FOOD HYGIENE AND SAFETY PRACTICES OF FOOD VENDORS AT A UNIVERSITY OF TECHNOLOGY IN DURBAN

Submitted in fulfilment of the requirements of the Masters Degree of Applied Science in Food and Nutrition in the Department of Food and Nutrition Consumer Science, Faculty of Applied Sciences at the Durban University of Technology

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BTECH: FOOD AND BEVERAGE MANAGEMENT

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DECLARATION

This work has not previously been accepted in substance for any degree and is not concurrently submitted in candidature of any degree.

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This is dissertation is the result of my own independent work/investigation, except where otherwise stated. Other sources are acknowledged by giving explicit references. A bibliography is appended. I declare that I did not commit plagiarism.

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ABSTRACT

Introduction: Food vending is becoming a very important and a useful service. Moreover, socioeconomic factors and lifestyle changes forces customers to buy food from street vendors. Since the food industry is growing worldwide, good hygiene practices coupled with food safety standards is of vital importance. Currently there is inadequate information or scientific data on the microbiological quality and safety of vended foods in South Africa more especially in Durban. To date limited research has been conducted on the food handlers (FH's) operating as food vendors in different areas of Durban, and a lack of documented evidence about the knowledge that food vendors have on food safety and food hygiene has resulted in the interest in this research.

Aim: The aim of this study was to ascertain food hygiene practices and knowledge, food safety practices and the nutritional value of the food served by various food vendors at DUT in Durban.

Method: A total number of 15 food vending stalls (comprising of 15 managers and 39 food handlers) situated within the Durban University of Technology (DUT) Durban campuses participated in the study. The study was conducted on all food vendors who prepared and served food items on site.

Data collected was of a quantitative nature with two sets of questionnaires (Managers questionnaires and (FH's) questionnaires), observation sheets to observe FH's during food preparation and cleanliness, and weighing and recording of menu items prepared and served in order to determine portion sizes and the nutritional content. All the administration of data was completed by the researcher on a Microsoft Excel spread sheet and analysed on the SPSS software version 20. Recording and weighing of menu items was done using an electronic food portion scale. A statistician was consulted to assist in the interpretation of the data.

Results: The majority (66.67%) of vendors were females with the educational level that was fairly high, (73.33%) had secondary education. Most of the respondents (80.00%) had been in the food vending business for more than 3 years.

The availability of proper infrastructure was poor, 40.00% of the vendors obtained running water from the kitchen taps within the stalls and 60.00% obtained water from a communal sink tap outside the food stalls. Most vending stalls 66.67% had no proper storage facilities; perishable stock was stored on refrigerators, while non-perishable food items were stored on built-in shelves, on top of fridges, on the floor, in storage containers, and on tables due to shortage of space. Thirty three percent of the vendors had designated storerooms for non – perishable items. Food preparation and cooking space was very minimal as a result the researcher observed that in some stalls white and red meat was grilled in the same griller and that increases the chances of cross-contamination.

The researcher also observed that the area where most of the vending stalls were situated had no shelter and paving, as a result during food preparation and service, food was exposed to dust, air pollution and flying insects. Most managers 73.33% and FH's 56.41% attended hygiene and food safety

training but observational findings indicated that important hygiene practises such as washing of hands before serving food were not practised. Another concerning observation regarding personal hygiene was that students did not wash hands prior to eating food despite the availability of tap water within the dining area.

The majority of managers had contracts with suppliers, and grocery items were mainly purchased from wholesale stores, meat items from formal retailers. A large number of managers 73.33% bought and delivered perishable products themselves using own cars, while 13.33% used refrigerated trucks from the suppliers for the delivery of perishable goods. In that way delivery temperature of food items was not monitored and maintained.

The nutritional value of food served by vendors was imbalanced with the majority of the meals exceeding the recommended energy contribution from fat of 15–30%, the carbohydrates (CHO) contribution was lesser than the stipulated percentage of 55-75%, and the mean energy contribution of protein was within the recommended percentage of 10-15%. The mean energy contribution made by fat in all meals was higher than the recommended percentage 15-30%, with the highest contribution of 63.59% and the lowest of 34.12%. High fat meals were of great concern as prospects of cholesterol, high blood pressure and heart diseases were high. The CHO content of meals was below the stipulated percentage of 55-75% with the maximum percentage of 49.86% and the minimum of 31.04%. The mean energy contribution of protein was 15.36% which was generally within the recommended percentage of 10-15%. Furthermore, the study revealed that out of the 12 881 kJ recommended for men and 10 093 kJ for females; male students on an average were consuming approximately 14% more kJ than recommended, and female students were consuming approximately 27% more kJ than recommended from the meals. Frequent consumption of such high energy meals can lead to overweight and obesity among young adults.

Conclusion: The results of the study revealed the urgent need for basic infrastructure such as a decent food kiosk with adequate working space, proper washing and storage facilities to improve food safety and hygienic practices. Even though food vendors claimed to have received hygiene training, knowledge attained was not effectively practiced or demonstrated; and that placed students at risk of foodborne illnesses. Furthermore, the nutritional value of food served by vendors was imbalanced with the majority of the meals exceeding the recommended energy contribution from fat of 15–30% and the CHO contribution being lesser than the stipulated percentage of 55-75%.

Recommendations: Extensive training programme and regular supervision should be put in place by management of the Institution to ensure that proper hygiene practices are in place and also to ensure the quality of food served to students is of acceptable standard. All vending stalls to be provided with basic infrastructure. Food court yard to be well sheltered to avoid food being contaminated by air pollution, dust and pests. DUT management, together with the Department of Health, should organise nutrition awareness programmes to enlighten students about the dangers of unhealthy eating habits.

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ACRONYMS

ADSA	Association for Dietetics in South Africa
AI	Adequate Intake
AIDS	Acquired Immune Deficiency Syndrome
ARV	Antiretroviral
BMI	Body Mass Index
CAI	Consultancy Africa Intelligence
CDC	Centre for Disease Control and Prevention
CHO	Carbohydrates`
DAFF	Department of Agriculture, Forestry and Fisheries
DD	Diarrheal Diseases
DoH	Department of Health
DRA	Data Research Africa
DRI	Dietary Reference Intake
DRM	Disease Related Malnutrition
DTI	Department of Trade and Industry
DUT	Durban University of Technology
EAR	Estimated Average Requirement
EFSA	European Food Safety Authority
eLena	Evidence for Nutrition Actions
FAO	Food and Agricultural Organisation
FBDG	Food Based Dietary Guidelines
FDA	Food and Drug Administration
FHQ	Food Handler Questionnaire
FH’s	Food handlers
FNB	Food and Nutrition Board
FRC	Faculty of Applied Sciences Research Committee
FSU	Food Service Units

FV's	Food Vendors
GNP	Gross National Product
GP	General Practitioner
HACCP	Hazard Analysis and Critical Control Points
HIV	Human Immunodeficiency Virus
HSRC	Human Sciences Research Council
IHR	International Health Regulations
InvoTech	Innovation Technology Business Incubator
IOM	Institute of Medicine
IRC	Institutional Research Committee
IREC	Institutional Research Ethics Committee
ITMB	Informal Traders Management Board
IUGR	Intrauterine Growth Restriction
kJ	Kilojoule
MRC	Medical Research Council
MQ	Manager Questionnaire
MUST	Malnutrition Universal Screening Tool
NDDIC	National Digestive Diseases Information Clearinghouse
NHS	National Health Service
NICUS	Nutrition Information Centre of the University of Stellenbosch
NSFAS	National Student Financial Aid Scheme
NSNP	National School Nutrition Programme
PAHO	Pan American Health Organisation
RDA	Recommended Daily Allowance
RDP	Reconstruction and Development Programme
SABC	South African Bureau of Standards
SARDP	South African Reconstruction and Development Programme
SALGA	South African Local Government Association
SANHANES	South African National Health and Nutrition Examination Survey
SEDA	Small Enterprise Development Agent

SEWA	Self Employed Women's Association
SEWU	Self Employed Women's Union
SFV's	Street Food Vendors
SMME's	Small Medium and Micro Enterprise
SPSS	Statistical Package for the Social Sciences
STATSSA	Statistics South Africa
TABEISA	Technical and Business Education Initiative in South Africa
TB	Tuberculosis
UK	United Kingdom
UL	Tolerable Upper Intake Level
UNICEF	United Nations Children's Fund
WIEGO	Women in Informal Employment: Globalising and Organising
WHO	World Health Organisation

CHAPTER 1: THE PROBLEM AND ITS SETTING

1.1 INTRODUCTION

The catering industry provides food and beverages to all sectors of society such as tertiary institutions, schools, hospitals, childcare and nursing homes. The industry has matured and undergone great changes in recent years (Giritlioglu, Batman and Tetik 2011:838). However, the changes that have occurred do not show an improvement in food handling and food safety; this is evident in the 1.8 million people that die yearly from diarrheal diseases caused by food and water impurity globally (Hassan and Dimassi 2014:127). Moreover, 22% of food borne outbreaks in Europe and 54% in Spain are another astonishing testimony that the catering industry has not progressed in terms of food safety. According to Smith, Gouws, Hoyland, Sooka and Keddy (2007:1272), in South Africa food-borne epidemics are common, but seldom reported. Similarly, Niehaus, Apalata, Coovadia, Smith and Moodley (2011:693) share the view that food-borne epidemics are common in South Africa but the recording of information is limited.

Previous research done to assess the quality of street food in several countries has proved that street food was the positive cause of food borne illnesses (Omemu and Aderoju 2008:396; World Health Organisation (WHO 2010a). According to Oldewage–Theron and Fuller (2008:644) countries like Latin America, the Caribbean, Asia and Africa are greatly affected by food-borne epidemics which are caused by street vended food. In Bagladesh, nearly 30 million people are affected by food-borne diseases annually. As a result, food safety of street vended food is one of the most critical health and safety matters challenging most of the developing countries.

The Annual Report by Department of Health (DoH 2009) on food-borne disease outbreaks define food-borne disease as “the occurrence of two or more cases of a similar illness resulting from ingestion of common food”. The (DoH 2009) stated that even though food poisoning is a notifiable condition nationally, food related illnesses are clinically mild therefore; most people do not go for medical help. The statistics available in South Africa for the period of 2001 to 2006 show that most epidemics were reported in the provinces of Eastern Cape, KwaZulu-Natal and Limpopo respectively (DoH 2006). A number of babies are diagnosed with foodborne illnesses worldwide; ultimately some die from the illness. However, Motarjemi (2014:123) believes that the majority of the foodborne illnesses could be averted if food handlers were knowledgeable in safe food handling, and customers informed correctly in the choices of food and food handling.

