microorganisms. The smell, taste and appearance of food are not good indicators of whether the food will make you sick. Some spoilage microorganisms do change the appearance of food and are dangerous. An example is the green mould on bread which can produce toxins. Examples of common dangerous foodborne microorganisms include:

- Bacteria - Salmonella, Shigella, Campylobacter and E. coli;
- Parasites - Giardia, Trichinella; and
- Viruses – Hepatitis A, Norovirus.

Considerations and suggestions for the trainer

- Become familiar with dangerous microorganisms in your region.

 It may be appropriate to change the example showing the relative size of a microorganism. For example, 10 000 bacteria side by side would occupy one centimetre of space.
 Providing pictures or actual examples of mouldy fruit may add interest, but it must be stressed that dangerous bacteria may not always make the food smell, taste or look bad.

Microorganisms are everywhere, but are mostly found in:
 Faeces;
 Soil and water;
 Rats, mice, insects and pests;
 Domestic, marine and farm animals (e.g. dogs, fish, cows, chickens and pigs); and
 People (bowel, mouth, nose, intestines, hands, fingernails and skin).

Human and animal faeces contain disease-causing microorganisms.
A single teaspoon of soil contains more than 1 billion microorganisms. All living things have microorganisms associated with them.
Animals carry microorganisms on their feet, in their mouths and on their skin.
An average 100 000 bacteria can be found on each square centimetre of human skin.

Considerations and suggestions for the trainer

 Name common sources of microorganisms in the local region.

Microorganisms rely on someone or something to move them around. The transfer of microorganisms from one surface to another is called “contamination”. Hands are one of the most common means of moving microorganisms from one place to another. Microorganisms can be spread through contaminated food and water. Pets and domestic animals can also be a source of contamination.
If a food handler is infected with a virus and continues to prepare food, some viruses may be passed on to the consumer via the food. Hepatitis A and Norovirus are examples of viruses which can be transmitted in this way. Zoonoses are communicable diseases caused by microorganisms transmitted from animals to humans. Avian influenza and infections with E. coli 0157 are examples of zoonoses. Avian influenza can be transmitted to humans through direct contact with an infected bird or objects contaminated by their faeces.

Considerations and suggestions for the trainer

 Give a demonstration of contamination by touching your hand to your face and then touching some food with that same hand.
 Discuss a local foodborne disease outbreak, including the cause of the outbreak and what could be done to prevent infection in humans.

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Most microorganisms “grow” by multiplication. To multiply, microorganisms need:
 Food;
 Water;
 Time; and
 Warmth.

Meat, seafood, cooked rice, cooked pasta, milk, cheese and eggs are foods that provide ideal conditions for microorganisms to grow. One bacterium can become 2 in just 15 minutes. This means that within 6 hours, 1 bacterium can multiply to over 16 million. To be harmful, some bacteria need to grow to high levels. Other bacteria can cause illness when they are present in very low numbers.
Viruses are many times smaller than bacteria. They do not grow in food or water, but these are vehicles for transmission.

Considerations and suggestions for the trainer

 Discuss local foods that do and do not provide the ideal conditions for growth of microorganisms.
 Dried beans, pebbles or other objects can be used to demonstrate bacterial growth. As an example of quick growth start with one object, in 15 seconds make it two objects, in another 15 seconds make it 4 objects and in another 15 seconds make it 8 objects, etc. (double the number of objects you have every 15 seconds). Please note that 15 seconds is used instead of 15 minutes so that it is possible to show how bacteria grow during a training session.

Every year, billions of people experience one or more episodes of foodborne disease, without ever knowing that their illness was caused by food. The most common symptoms of foodborne disease are:
 Stomach pains;
 Vomiting; and
 Diarrhoea.

The symptoms depend on the cause of the disease. Symptoms may occur very quickly after eating the food, or may take days or even weeks to appear. For most foodborne diseases, symptoms occur 24 -72 hours after the food has been eaten. Foodborne disease can lead to long-term health problems. Very severe

diseases, including cancer, arthritis and neurological disorders can be caused by contaminated food. For infants, the sick, pregnant women and the elderly, the consequences of foodborne disease are usually more severe and more often fatal. Drinking plenty of fluids will maintain hydration during diarrhoea. It is estimated that 3% of cases of foodborne disease can lead to long-term health problems. Mouth masks are recommended for people who may cough or sneeze while handling food. Gloves can be used to cover any cuts or lesions and should be changed frequently. Advice on treatment of foodborne illness differs between countries and should be adapted to the local region. However, one should seek medical advice when bowel movements are very frequent, very watery or contain blood, or last beyond 3 days.