Santos, Nogueira, Patarata and Mayan (2008:387-401) state that food safety in school food services is of utmost importance since any incident can affect a great number of students. Furthermore, meals

served at school canteens should not only be nutritionally balanced, but also avoid placing students at risk of food-borne illnesses. Above all, food-borne illnesses pose extensive health burdens and the impact on vulnerable student population is of great concern. This has prompted the study to investigate the level of hygiene, food safety knowledge and the nutritional value of food prepared and sold by vendors at the Durban University of Technology (DUT). Since no study of this nature has been conducted in the institution of higher learning, findings will bestow useful information to the management of the institution and the students at large. Moreover, training programs and food vending regulations may be strengthened to ensure safety of food served to the DUT community.

1.2 BACKGROUND TO THE PROBLEM: A GLOBAL PERSPECTIVE

In this chapter the researcher will focus on an overview of the problem by looking at the global, continental and national perspective ("funnel effect"). There have been a number of research studies done on the informal economy in developing countries. The interest in these studies has been influenced by the proliferation of street vendors and the inconveniences the vendors cause to the urban space (Asiedu and Agyei-Mensah 2008:191). As far as Skinner, (the Director of Urban Policies Programme) is concerned, "the most significant employment generators are left out of the economic equation altogether, despite the fact that globally informal economic activities are a significant source of employment". Skinner further explains that the working environments in the informal division are not great; there is no basic infrastructure, no job guarantees, and salaries can hardly buy the basic needs (Proietti, Frazzoli and Mantovani 2014:145; Rane 2011:100).

Street food feeds a significant number of people in the urban cities, more especially in developing countries. Dhaka is one of the world's cities with the greatest number of vendors; 90 000 - 100 000 street traders market prepared food items and approximately 418 000 people rely on the revenue generated by street food traders. (Khairuzzaman, Chowdhury, Zaman, Mamun, and Bari 2014:1). In Asia, Mumbai has 250 000, Calcutta 150 000, Delhi 200 000 and Bangkok 100 000 street vendors. Almost 80% of city residents in Africa rely on street food for survival. Furthermore in Brazil and Salvador, street food business has expanded to the beaches where it caters mostly for tourists, and it is the main source of income for a number of people. However, in 2010, food stalls were destroyed around the beaches and street food became the only alternative in the beachfront vicinity (da Silva, Cardoso, Góes, Santos, Ramos, de Jesus, do Vale and da Silva 2014:79). In 2003, Zambia had the revenue of US$100 million yearly, and approximately 16,000 individuals working in the street food trade industry (Proietti, Frazzoli and Mantovani 2014:144).

In South Africa, the international phenomenon is shared with the employment rate of 6-20% and four million people consumed food eaten away from home (Campbell 2011:1). Moreover, street food vending provides people with nutritional food and dietary options at a reasonable price (da Silva *et al* 2014:78; Khairuzzaman, Chowdhury, Zaman, Mamun, and Bari 2014:1; Proietti, Frazzoli and Mantovani 2014:144).

Proietti, Frazzoli and Mantovani (2014:144) stated that even though street vending has some advantages in terms of food security, it also has food safety issues. The main food safety issue being the lack of basic infrastructure such as sanitary facilities, hygienic water, storage facilities and waste removal is not available. Furthermore, food transportation and poor storage facilities subject the food to pathogenic micro-organisms and harmful chemicals. The above conditions impact heavily on the management of street food and hygiene and safety.

1.3 BACKGROUND TO THE PROBLEM: THE AFRICAN PERSPECTIVE

In Africa, several surveys on street traders have been carried out, for example in Ghana (Monney, Agyei and Owusu 2013), Nigeria (Aluko, Ojeremi, Olaleke and Ajidagba 2014; Oyefara 2005), Democratic Republic of Congo - Kinshasa (Iyenda 2005), reports on Kenya, Zambia and Zimbabwe (Lubaale and Nyangoro 2013; Kamhungira 2014) and South Africa (Campbell 2011; Kok and Balkaran 2014; Mosupye and von Holy 2000; Kubheka, Mosupye, and von Holy, 2001; Oguttu, McCrindle, Makita, and Grace 2014 and Niehaus, Apalata, Coovadia, Smith and Moodley 2011).

According to Proietti, Frazzoli and Mantovani (2014:145), nearly all people from different ethnic groups eat street food. However, children and teenagers make up an important fragment of street food buyers. Proietti, Frazzoli and Mantovani (2014:145) further revealed that in Tanzania, 67% of primary school children buy street food every day, in Senegal 35% of students consume street food and in Nigeria, 96% of school children buy breakfast from street food merchants and 76% purchased two meals daily from street food sellers. What is more, 75% of school children utilised most of their spending money to purchase street foods. Kamhungira (2014:1) of Nehanda Radio describes Zimbabwe as the “country of vendors” because even the educated individuals are unable to obtain work and the unemployment figures exceed 80%. The above statistics delineate the importance of food safety concerns, in view of the fact that children are susceptible to a number of chemical pollutants (Proietti, Frazzoli and Mantovani 2014:145).

Food contamination in emerging countries is caused by a number of elements, namely, processing methods, incorrect holding temperatures, utensils used for cooking and serving, traditional foods and poor standards of personal hygiene. In addition, food is not well safeguarded from dust and flies (Rane 2011:100; Khairuzzaman *et al.* 2014:1). Food borne incidences in emerging countries are triggered by law implementation procedures, legislation, public services, financial and developmental matters and law implementation procedures (Monney, Agyei and Owusu 2013:283). In Africa alone, the projections of food and water borne diseases result in approximately 450, 000 – 700,000 deaths yearly.

Khairuzzaman *et al*. (2014:1) recommend that it is crucial to understand the source and the cause of food borne disease since it will assist in prevention and regulation attempts, and also assist in earmarking suitable resources to control food borne disease.

1.4 BACKGROUND TO THE PROBLEM: THE SOUTH AFRICAN PERSPECTIVE

In South Africa food vending is probably the single largest employer in the informal sector despite its modest appearance, and possibly a major source to the South African market (von Holy and Makhoane 2006:90; Oldewage–Theron and Fuller 2008:643). In 2007 the unemployment rate in Black African women was significantly higher than the male counterparts (Labadarios, Dhansay and Hendricks 2008:115). As a result, most of the street traders in South Africa are black women, mostly uneducated, destitute and at a lower level of the socio-economic ladder (Maxon 2014:1; da Silva *et al.* 2014:78; Martins 2006:19; Khairuzzaman *et al.* 2014:1). According to Proietti, Frazzoli and Mantovani (2014:145) other countries are in a similar situation.

Several studies relating to food safety and hygiene practices of the food vendors have been conducted in South Africa (refer to Table 2.1), but the recent survey conducted by (Kok and Balkaran 2014:190) on street food vending and hygiene practices and implications for consumers in central Durban Transport Exchange, revealed a number of unhygienic conditions observed in the area. Cooking equipment was washed in containers and big pots that were later used for cooking food; water used for washing dishes in the containers was used repeatedly since water was not available nearby; unclean dishes and pots were kept next to the serving areas and that attracted flies in the area; refuse bins were left open promoting insects and rodents; and prepared food was not appropriately covered exposing it to dust and humid temperatures (Kok and Balkaran 2014:190). Regardless of all the noticeable unhygienic conditions, customers proceeded and bought meals from the food vendors. The above occurrences prove that street food handlers are not well educated and require knowledge in safe food handling and sanitation. Moreover, it is also evident that customers prefer street food because the price is affordable compared to food bought from more formal outlets like fast food outlets.

On the contrary, the research conducted by the Department of Microbiology at the University of Witwatersrand on street vended food in Johannesburg, found that the quality and safety of street vended food was satisfactory, because the total number of bacteria was trivial (Campbell 2011:71). The latter testimony confirms that the relationship between health and food safety is very complex. In spite of advances in modern technology, food contamination remains a major worldwide problem and poses a significant threat to the world economy (Yabanci, and Sanlier 2007:419). On one hand, food provides all the nutrients required by the human body, while, on the other, food can be a dangerous vehicle for transmitting risk factors that cause- food borne diseases (Unusan 2007:45).

Table 1.1: Studies conducted in South Africa from (2002 – 2015) on Food Safety Knowledge and Hygiene Practices of Food Vendors.

Author and Reference	Study Population	Measuring Instruments	Summarised results
Campbell, P.T. 2011. Assessing the knowledge, attitudes and practices of street food vendors in the city of Johannesburg regarding food hygiene and safety.	• Certified street food vendors selling cooked foods in the City of Johannesburg. • The targeted study sample for the study was 378 rounded to 400, but due to practical reasons, and other operational factors, only 150 street vendors were recruited	• Interviews with street food vendors to collect data on knowledge and attitudes. • Observation checklist to collect data on practices related to food hygiene and safety.	• The results revealed that in general street food vendors were knowledgeable on the principles of ensuring safe food. • It was also noted that there was a significant statistical difference between the street food vendors that were trained and those that did not have any training.
Oguttu, J.W., McCrindle, C.M.E., Makita, K. and Grace, D. 2014. Investigation of the food value chain of ready to eat chicken and the associated risk for staphylococcal food poisoning in Tswane Metropole, South Africa.	• The study was conducted in Pretoria , Tshwane Metropole with a population of 2,345,908	• Participatory risk assessment was used to understand food safety in data scarce environments to collect information. • Structured interviews and focus groups were conducted	• The provision of hygiene training to minimize the quantity of S. aureus on the ready to eat (RTE) chicken is - essential. • The risk of diseases as a result of eating ready-to –eat chicken sold in informal markets was minimal.

Table 1.1 – Continued: Studies conducted in South Africa from (2002 – 2015) on Food Safety Knowledge and Hygiene Practices of Food Vendors.

Author and Reference	Study Population	Measuring Instruments	Summarised results
Kok, R. and Balkaran, R. 2014. Street food vending and hygiene practices and implications for consumers.	• A total of 29 street vendors were observed within the largest transport exchange in the city of Durban.	• No interviews or questionnaires, only the observation sheet.	• The researcher discovered that street vendors have the knowledge of food safety and hygiene. However, the knowledge of food safety and basic hygiene practices need to be improved.
Niehaus, A. J., Apalata, T. Coovadia, Y. M., Smith, A.M. and Moodley, P. 2011. An outbreak of foodborne Salmonellosis in rural KwaZulu – Natal, South Africa.	• Stool specimens from 37 patients, as well as food samples were available for microbiological investigation.	• Similarity between isolates was investigated using phenotypic and genotypic techniques. Phenotypic investigation included morphological, biochemical and antibiogram profiling. Genotypic relatedness was determined with pulsed – field gel electrophoresis analysis.	• The results suggested a foodborne Salmonella Enteritis's outbreak due to contaminated food served at school function. • Epidemiological investigations continue to be extremely difficult in rural areas.
Mayrhofer, A. M. and Hendriks, S.L. 2010. Service provisions for street – based traders in Pietermaritzburg, KwaZulu –Natal: comparing local findings to lessons drawn from Africa and Asia.	• Interviews were conducted with 98 Pietermaritzburg Street – based traders and 10 KwaZulu – Natal service providers to determine service provisions requirements.	• Comparison of samples surveyed in four international studies.	• Service institutions need to have the capability to design and deliver suitable services. • Service institutions also need inducements to serve the informal sector.

von Holy, A. and Makhoane, F.M. 2006. Improving street food vending in South Africa: Achievements and lessons learned.	• No specific study population. The researchers looked at the previous studies conducted in South Africa.	• No specific assessment tool used on the study. Conclusions were drawn from the previous researcher's findings.	• Improving the safety of street vended food in a developing country is a huge challenge. • In order to determine the safety and the socioeconomic importance of street vended foods, research has to be conducted.
Martins, J.H. 2006. Socio – economic and hygiene features of street vending in Gauteng.	• Primary research was conducted among 200 street food vendors and 800 customers in South Africa. 200 samples of food were taken	• Customers were interviewed and the reasons for buying street foods as well as experiences in consuming street foods were noted. • Street food samples were also tested to assess the microbiological safety of the food.	• The survey showed high hygiene standard maintained by most vendors during preparation and serving of foods. • The microbiological tests showed relatively low microbiological counts. • The study also indicated that the health risks of consuming street foods are minimal.

1.5 RATIONALE AND MOTIVATION

Previous studies conducted globally have highlighted the value of street food in the economy and the society; and the challenges that are encountered by street food vendors. One example of the value of street food in society is that, due to limited time and money for eating, the majority of employees prefer ready – to – eat and low priced foods prepared by street traders (von Holy and Makhoane 2006:89). Some studies have also raised concerns with the lack of basic infrastructure in places where street food vendors operate, which in turn results in the perception that street food is unsafe and it must be prohibited in South Africa (Khairuzzaman *et al*. 2014:1; Omemu and Aderoju 2008:396; von Holy and Makhoane 2006:89). Surveys in numerous developing countries reveal that poor sanitary practices during food preparation have been identified as the main cause of bacterial contamination in street food (Ghosh, Wahi, Kumar, Ganguli 2007:152).

Research done to assess the quality of different street food in several countries has proved that street foods were positive causes of food borne illnesses (Omemu and Aderoju 2008:396). Similarly, Meaker (2008:3) stated that compromised nutritional status of food consumed by students will have a short and long term negative outcome in educational achievements, particularly in learners that are from the lower socio-economic backgrounds. Meaker (2008:3) further emphasises the fact that educational and economic status of any community is closely linked to health status. Therefore, improving nutrition and health will strengthen education and the economy, thus improving people's living standards.

According to Larson, Neumark-Sztainer, Story, Wall, Harnack, and Eisenberg (2008:79), various studies indicated that there is a need for nutrition interventions to address fast food intake of adolescents when moving to adulthood. Moreover, in the study conducted in the USA on fast food intake during the transition from middle adolescence to young adulthood Larson *et al.* reported that the fast food intake of young people is more than three times per week. Hence the recommendation for college students was a healthy and packed lunch that could be brought from home, or guidelines in managing portion sizes and selecting nutrient dense options from fast foods menus.

Since this is the first research project of its nature in the Institution and in KwaZulu - Natal, it will provide valuable information to be utilised by the state health officers in the improvement of strategic plans towards adapting safe street food handling practises, preparation and food vending laws / policies within the city of Durban. The result of the study will be available to the owners of the outlets so that they can assess the need for further training and highlight other problem areas. In addition, the outcome of the study will also inform the management of the institution and the community at large about the hygienic standards and the nutritional value of the food served by food vendors in and around the DUT Campuses.

1.6 STUDY AIMS

To date limited research has been conducted on the food handlers operating as street vendors in Durban. The aim of the study is to determine the current personal and food hygiene practices, food safety knowledge and the nutritional value of the food served by various food vendors in the Institution of higher learning in Durban, in order to ascertain the safety of food served to tertiary students on campus. A lack of documented evidence about the knowledge that food vendors have on food safety and food hygiene has made this study significant.

There is always opposition among food outlets based on the quality, safety and healthiness; hence the results of this study will be available to the management to assess the need for training.

1.6.1 Specific Objectives

The specific objectives of this study are to investigate the hygiene practices, food safety knowledge and the nutritional adequacy of food prepared by food vendors at DUT by:

- Determining the demographic characteristics of the vendors by means of a Demographic Questionnaire.
- Determining the food safety and hygiene practices of the food handlers by means of food safety questionnaire.
- Assessing the nutritional adequacy of menus offered to students by documenting and analysing nutritional adequacy of the food items offered to students.

- Determining the management of the food service system (receiving, storage, preparation and service) by means of a management questionnaire.
- Observing food preparation, food service and safety practices of the vendors using an observational check list.