What to do if you get sick
Try not to handle or prepare food while you are sick and for 48 hours after your symptoms stop. However, if this cannot be avoided, wash your hands with soap and water first and frequently during food preparation.
When symptoms are severe seek medical advice immediately.
Some foodborne diseases can be transferred from person to person. Caregivers can become sick from patients with a foodborne illness.
Considerations and suggestions for the trainer
- Food industry workers need to notify their employers of the following: Hepatitis A, diarrhoea, vomiting, fever, sore throat, skin rash, other skin lesions (e.g. boils, cuts, etc.) or discharge from ears, eyes or nose.
- High risk activities such as slaughtering and preparing ready to eat foods may require special personal protective equipment. Contact the local government authority for more information.

Microorganisms are not the only cause of foodborne illness. People also get sick from poisonous chemicals, which include:
- Natural toxins;
- Metals and environmental pollutants;
- Chemicals used for treating animals;
- Improperly used pesticides;
- Chemicals used for cleaning; and
- Improperly used food additives.

Simple measures such as washing and peeling may reduce the risk from chemicals that are found on the surface of foods. Appropriate storage can avoid or reduce the formation of some natural toxins.
“Poisoning” is a term used to describe sickness resulting from chemical contamination.
Some “natural” toxins (e.g. aflatoxin) are caused by moulds growing on the food. Ingesting aflatoxins may have harmful effects on the liver that can lead to cancer.
Considerations and suggestions for the trainer
- It may be useful to elaborate on some of the chemicals that are a threat to specific populations (e.g. methylmercury, arsenic).
- Discuss the importance of reading and understanding instructions on the labels of chemicals used for cleaning.
- Using cookware and utensils glazed with materials containing heavy metals (e.g. lead, cadmium) can result in chemical poisoning. Discuss appropriate cookware.

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KEEP CLEAN

- Wash your hands before handling food and often during food preparation
- Wash your hands after going to the toilet
- Wash and sanitize all surfaces and equipment used for food preparation
- Protect kitchen areas and food from insects, pests and other animals

While most microorganisms do not cause disease, dangerous microorganisms are widely found in soil, water, animals and people. These microorganisms are carried on hands, wiping cloths and utensils, especially cutting boards, and the slightest contact can transfer them to food and cause foodborne diseases.
Considerations and suggestions for the trainer
Just because something looks clean does not mean that it is. It takes over 2.5 billion bacteria to make 250 ml of water look cloudy, but in some cases it takes only 15-20 pathogenic bacteria to make one sick.
If slaughtering of animals at hom e is practised in your region, the following information is very important.
- Keep the area clean and separate from food preparation areas.
- Change clothes and wash hands and equipment after slaughtering.
- Do not slaughter sick animals.
- Be aware of on-going diseases in your area such as Avian influenza. Human health risks from these diseases may require additional controls such as using personal protective gear. Contact the local government authority for further information.

 Remove faeces from the home and keep it separate from food growing, preparation and storage areas.
 Wash hands to prevent contamination with faecal material.
 Keep domestic and other live animals away from the food growing, preparation and storage areas (e.g. pets, poultry, animals raised in the home).