1.6.2 Plan of Research Activities

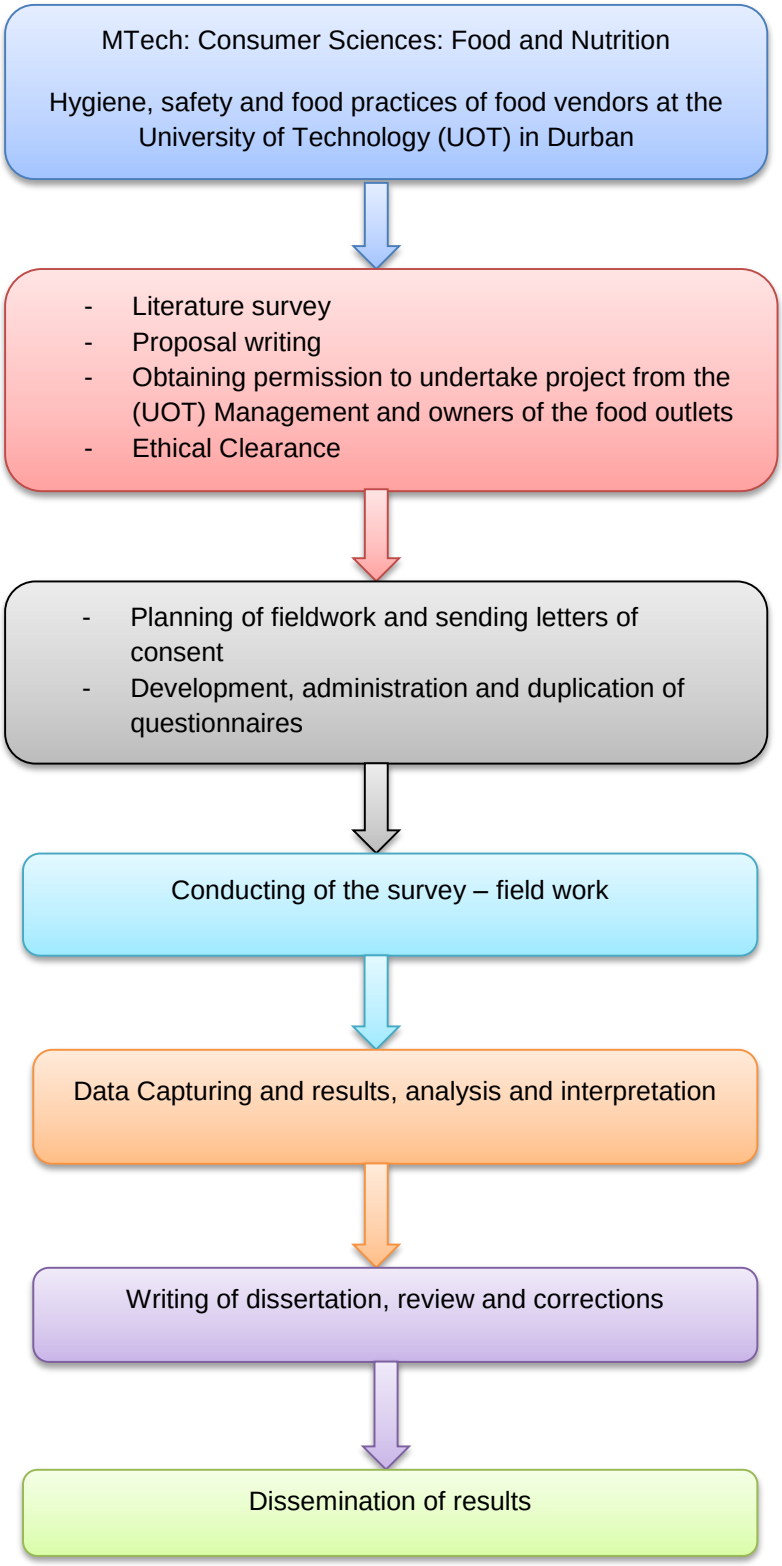

Figure 1.1: Plan of research activities

1.7 STRUCTURE OF THE DISSERTATION

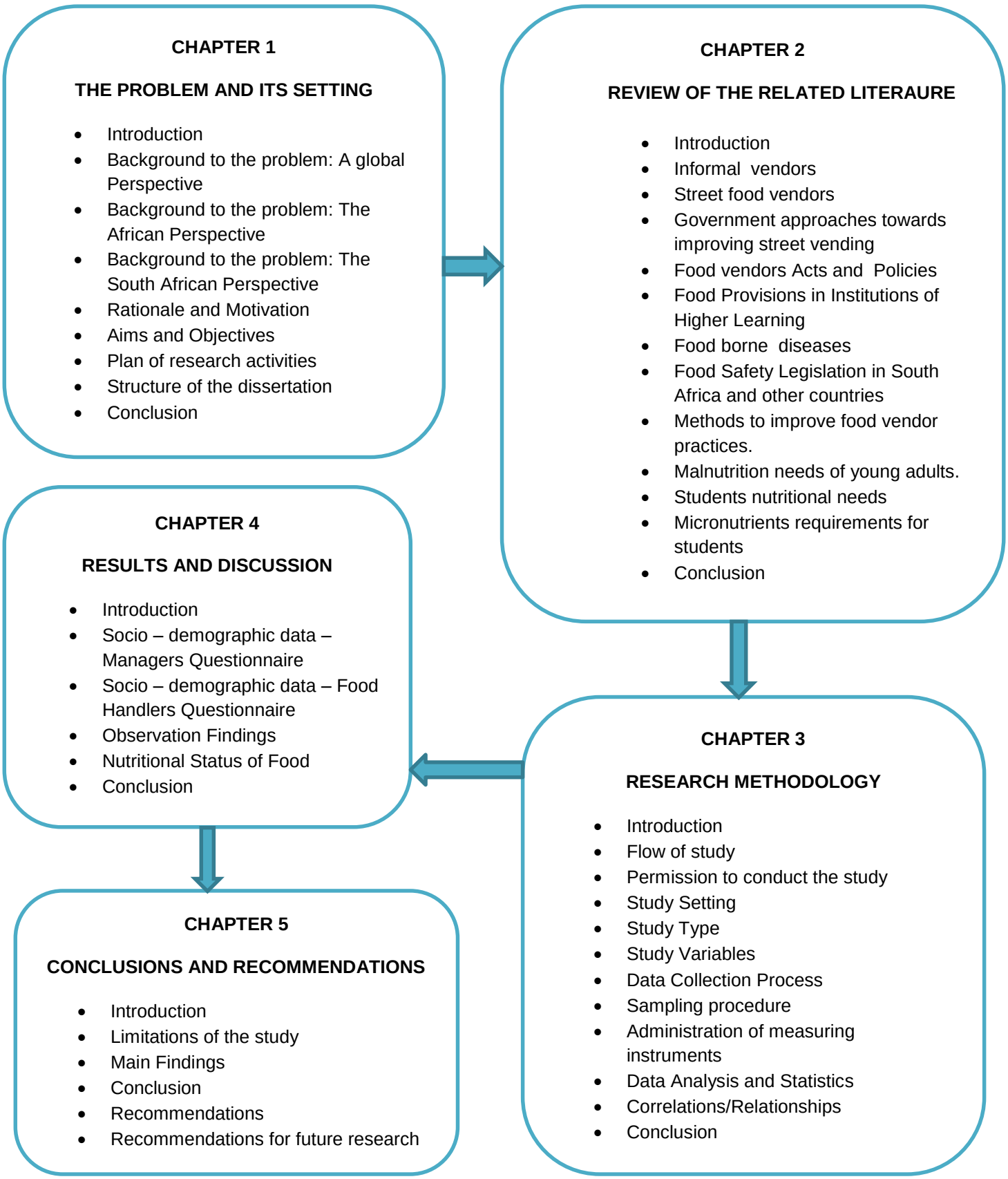

Figure 1.2: Structure of the dissertation

1.8 CONCLUSION

Globally, street food vending is becoming an indispensable and a useful service. Moreover, socio-economic factors and lifestyle changes force customers to buy food from street vendors. Monney, Agyei and Owusu (2013:282) suggest that because the street food industry is flourishing worldwide, obeying hygiene practices is of vital importance.

The study will be a descriptive study with a theoretical structure. The dissertation is composed of five comprehensive chapters (refer to Figure 1.2).Chapter 1 described the background problem by looking at the funnel effect which is recognised internationally, in Africa and in South Africa.

CHAPTER 2: REVIEW OF THE RELATED LITERATURE

2.1 INTRODUCTION

Until the late 1990's, there was inadequate information or scientific data on the microbiological quality and safety of street-vended foods in South Africa. In other developing countries, including those within the African region, this information was already available. At that time, street-vended foods were perceived as unsafe and street food-vending in South Africa was regarded as a practice that should be prohibited (von Holy and Makhoane 2006:89).

This chapter will review the literature, covering street food-vendors and their role in the community, methods to improve food-vendor practices and a broad view on food-borne diseases. Malnutrition in young adults will be discussed. Relevant literature on student's nutritional needs, their food choices, and the causes of malnutrition will be reviewed. Findings of the previous research studies relating to safety of food prepared and sold by food-vendors, general hygiene practices, and food safety knowledge of the food handlers will be presented.

2.2 INFORMAL VENDORS

2.2.1 Definition and categories of informal vendors

According to Campbell (2011: xiv), vendors are divided into two categories, namely, formal and informal vendors. Campbell (2011:xiv) describes formal food-vendors as people involved in food preparation, distribution or selling thereof in the mainstream sector e.g. restaurants, hospitals, catering establishments etc., while informal food-vendors are people involved in food preparation, distribution or selling thereof in the "non- mainstream" sector such as hawkers or street food-vendors. Informal food-vendors may operate from fixed stalls such as kiosks, semi-fixed stalls like folding tables, collapsing stands or wheeled push-carts that are moved and stored overnight; whilst formal vendors work from fixed locations such as buildings that are privately owned e.g. restaurants, hospitals, schools, etc. (Campbell 2011:14; Bromley 2000:2). Similarly, Aluko, Ojeremi, Olaleke and Ajidagba (2014:165); Martins (2006:18) categorize food-vendors into two groups, namely, the mobile vendors and the stationary vendors. Mobile vendors move from one place to the other using vehicles such as bicycles, trolleys and pushcarts to sell prepared and wrapped - up food. Stationary vendors have permanent shops/kiosks where food is stored, cooked and served to customers.

In this study, the term food-vendor excludes vendors that sell from kiosks without a proper stall structure, for example, vendors that push carts around selling products, or vendors that display goods on tables with cloth or plastic sheets.

Street vendors selling prepared food, vegetables, fruits and snacks are regarded as informal traders since vendors are often unlicensed, untrained in food hygiene and sanitation, and work under basic unhygienic conditions (Omemu and Aderoju 2008:396). Similarly, from the above definition, Willemse (2011:7) defines informal employees as employees who do not have a written contract of employment, are not registered for income tax or value added tax, and do not have basic benefits such as pension and medical aid. Siqwana – Ndulo (2013:1) states that the informal sector is a resourceful and dynamic sector with a wide range of economically active individuals such as street vendors, taxi drivers, rubbish collectors and home based care workers. The most emphasized characteristics of the informal vendors is the small scale, low level of organization, low productivity and the fact that it occurs outside the state licensing and regulation framework. On the other hand, Berry (2009:8) describes the informal sector as being made up of employees working in the establishments that employ less than five employees who do not pay income tax from salaries/wages.

According to Sun, Wang and Huang (2012:159), more people have resorted to informal vending as a source of livelihood, owing to the fact that food-vending business entails less equipment, but produces a better profit margin than other businesses. Hence, the number has indisputably grown since then, owing to food-vendors being able to provide food for lower prices during times when living costs are higher. The above observation was also supported by Gadaga, Samende, Musuna and Chibanda (2008:829) who state that "informal food vending has been increasing in many developing countries mainly due to lack of formal jobs for the working age groups. Many of the vendors also view this business as a way towards a more formal approach to earning a living, but lack the necessary support that can help them in achieving this goal". In the African cities e.g. Cotonou in Benin, Abidjan in Côte D'Ivoire, Antananarivo in Madagascar, Bamako in Mali, Ouagadougou in Burkina Faso street traders constitute 15 – 25% of total informal employment, 10 – 15% in Asian cities e.g. Ahmedabad in India, Hanoi in Vietnam and 5 – 10% in Latin American cities e.g. Buenos Aires in Argentina and Lima – Peru. Women in Informal Employment Globalising and Organizing (WIEGO 2013). Furthermore, in Sub-Saharan Africa, the informal segment represents 70% of the workers, and in Ghana the informal market hires 85% of the workers, while India has 400 million individuals working in this segment (Guliwe 2013:1).

2.2.2 Crime, safety and harassments

Berry (2009:23) states that crime and violence affect women in different ways than men; women are more susceptible and may run away rather than react violently. On the 12th of September 2008, Johannesburg hosted the Gauteng round of National Poverty Hearings. When addressing the delegates, Archbishop Njongonkulu Ndungane urged the South African nations to speak out against poverty and discrimination. In that meeting street vendors blamed government for publicising by – laws that were detrimental to street vendors alone. The dispute was about the decision taken by the city of Johannesburg to seize merchandise- belonging to street vendors, instead of empowering the traders, thus generating more jobs for the underprivileged (Berry 2009:24). The street vendors also critised the

manner in which goods were confiscated and the harassment faced from Johannesburg Metro Police. In addition, street vendors indicated that the exploitation from the officers contradicted the former President Thabo Mbeki's call for the people "to act in the spirit of vukuzenzele" (getting up and doing it for yourself). Street-vendors also complained about the fact that reclaimed foodstuff was no longer fit for sale. Moreover, the penalties that were enforced by the police when recovering the seized goods were exorbitant. Finally, vendors protested against being described as filthy people with illegal businesses as tax evaders. Therefore, government policy seems to abuse street-vendors and street-vendors felt defenseless when working with municipalities and the Metro police. In conclusion, there is sufficient indication that informal traders are susceptible to abuse from public officials (Berry 2009: 24-25; WIEGO 2013).

The report by the Informal Economy Monitoring Study (IEMS) 2014 confirms that a large percentage of street-vendors are ill-treated by city officials. The ill-treatment includes the demand for bribes, harassment by city officials, seizure of goods and physical exploitation. Figure 2.1 illustrates that street vendors encountered ill-treatment on a larger scale as opposed to the market vendors (refer to figure 2.1). A large percentage of street-vendors 55% encounter insecurities such as difficulty in obtaining a license or a permit, while 53% are harassed by the authorities, 40% have the goods confiscated and 42% threatened with eviction.