Bacteria A microscopic organism which may be found in the environment, in foods and on animals.
Bleach (chlorine) A strong smelling liquid containing chlorine that is used for disinfecting food contact surfaces and sanitizing plates and utensils.
Contaminant Any biological or chemical agent, foreign matter or other substances not intentionally added to food that may compromise food safety or suitability.
Cross-contamination The introduction of microorganisms or disease agents from raw food into ready-to-eat food making it unsafe.
Danger zone The temperature range 5 °C to 60 °C, in which microorganisms grow and multiply very fast.
Diarrhoea A disorder of the intestine marked by abnormally frequent and fluid evacuation of the bowels.
Disinfection The reduction by means of chemical agents and/or physical methods, of the number of microorganisms in the environment, to a level that does not compromise food safety or suitability.
Equipment All stoves, hot-plates, cutting boards, tables and kitchen surfaces/counters, refrigerators and freezers, sinks, dishwashers and similar items (other than utensils) used in food processing and food service establishments.
Feaces Waste matter or excrement eliminated from humans and animals.
Food Any plant or animal product prepared or sold for human consumption. Includes drink and chewing substances and any ingredient, food additive or other substance that enters into or is used in the preparation of food. Does not include substances used as a drug or medicine.
Foodborne disease A general term used to describe any disease or illness caused by eating contaminated food or drink. Traditionally referred to as “food poisoning”.
Food contact surfaces Surfaces of equipment and utensils normally in contact with food.
Food handler Any person who directly handles packaged or unpacked food, food equipment and utensils or food contact surfaces, and is therefore expected to comply with food hygiene requirements.
Food hygiene All conditions and measures necessary to ensure the safety and suitability of food at all stages of the food-chain.
Food preparation The manipulation of food intended for human consumption by processes such as washing, slicing, peeling, shelling, mixing, cooking and portioning.
Food safety All measures to ensure that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use.
Microorganisms Microscopic organisms such as bacteria, moulds, viruses and parasites, which may be found in the environment, in foods and on animals.
Pathogen Any disease-causing microorganism such as a bacterium, virus or parasite. Often referred to as a “germ” or “bug”.
Perishable food Food that spoils within a short amount of time.
Pest control The reduction or elimination of pests such as flies, cockroaches, mice and rats and other animals that can infest food products.
Risk Is the severity and likelihood of harm resulting from exposure to a hazard.
Ready to eat Food that is consumed without any further preparation, such as cooking, from the consumer.
Toxic Harmful or poisonous
Utensils Objects such as pots, pans, ladles, scoops, plates, bowls, forks, spoons, knives, cutting boards or food containers used in the preparation, storage, transport or serving of food.
Virus A non-cellular, microscopic infectious agent that relies upon a host cell to reproduce.

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Appendix 4: Questionnairre

INTERVIEW – ENGLISH

STREET FOOD SURVEY (VENDORS)

KNOWLEDGE, ATTITUDES & PRACTICE (KAP) SURVEY

QUESTIONNAIRE IDENTIFICATION	**FOR OFFICE USE ONLY** **RECORD # 1 _ _ _**
WARD_____ SUB WARD _____	

INTERVIEW DATE _____/_____/_____ DD/MM/YY INTERVIEWER'S NAME_____	BUSINESS NAME _____ BUSINESS ADDRESS_____ CELL No._____

INTRODUCTION AND CONSENT

INFORMED CONSENT

Hello. My name is _____ and I am working with City of Joburg. We are conducting a survey on behalf of the Department of Health and the University of the Western Cape, about the Information that Street Food Vendors have on Food Safety. We would very much appreciate your participation in this survey. This information will help us to plan and improve information made available to Street Food Vendors. The survey usually takes _____ minutes to complete. Whatever information you provide, we will be kept strictly confidential and will not be shown to other persons.

Participation in this survey is voluntary and you can choose not to answer any individual question or all of the questions. However, we hope that you will participate in this survey since your views are important.

At this time, do you want to ask me anything about the survey?

Signature of interviewer: _____ Date: _____

RESPONDENT AGREES TO BE INTERVIEWED…… 1

RESPONDENT DOES NOT AGREE TO BE INTERVIEWED..... 2
➔END

Respondent remarks: _____
_____
_____

Interviewer remarks: _____
_____

health
Department:
Health
REPUBLIC OF SOUTH AFRICA

INSTRUCTION TO INTERVIEWERS

(i) The questionnaire must be completed at the business address. If a respondent refuses to co-operate, make a note for the researcher.

(ii) Interview the owner/manager of the business. Conduct the interview at the business site. Please hand the respondent your letter of introduction or read it out if necessary. Confirm to the respondent (owner/manager) that the information supplied will be treated strictly confidential. Obtain signed Consent.

(iii) Follow the instruction to the interviewers carefully to ensure that the questions are asked according to sequence. Indicate the response by means of a tick or circle in the blocks provided for closed ended questions or write down the exact response where applicable.

(iv) Do not try to influence respondents. Should the respondents give you wrong answers deliberately, make a note of this next to the relevant question.

(v) Check the completed questionnaire thoroughly to ensure that no question has been skipped and all the questions have responses.

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(vi) Complete the Observation Checklist.

(vii) Upon completion of the Questionnaire, thank the respondent for agreeing to participate and remind them that they will receive feedback.

PLEASE CIRCLE THE RESPONDENT'S ANSWERS

SECTION 1 – GENERAL INFORMATION

List the three most important products/services your business sells in order of highest sales to lowest sales:

	What do you sell? (list in order of importance)	**Approximate % of total sales**
1	e.g. Vetkoek	60 %
1		
2		
3		
	Total	**100 %**

NO.	QUESTIONS	ANSWERS	Rate
1	Are you the Owner or Manager of the business	Yes..... 1 No ..... 2 DK..... 88	
2	How many employees including you does the business have?	One……1 Two……2 Three……3 Four or more……4	
3	How long have you been running the business?	One……1 Two……2 Three……3 Four or more……4	
4	Why did you start this business? Circle (O) ALL that apply. Rate the three most important. [1=most important, 2=second most important, 3=third most important]	To increase income……1 Unemployed ……2 Recently laid off ……3 Family business……4 Business opportunity for profit……5 To work from home……6 Disabled……7 Household restructuring, sickness or death in the family……..8 Other, specify……9	
5	What is your highest level of education?	No education……1 Std. 1/Grade 1-3……..2 Std. 2-5/Grade 4-7……..3 Std. 6-9/Grade 8-11/NTC1 & 2……..4 Matric/Std. 10/Grade 12/NTC3……..5 Apprenticeship……..6 Post-matric diploma/Technikon……..7 University……8	
6	Age of respondent Or Date of birth	_____ _____	

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SECTION 2 – TRAINING AND RELATED ISSUES

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES
1	Have you ever received any training in Food Safety?	Yes..... …1 No 2
2	When (How long ago) did you receive the training?	< 6 months ago.....……..1 6mths-1yr…….2 < 2 years ago……3 3 or more years ago……..……...4
3	Do you think that the training was important for your business?	Yes…..……1 No……..……..2

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	1	2	1.
			2.
			3.
Your workers	1	2	1.
			2.
			3.

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SECTION 3: KNOWLEDGE & ATTITUDE – REGULATIONS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	Go To
1	Do you have a Certificate of Acceptability?	Yes.....1 No .....2 Don't Know.....88	➔Ques 2 ➔Ques 2 ➔Ques 3
2	Do you know why you have/need a Certificate of Acceptability	Yes.....1 No .....2 Don't Know.....88	
3	Do you know who is the EHP/Inspector	Yes.....1 No .....2 Don't Know.....88	➔Section 4
4	Do you think that the EHP/Inspector is helpful for your business?	Yes.....1 No .....2 Don't Know.....88	
5	Did an Environmental Health officer ever inspect your premises?	Yes.....1 No .....2 Don't Know.....88	
6	Did an Environmental Health Practitioner/Inspector take samples of any of your food?	Yes.....1 No .....2 Don't Know.....88	

SECTION 4: KNOWLEDGE & ATTITUDE

NO.	QUESTIONS AND FILTERS	FOOD ITEM	CODING CATEGORIES
1	What is Food Poisoning		
2a	Where do you obtain your raw materials from? Mention & Circle those that apply	Chicken	Abattoir……1 Formal retailer……2 Wholesale stores……3 Informal businesses……4 Other (specify)_____96
2b		Meat	Abattoir……1 Formal retailer……2 Wholesale stores……3 Informal businesses……4 Other (specify)_____96
2c		Maize	Formal retailer……1 Wholesale stores……2 Informal businesses……3 Other (specify) _____96
2d		Bread / Rolls	Formal retailer……1 Self (baked)……2 Bakery……3 Informal businesses……4 Other (specify) _____96
2e		Vegetables	Formal retailers……1 Fruit and veg stores……2 Direct from farm……3 Direct from market……4 Informal businesses……5 Other (specify)_____96
3	Where do you store your perishable products? (Interviewer explains the term perishable). Circle all that apply.		Fridge.....1 Cooler Box.....2 Newspaper.....3 Other _____ 96 (Specifiy)
4a	Do you have a thermometer? (Interviewer please explains what a thermometer is).		Yes.....1 No.....2
4b	What do you use it for?		_____ _____96
4c	Why is it important?		_____96
5	How are cooking utensils washed?		Hot water & detergent.....1 (washing up liquid) Cold water & detergent.....2 Other (specify) _____96