Key difficulties encountered, by Street and Market Vendors at Work (%)

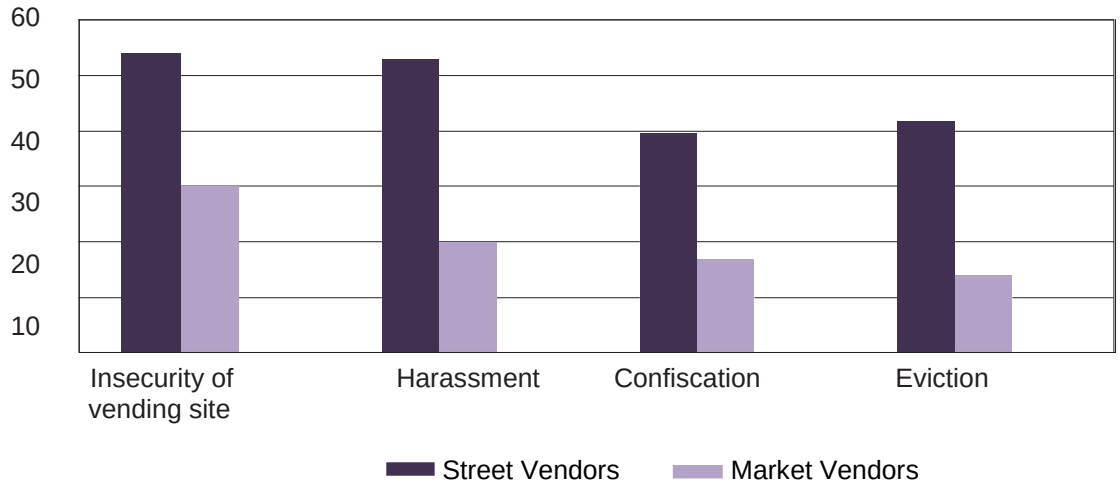

Figure 2.1: Main Difficulties faced by Street Vendors at Work (IEMS 2014).

The Consultancy Africa Intelligence (CAI) paper written by Siqwana-Ndulo outlines the challenges faced by women street traders in Durban:

- The availability of by-laws is a challenge for the street traders, and yet the South African Constitution requires that municipal by-laws be available to the public. Moreover, the wording and the legal terms used make it very hard to comprehend.

- The enormous cost of services such as electricity, water, and transport makes it difficult for the street traders to access vital services e.g. Health services.
- The majority of the traders do not receive any training and support, even though the policies assure to equip them with basic skills and financial support.
- It is said that women street vendors lack formal education or have a lower educational level when compared to men, owing to several structural and social matters. This lack of education in women restricts the ability to comprehend rules, by-laws and information that could assist to develop businesses.
- Women street traders also encounter problems with accommodation, due to restrictions encountered in the past. Previously African women were restricted from living in the cities, except as domestic workers. This result in these women being forced to travel between rural homes and the city to trade as street vendors. Another challenge is the shortage of child care facilities provided by government for the street traders' children. Women look after children while employed or other family members are tasked with the obligation of looking after the children.
- Women are more susceptible to sexual assault which can expose them to HIV. Street traders are also vulnerable to crime, harassment, abuse and bribery by city officials.
- If street traders feel unlawfully treated, challenging by-laws in court and taking legal action against officials can be frightening and expensive for the street trader (Siqwana-Ndulo 2013:1-2).

Because of the above challenges, informal traders have established the Informal Trader's Management Board (ITMB) to assist both male and female street traders in the struggle to report concerns such as access to credit, crime, police harassment, assistance with bulk buying systems, prices, corruption and clean environment (Siqwana-Ndulo 2013:1-2).

In conclusion, Siqwana-Ndulo (2013:2) states that the lack of concern for women-specific matters resulted in the formation of the Self – Employed Women's Union (SEWU), whose goal was to inspire self-employed women to unify, command appreciation and support for the work done. On the other hand, because SEWU cannot be registered with the Department of Labour which takes care of people in formal employment, it cannot assist street traders with labour law related issues.

2.3 STREET FOOD VENDORS (SFV's)

2.3.1 Definition and role of street vendors in the community

The term "street vendor" in English is used interchangeably with "street trader", "hawker" or "retailer" (Street Vendors 2013 and Bromley 2000) and is mostly used to describe all the people marketing products and services to the community without a secured or proper vending structure (Asiedu and Agyei-Mensah 2008:191; Brown, Lyons and Dankoco 2010:666). A popular subject among the description of vendors is the trading place. Brown, Lyons and Dankoco (2010:667) used a comprehensive lawful description and define street vending as "the production and exchange of legal goods and services that involved the lack of appropriate business permits, violation of zoning codes, failure to report tax liability, non-compliance with labour regulations governing contracts and work conditions, and/ or legal guarantees in relations with suppliers and clients". On the contrary, Benny – Olliviera and Badrie (2007:67); Choudhury, Mahanta, Goswami, Mazumder and Pegoo (2011:196); Aluko *et al.* (2014:165) define street-foods as ready-to-eat foods and beverages prepared and sold by vendors and hawkers in streets and other similar public places. The abovementioned researchers explain this definition even further by revealing that street food is bought for immediate consumption or for consumption later, without any further processing or preparation.

Most food vendors in South Africa and around the world operate from city streets, markets and shopping areas, outside schools and hospitals, factories, construction sites, and public transport centres such as bus stations, train stations and taxi ranks (Campbell 2011:14; Choudhury *et al* 2011: 196). According to Steyn, Labadarios and Nel (2011:1-2) food vendors sell various types of food which often comprises of sandwiches, potato chips, and boerewors rolls, hot dogs (sausage on rolls) burgers, schwarmas, salads, pies, fat cakes (deep – fried bread dough shaped in balls), snacks and a variety of fizzy drinks, fruit juices and water.

According to WIEGO (2013), street-vendors have existed for hundreds of years, and are a vital component of urban economies around the world. Street vendors are also known as distributors of inexpensive goods and services. Furthermore, street vendors provide the consumers with convenient and reachable retail options and form a dynamic part of the social and economic life of a city.

SFV's play a major role in the food supply chain by conveniently catering for the "people on the run". Because street- food is low-priced and readily available, it forms a vital part of the diet and is consumed with regularity and steadiness across all income groups (Choudhury, Mahanta, Goswami and Mazumder 2011:1233; Benny – Olliviera and Badrie 2007:67). Vendors' families rely on the profits from sales as the primary source of household income. Although studies have revealed that the majority of street-vendors lack access to social protection and are subject to a range of employment risks, many vendors view this business as a way towards a more formal way of earning a living (WIEGO 2013).

A report compiled by McConnell, Hixon and McConnell in (2010:6) confirms that only two major research works have been recorded and are suitable for the number of street-vendors in South Africa. The first

one was conducted in 1995 by the Johannesburg Administration of the Transitional Metropolitan Council. The main aim of the study was to establish the size, allocation and the density of informal street vendors in Johannesburg Central Business District (CBD). The second study was conducted in 1997 by Data Research Africa (DRA) in the Durban Metropolitan area as well as vendors in townships. In Durban, almost 19 000 street vendors were identified in the survey, and a large percentage (57%) was from the inner city and 30% were from the non – CBD areas such as townships. Of the total, 78% of the street vendors sold goods and 21% offered services.

2.3.2 Characteristics and common practices of SFV's

In most countries there is a general perception that street-vended food is unsafe, (Campbell 2011:15; Aluko *et al.* 2014:166; Martins 2006:19) primarily because of the environment under which food is prepared, sold and consumed which exposes it to possible contamination (Muyanja, Nayiga, Namagumya and Nasinyama 2011:1551; Gomes – Neves, Araújo, Ramos and Cardoso 2007:708). Because SFV's operate from places such as bus terminals, industrial sites, market places, school gates, road sides and street corners, such locations usually do not meet all the food safety requirements and are associated with causing food borne illnesses. Moreover, huge amounts of garbage accumulate which provides a habitat for insects, animals and pests around the vending sites (Muyanja *et al.* 2011:1551).

Food is also not well protected from dust and flies which may shield food-borne pathogens, and safe food storage temperatures and appropriate holding temperatures are difficult to retain (Monney, Agyei and Owusu 2013:283; Mosupye and von Holy 2000:138). Furthermore, the flow of water from taps is not consistent for hand washing, dishwashing, cooking and drinking, thus compelling the street vendors to store water under susceptible conditions that are subject to contamination.

Figure 2.2 demonstrates the necessities that all SFV's need to have in their stalls, especially the ones that prepare and sell meat items.

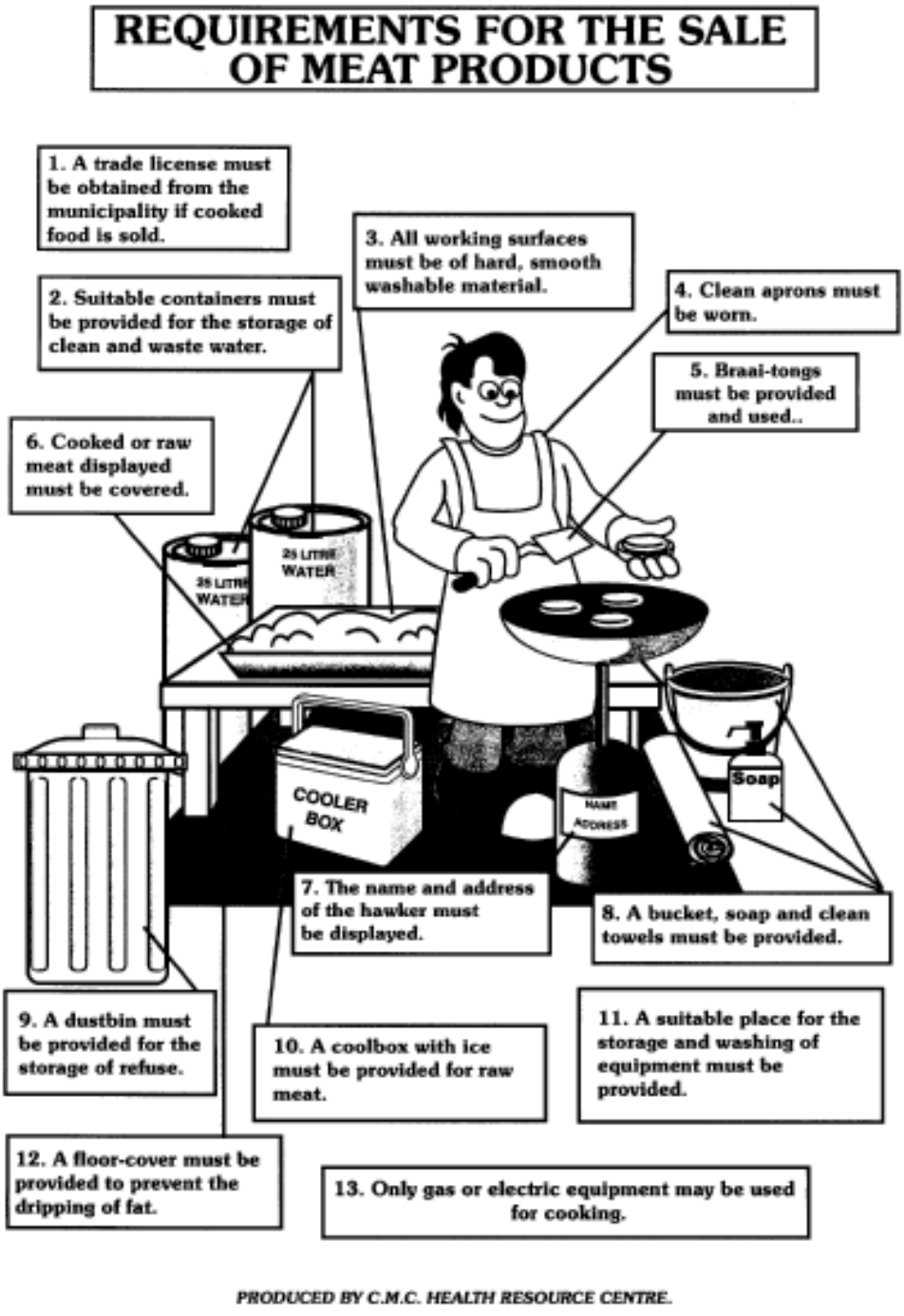

Figure 2.2: Requirements for street-vendors preparing and selling meat items (Department of Health 2003)

Food sellers might infect food by poor personal hygiene, thus food handlers need to ensure good hygienic practices during handling, preparation and selling of food. Food vendors selling meat items are guided by regulations which include obtaining a trade license from the Municipality, arranging suitable water containers for storing clean and waste water, ensuring that the working surfaces are hard, smooth

and washable, wearing clean aprons, providing refuse bin with the lead for all the refuse, arranging a cool box with ice for storing raw meat and ensuring that the name and address of the food vendor is displayed (refer to figure 2.2)

2.3.3 The number of street vendors internationally, nationally and in South Africa

According to Bhat and Nengroo (2013:112), there has been an extensive increase in the number of street-vendors in the major cities around the world, especially the developing countries of Asia, Latin America and Africa.

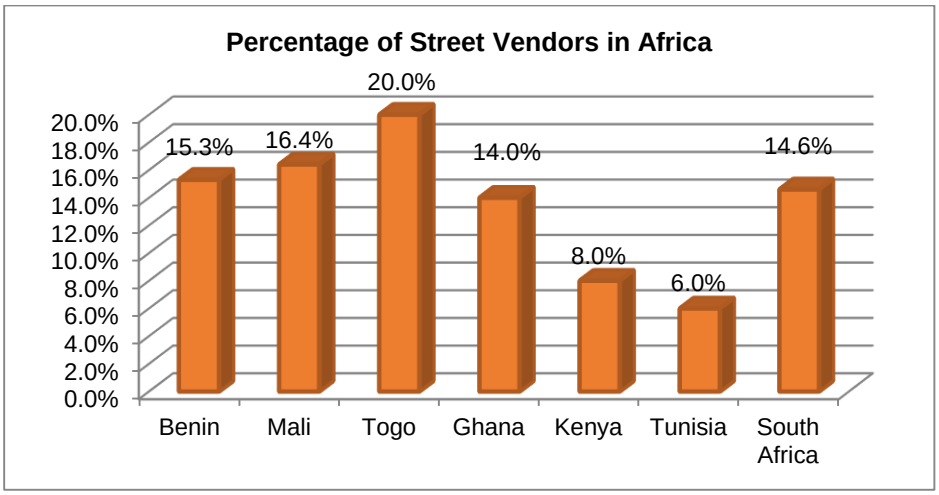

Figure 2.3: Street vendors in Africa (WIEGO 2013).

Street vendors represent 14.6% of total non–agricultural employment in South Africa, 9% in Guatemala, 8% in Kenya, 6% in Tunisia, 3% in India and 1-5% in Brazil, Costa Rica and Mexico (WIEGO, 2013). Figure 2.3–2.5 shows the sample percentage of street vendors in major cities around the world, especially developing countries of Asia, Latin America and Africa. Since Brazil, Costa Rica and Mexico do not have an exact percentage it was excluded from the graph. The above graph displays the breakdown of available official statistics of street vendors in Africa.

In South Africa, black women are the main role players in street trading (Wills 2009:48) and sell a wide range of goods such as clothing, snacks, cigarettes, fruits and vegetables that are often bought at the markets (Siqwana – Ndulo 2013:1). WIEGO (2013) states that low admission cost and flexible working hours, makes street vending an attractive option for poor women; hence the high statistics on women street vendors. Table 2.1 below display the number of males and female street vendors selling foodstuffs and non-food stuffs is South Africa.

Table 2.1: Statistics of vendors selling foodstuffs, non –food stuffs, and the total of street vendors in South Africa, 2007 (WIEGO 2013).

	Street vendors of foodstuffs			Street vendors of non-foodstuffs			All street vendors		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
% and numbers of informal workers who are street vendors.									
Weighted count	92.512	263.632	356.144	80.387	96.491	176.878	172.899	360.123	533.022
	(10,663)	(18,217)	(23,124)	(10.404)	(9,297)	(15,065)	(15,174)	(20,691)	(29.228)
Un -weighted count #	145	543	688	151	228	379	296	771	1,067
% of informal workers in non-agricultural self-employment	12.56%	34.98%	24.39%	10.92%	11.81%	11.39%	23.47%	46.79%	35.78%
% of informal workers in non-agricultural employment	5.13%	14.30%	9.76%	4.45%	5.23%	4.85%	9.58%	19.53%	14.61%
	-0.582	-0.931	-0.586	-0.549	-0.503	-0.396	-0.789	-1.052	-0.717

The unemployment rate in South Africa has fluctuated between 24% and 30% since 2000, forcing many South Africans who have been unable to enter the formal job market to opt for street trading to generate income (Siqwana – Ndulo 2013:2). Table 2.1 indicate that the majority of street vendors selling both foodstuffs and non-foodstuffs under non-agricultural employment category are females 19.53%, and the female's statistics surpass that of the male counterpart which is 9.58%. In the same way, female's statistics 46.79% in the non -agricultural self -employment category surpasses that of the male counterpart 23.47% (WIEGO 2013).

Statistics SA confirmed that more men work in the formal sector then women. Fifty two percent of women are employed in the formal sector, while 74% men are employed in the formal sector. In Africa more than two thirds of street traders in the main cities of Benin, Ghana, Mali, Côte D'Ivoire and Togo are women, while in Kenya, Madagascar, Senegal and South Africa women constitute more than half of the street traders (Skinner 2008:7). Women also form a majority of street traders in other cities in Asia and Latin America including Hanoi (79%), Ho Chi Minh City (67%) and Lima (65%). Ten percent of women street vendors are found in countries where cultural norms restrain women's commercial activities (WIEGO 2013).

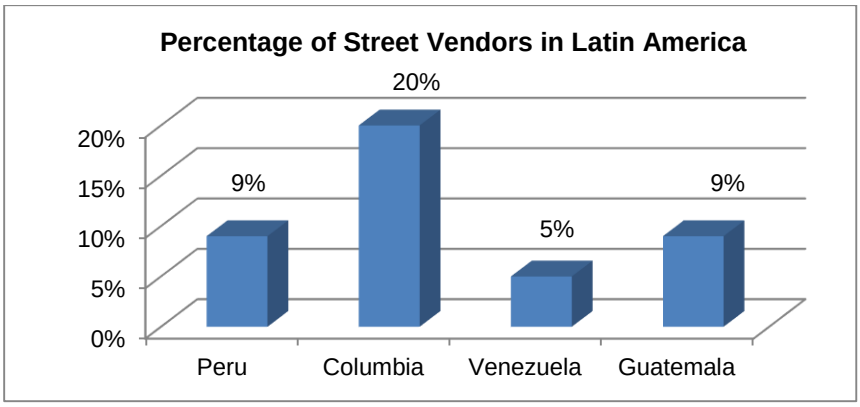

Figure 2.4: Percentage of street-vendors in Latin America, adapted from (WIEGO 2013)

Figure 2.4 illustrates the available statistics of street-vendors in Latin American countries; Columbia has the highest number of street-vendors in Latin American countries with 20% followed by Peru and Guatemala with 9% and lastly Venezuela with only 5%.