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NO	QUESTIONS AND FILTERS	CODING CATEGORIES	GO TO
6	When should you wash your hands	After visiting the toilet.....1 Before preparing food.....2 Both.....3 Neither.....4 Other (specify_____96 Don't know.....88	
7a	Do you know about the 5 Keys to Safer Food?	Yes.....1 No.....2	**NO➔Go to Question 8**
7b	Can you name the 5 Keys?	Lists 5.....1 Lists 3-4.....2 Lists 2.....3 Lists 1.....4 Lists 0.....5	
8a	Do you prepare any food at home?	Yes (Specify)_____1 _____ No.....2	
8 b	How do you transport the food to the venue where you trade?	Ca.....1 Taxi.....2 Bus.....3 Train.....4 Walk/trolley.....5	
9	Do you use separate utensils/containers for raw products and Cooked foods?	Yes.....1 No.....2	
10	Wiping Cloths can spread microorganisms	True.....1 False.....2	
11	The same cutting board can be used for raw foods and cooked foods provided it looks clean	True.....1 False.....2	
12	Raw foods need to be stored separately from cooked food	True.....1 False.....2	
13	Cooked foods do not need to be thoroughly reheated	True.....1 False.....2	
14	Cooked meat can be left out of the fridge to cool overnight before refrigerating	True.....1 False.....2	
15	Cooked foods should be kept very hot before serving	True.....1 False.....2	
16	Wash fruits and vegetables before eating/preparing	True.....1 False.....2	

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17	Safe water can be seen by the way it looks	True.....1 False.....2	
18	Frequent hand washing during food preparation is worth the extra time	Agree……..……..1 Not Sure……..……2 Disagree……..……3	
19	Keeping kitchen surfaces clean reduces the risk of illness	Agree……..……..1 Not Sure……..……2 Disagree……..……3	
20	Keeping raw and cooked foods separate helps to prevent illness	Agree……..……..1 Not Sure……..……2 Disagree……..……3	
21	Thawing food in a cool place is safer	Agree……..……..1 Not Sure……..……2 Disagree……..……3	
22	I think that it is unsafe to leave coked food out of the refrigerator for more than two hours	Agree……..……..1 Not Sure……..……2 Disagree……..……3	
23	I separate raw and cooked food during storage	Always……..……1 Most Times……..……2 Sometimes……..……3 Not often……..……4 Never……..……..5	
24	I inspect food for freshness to ensure quality ingredients	Agree……..……..1 Not Sure……..……2 Disagree……..……3	
25	I think it is important to throw away foods that have reached their expiry date	Agree……..……..1 Not Sure……..……2 Disagree……..……3	

SECTION 5: PRACTICES--- OBSERVATION CHECKLIST

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NO.	QUESTIONS	ANSWERS		PASS
1	Food hygiene equipment checklist [Interviewer circle the answer if the respondent has the equipment at the point of sale]	Yes	No	
1a	A water container to carry water	1	2	
1b	A bowl or bucket for washing hands	1	2	
1c	Clean hand drying towels	1	2	
1d	Nail brush	1	2	
1e	Soap for hand washing	1	2	
1f	A bowl or bucket for washing dishes and utensils	1	2	
1g	Soap powder or liquid to wash dishes	1	2	
1h	Cleaning cloths	1	2	
1i	Bleach/Jik	1	2	
1j	Broom and or mop	1	2	
1k	Rubbish bags from your local council	1	2	
1l	Cooler box	1	2	
1m	Apron	1	2	
1n	Doek/Scarf	1	2	
1o	Pots with lids or a cover for cooked food	1	2	
1p	Cloths to cover all food	1	2	
1q	Plastic table cloth	1	2	

2. What equipment do you need to get?

_____

_____

3. What plan can you make to get this equipment?

_____

_____

4. Do you think that the FIFA 2010 World Cup will improve your business? If So/Not- How(Record all answers/responses)

_____
_____
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Do you have any questions/comments/suggestions?

_____
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END OF QUESTIONNAIRE

Please thank the respondent for their participation!