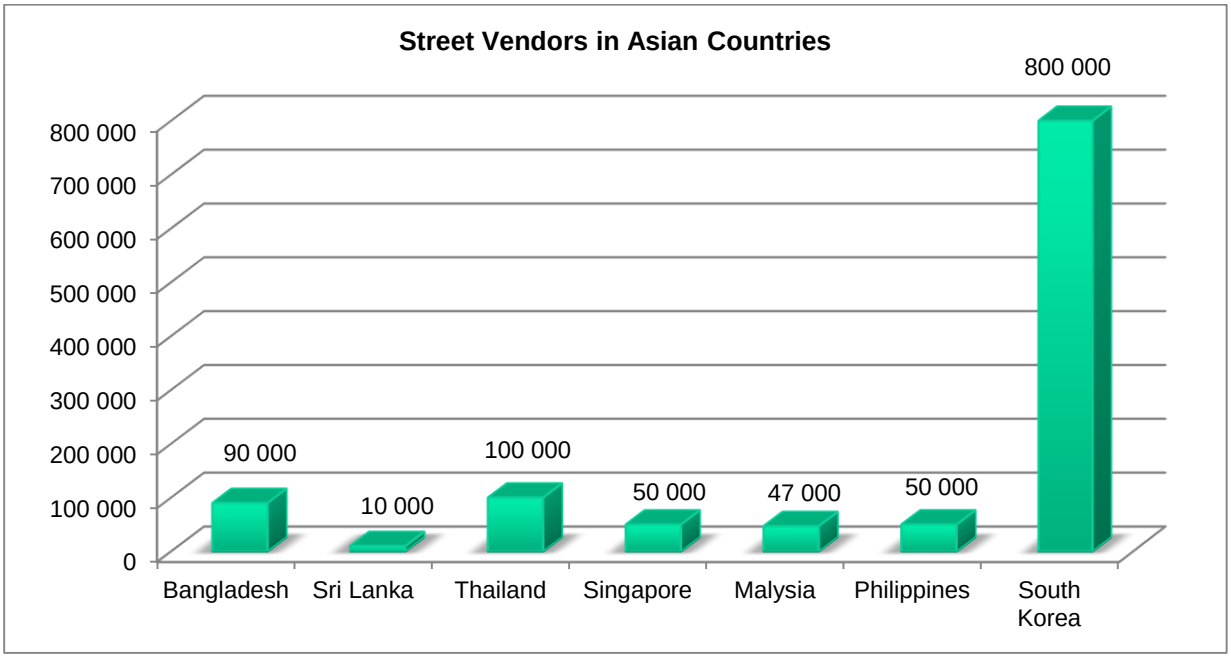

Figure 2.5: Street vendors in Asian countries, adapted from (WIEGO 2013)

The above graph (figure 2.5) illustrates the statistics (in numbers) of the street-vendors in the Asian countries. There are about 90 000 street-vendors in Bangladesh, 10 000 in Sri Lanka, 100 000 in Thailand, 50 000 in Singapore 47 000 in Malaysia, 50 000 Philippines and 800 000 in South Korea. Only India and Vietnam had their statistics in percentage format, India 9% and Vietnam above 11%..

According to WIEGO (2013), obtaining reliable statistics on the size of the street-vending inhabitants can be very difficult, and few countries have official data on street-vendors. Below are the quoted reasons why street-vendors might be missing from the official data.

- The population census and labour force surveys do not have “place of work” questions for street vendors in them.
- The question about “place of work” does not have suitable response classification to let statistics expert to pinpoint street vendors.
- The occupational classifications for the street vendors in the international standard classification of occupations (ISCO-88) are not obtainable in official data.
- Several traders use street trading as a seasonal, short-term, or part- time income generating activity, and many labour force surveys ask only about primary occupations.
- Lastly, the fact that most of the street traders feel uneasy about stating their real occupation in government analyses, because of the fear of sanctions such as levies, seizure of goods, or even jail sentences (WIEGO, 2013).

2.3.4 The dangers of selling in community places

In countries like South Africa and other developing countries, street food vending is very common, and there has been little information regarding the incidence of street-food related diseases. This has raised great concern because the environment under which street-vendors operate which are usually inappropriate for the preparation and selling of food (WHO, 2007, Mosupye and von Holy, 2000:138). Street-vendors encounter numerous problems in the work place and yet take home very little earnings. According to eThekwini Municipality (Department of Business Support Tourism and Market Unit), 54% of the informal economy take home R500 or less per month and 92% take home less than R2500 per month, signifying a link between impoverishment and working in the formal economy. Moreover legal representation is very poor (WIEGO2013). The vendor’s difficulties range from 1) the complicated process of finding the trading site; 2) shortage of facilities such as power supply, water supply, removal of trash, financial assistance, accommodation and storeroom; 3) seizure of their stock by the city officials; 4) corruption claims; 5) persecution; 6) removal from the vending sites; and 7) health problems such as inhaling car gasses, inhaling poisonous gasses from the space and the danger of contracting diseases spread by pests (WIEGO 2013).

2.3.5 The Economic impact of street food vendors

Due to the lack of recent research on street-vendors in South Africa, the literature on the economic impact of the street-vendors is mainly based on research done in 2006 by von Holy and Makhoane. Street food trading has emerged as a profitable activity and a great source of income for the underprivileged in many developing countries (Campbell 2011: xiv). Despite the concerns raised over the safety and quality of street-vended food, the sector experienced major growth during the past few years, due to socio-economic changes in many countries including South Africa. What is more remarkable is the fact that street food vending is undoubtedly the single major employer in the informal sector and probably one of the main contributors to the South African economy (von Holy and Makhoane 2006:90).

In a study on improving street food vending in South Africa, von Holy and Makhoane (2006:90) revealed that street food vending in South Africa adds significantly to the economy of the country. Correspondingly, Guliwe (2013:1) of the Business Report – News reported that the informal segment provides over 3 million employment opportunities to the South African Economy. Not only 44.7 million rand was spent on street food outlets in the Gauteng Province, but also over 8 million rand was spent in the Western Cape. In the Durban metropolitan area, over 18 million rand was spent in 1998 on street – vended foods. Moreover private household in South Africa spent approximately 4.3 million Rand on food bought for consumption away from home and more than 47% of that total was spent on meals and snack bought from hotels, restaurants and street-vendors (von Holy and Makhoane 2006:91).

In Ghana, street foods recorded 19 – 27% of food expenses and provided 134 – 417 kcal per day per person. The research that was conducted in Ghana revealed that the street food sector employs over 60 000 people with an estimated turnover of US$ 100million, whereas the Food and Agricultural Organisation (FAO) estimated that there are approximately 100 000 vendors in Malaysia, with a joint total annual sales of over $2 billion. In the review that was done in Ghana, the street food sector revealed that the food sector employ over 60 000 people with a projected revenue of US$ 100 million (Campbell 2011:13).

2.4 GOVERNMENT APPROACHES TOWARDS IMPROVING STREET VENDING

South African municipalities face numerous challenges in developing and implementing policies and by-laws that create a supporting environment for the sector (Informal Economy, 2012). Some of the local authorities took the initiative to improve street food vending in their areas of power. The eThekwini Metropolitan Council (formerly known as the Durban City) in the KwaZulu – Natal Province, took the initiative of improving street food vending in certain areas in the region. Metro took the decision to integrate the informal economy into its long - term plan to promote economic development (von Holy and Makhoane 2006:91). Some of the benefits that came out of the initiative were outlined by von Holy and Makhoane (2006:91) as follows:

a) The eThekwini Metro street food vendors operate in assigned areas, thus reducing the problem of public annoyance in Durban City and surrounding towns.

b) The Metro also ensures that street vendors acquire essential food hygiene training, which enables them to adhere to minimum hygiene training guidelines.

c) To sum up, the street vendors receive a certificate of acceptability that allows them to operate within the Metro.

In Durban, the government also worked with the street vendors to form the Street Net International alliance. The organization was designed to solve the menace that was caused by over –trading in the overcrowded area of Warwick Junction. The organisation has since extended its operations to cities across the continent and has formed associations with other organisations in Nairobi, Kenya and Zambia (Street Net International Alliance). According to the Department of Business Support Tourism and Market Unit (eThekwini Municipality),the city of Durban has expended more on ground work for informal dealers than any other South African city (Skinner 2008:18). Furthermore, the eThekwini Municipality has introduced the support structure for small enterprises which comprises of the following:

- Business skills training – a unit that trains people in basic business skills and inspire growth of small businesses.

- Legal advice – local government to offer fundamental legal advice to small businesses on labour legislation, trade laws and tax laws.

- Health education – to be offered to the individuals that trade with food, and other traders which have effect in health, for example hair dressers.

- Promotion of research – local government to support studies that explore the effects of current training, with the emphasis on publishing good practices.

- Facilitating access to financial services – eThekwini Municipality has finally considered the problem encountered by a number of small business persons, accessing funding. Financial Institutions have been assigned to offer suggestions to increase access to funding for Small Medium and Micro Enterprise (SMME's).

Similarly, the Ehlanzeni District Municipality in the Mpumalanga Province compiled the Street Trading By – laws, whereby the municipality registered all the street food vendors in its area of power and allocated specific sites as food vending sites. At these sites, the municipality also provided basic facilities such as running water, wash basins, storage facilities and toilets. The maintenance of these facilities is paid for by the vendors themselves. Vendors in the Ehlanzeni district are required to obey the minimum requirements set out by the National Hygiene Regulations. The municipality also present training to the vendors and organises assessments as part of obedience monitoring (von Holy and Makhoane 2006:91).

In the Gauteng Province, the Department of Health established the Informal Food Trading Programme to encourage safe food handling within the informal food trading sector in the province. The goals of the programme are to provide the street food vendors with general knowledge and awareness of good hygiene practices; inspire the food vendors to become responsible and diligent in providing safe food to their clients and thus minimizing the risk of food contamination and the frequency of food-borne disease outbreaks. The Johannesburg Metropolitan Council also registered the street food vendors and assigned space for them to operate. This Metro also provided the vendors with basic facilities similar to the Ehlanzeni District Municipality (von Holy and Makhoane 2006:91). According to the report on the Future of Street -vendors at Crossroads (2012:1), there is proof that some governments are heading in the right direction in terms of improving street vending.

The Indian parliament introduced the 2012 Street Vendors Bill which allow people to register as street vendors with a once of fee. The main objective of the Bill is to control and protect their rights. In Jakarta the Governor is repositioning street vendors to traditional markets in an effort to clean up and revamp the city. Meanwhile in Kolkata some street-vendors took matters into their own hands after being expelled and raised money to build a three-level shopping centre, where more than 100 hawkers now sell their goods. In New Delhi, a non – profit organization called Self Employed Women's Association (SEWA) walked in to assist street-vendors that were evacuated during the Commonwealth Games. Vendors were allocated a specified area where they continued to set up their stands. This model is also supported by developed cities like London and the Canadian cities of Victoria (Future of street-vendors at crossroads 2012:1). Lastly, the Pan American Health Organisation (PAHO) worked hard to advance the hygiene standards of street food traders by intensifying training and inspection (Benny-Ollivierra and Badrie 2007:68).

2.5 FOOD VENDOR'S ACTS AND POLICIES

In South Africa, street traders are protected by the Constitution and through Section 52 local governments are inspired to engage the communities in local government affairs (Siqwana-Ndulo 2013:2). During apartheid, informal traders were controlled by the local municipalities using the by-laws and licenses. After the political changes which took place in the 1980's, government encouraged Black businesses hence the passing of The Business Act in 1991. The Business Act recognizes the street traders as people who are entitled to support as they also contribute to the economy (Siqwana-Ndulo 2013:1-2).

South Africa also has laws administering the handling, carriage, storage and sale of unloaded foods to the community. Laws are there to safeguard the customers against possible danger of contracting food poisoning or foodborne illnesses, and also guard the food industry from lawful action by passing rules to help in business (Gordon-Davis 2011:114).

Sun, Wang and Huang (2012:160) state that previous studies revealed that most of the organizations in Africa and other developing countries do not have specific policies for the safety of street food vending. Furthermore, a large number of the street vendors in Africa and other emerging countries were unaware of essential food safety issues; most of them were unlicensed, not competent in food hygiene and selling food items that are not legalized or controlled. In Taiwan only the restaurants and the food processing plants are controlled by the state; street food vendors are not obligated to conform to the above policies.

In Trinidad and Tobago the Ministry of Health encourages vendors to expose the food badge to signal that the vendor is licensed to sell food to the community. Moreover the food badge grants the public the "safe food security" assurance (Benny-Ollivierra and Badrie 2007:76). Food vendors are also required to obtain a certificate of good health from the medical practitioner, pay fees that are prescribed by the Public Health Department and attend a food safety lecture. Similarly in Turkey the public health legislation demands that individuals working in food service areas should be health-tested every three months, and have to acquire a confirmation report denoting fitness for work (Çakıroğlu and Uçar 2008:13). Benny-Ollivierra and Badrie (2007:76) reported that street vendors in Trinidad and Tobago often trade with fewer regulations because current policies are not fully implemented. On the other hand, in New York City in the USA, the number of people requesting food vending licenses exceeds the number of licenses available; thus several street vendors avoid the system and sell their food unlawfully.

In the article titled 'Informal traders criticize licensing bill" by Ensor (2013:1) the author reported that the Informal Traders in South Africa condemn the licensing bill which among other things compels all businesses to obtain a permit to trade from the city officials. In response to that, the National Association of Informal Traders wrote to the Minister of Trade and Industry Rob Davies, expressing dissatisfaction about the number of issues enclosed in the bill. Firstly the requisites set out for the application of a permit discriminate uneducated vendors. The second burden was the excessive amount of authority that was given to the city officials. Lastly the chairman of The South African Traders Alliance Thabiso Pita said that the bill was oppressive since it crushed informal traders with inflated administration charges. Moreover, Pita felt that the informal traders will not be able to meet the administration expenses, thus resulting in additional job losses. On the contrary Trade & Industry representatives were obstinate that the licensing bill will assist informal vendors to acquire funding from the government. In addition Minister Davies believed that issuing trade permits would assist the government to prosecute all food vendors selling illegal commodities (Ensor 2013:1).

The South African Local Government Association (SALGA) believes that there were several issues that the government encountered when drafting down the policies for the informal economy. Issues includes "*complex co-ordination processes within municipalities*, each using its own strategies; *low literacy levels* such as informal workers are unable to exercise the constitutional rights and duties; *instability and vulnerability* of informal worker's representation and associations and *multiple structures within municipalities* which usually do not plan and operate jointly" (South African LED Network 2010).

2.5.1 Street trading Bylaws

According to Steyn (2011:10), a by-law is a public governing law within a particular region, and the main purpose is to control the informal business in a certain area. Street vending laws comprises of various standards, conditions concerning licenses, payments, food safety, location and road traffic safety. In most countries or cities street trading is controlled by municipal codes (Tester, Stevens, Yen and Laraia 2010:2039).

2.5.1.1 Location

The eThekwini Municipality Container Policy confirmed that 74% of the traders work without proper licenses, 18% lease the trading stalls from private people and pay only for the trading stall. Only 26% work officially with licenses, and 50% are not up- to- date with monthly rental payments (Business Support and Markets Unit - eThekwini Municipality 2006:8).

Local governments usually have strong restrictions for street vendors with regards to trading areas. Street traders in the Durban Municipality and the City of Cape Town are prohibited from conducting business at a place or an area where street trading is forbidden. These areas include the space next or adjacent to:

a) A church building or place of worship

b) A national monument building under the National Monuments Acts, 1969 (Act No. 28 of 1969), unless a written permission is granted by the Council.

c) A State or Council building

d) A store selling the same or similar items as that of the street vendor

e) Public road adjoining a residential building, not unless permission is granted by the landlord.

f) A place where a vending site significantly hinders pedestrians from using the sidewalk.

g) A place where the vending site obstructs motor vehicle traffic

h) A place where the vending site blocks the entrance and the exit of a building, and the fire hydrant.

i) Operating in an area or a stand without confirmation that the place or stand has been hired/ allocated to the vendor by the Councilor (Business Support and Market Units 1990:1-5).

2.5.1.2. Health and Safety Regulations

The municipal food policies are intended to safeguard the community from food-borne illness and to improve food hygiene standards. Furthermore food policies are meant to improve food handling practices (Tester, Stevens, Yen and Laraia 2010:2039). Every street vendor has to practice cleanliness in the place of business and protect community health by ensuring that:

a) The business is conducted in a manner that is not hazardous to public health and public welfare.

b) If an officer or an employee of the Council asks the vendor to move all his/her belongings so that the place can be cleaned, the vendor has to comply. The business area is clean and in hygienic condition at all times. Vendors that are involved in the preparation of food need to ensure that food is prepared in hygienic environments and in accordance with the prerequisite of the Health Department.

c) No fire is made in a place that could hurt people or damage property.

d) The trading areas are not full of garbage (Business Support and Market Units 1990:1-5 1990:1-5).

2.5.1.3 Permits and Fees

According to Tester *et al*. (2010:2039; The Informal Trading By-Law, 2014) local authorities demand that all vendors obtain a permit or a license card, and no one is allowed to operate as an informal trader on Municipality land without a valid trading approval from the Municipality. The eThekwini Informal trading by – law (2014) states the following:

(1) "Any person may apply for an informal trading permit, to conduct informal trading on Municipal property, if that person–

a) Is an informal trader or a person who wants to become an informal trader

b) Does not already hold a permit in respect of any other informal trading site within the area of jurisdiction of the Municipality

c) Is a South African citizen or, has a valid work permit, but is not limited to a refugee permit

d) Does not employ more than ten persons

e) Does not have an interest in more than one entity or partnership which conducts informal trading; or

f) Is currently unemployed, and on becoming gainfully employed, surrenders such permit

(2) An application for an informal trading permit must be on the form prescribed by the Municipality from time to time. Furthermore, the Municipality takes certain factors into account when granting informal trading licences. Preferences are given to applicants who are unemployed, physically incapacitated, black and first time applicants" (The eThekwini Informal Trading By-law 2014).

There are different charges for the operating permits. In addition vendors need to do well in the assessment test conducted by the Health Department to qualify for the license card/ permit. The eThekwini Informal Economy Policy of 2001 also focuses on the complicated and costly permit and licensing procedures. To deal with the challenge, the policy proposes a full and cohesive approach towards funding, since very few small businesses are getting funding from the SMME policy. Hence, the policy emphasizes on basic social infrastructure (Steyn 2011:7; Durban Informal Economy Policy 2000).

2.6 FOOD PROVISIONS IN INSTITUTIONS OF HIGHER LEARNING

Students often neglect eating nutritious meals because of busy timetables and the shortage of time to sit down and enjoy a meal. The study on "competitive foods sales in schools" revealed that youngsters blame the shortage of time as the main reason for consuming junk food. Furthermore, lunch break activities such as sport activities, tutoring classes, union or organization meeting encourage learners to eat unhealthy food (Park 2006:1).

Most of the institutions of higher learning rely on cafeterias, canteens, tuck shops, street vendors and catering companies contracted to institutions for the provision of food. Wiles, Green and Veldman (2011:129) believe that home and school surroundings play an important role in promoting a healthy lifestyle. Parents are responsible for ensuring that good meal patterns are established at a young age, but dietary education obtained at school, friends, mass media, substitutes all the good food values that were instilled by parents. In addition, Wiles, Green and Veldman (2011:129) and Park (2006:2) regard tuck shops as food provision places that encourage poor food behaviour which in turn results in obesity. Similarly, Fox (2010:1010) is of the view that bad eating with the lack of exercise impacted heavily on the rise of obesity incidences in the past four years.

Previous researchers Adam, Hiamey and Afenyo (2014:136) revealed that university students in Ghana prepare meals themselves, which is a different practice to schools that have boarding provisions. However, food that is cooked and marketed on university campuses is not well monitored in terms of hygiene standards and food safety rules; because health authorities are not implementing the rules or the food regulating bodies do not exist. Adam, Hiamey and Afenyo (2014:136) further highlight that the absence of food regulating bodies might have severe health implications, more especially because there is proof that approximately 70% of bacterial food poisoning incidences ensued from caterers.

2.7 FOODBORNE DISEASES

Food-borne disease is described as incidences of similar sickness resulting from consumption of common food or water (Soon, Singh and Baines 2011:823-824; Linscott 2011:41-42). Gordon-Davies (2011:109) explains that food-borne illnesses include cholera, hepatitis, typhoid, tuberculosis (TB), dysentery, and other threatening diseases like tapeworm. Food-borne diseases are a serious community health problem across the world. Several researchers expressed concern about the increasing number of foodborne disease incidents in recent years, both in developed and developing countries (Martins, Hogg and Otero 2012:184; da Cunha, Fiorotti, Baldasso, de Sousa, Fontanezi,Caivano, Stedefeldt, de Rosso and Camargo 2013:662; Mukhopadhyay, Kr. Joardar, Bag, Samanta, Sain and Koley 2012:21; Seaman and Eves 2006:279; van Tonder, Lues and Theron 2007: 33).

Seventy six million food-borne illnesses including 325 000 cases of hospitalization and 5 000 deaths occur in the United States each year (Nyachuba 2010:257). According to the DoH (2006), in Turkey, 26 772 people were admitted in hospitals as a result of food-borne diseases, 429 as a result of Salmonella paratyphoid illness, and 8 824 incidents of Hepatitis A took place in 2004 (Sanlier, Bilic, Çelik and Memis 2012:87). In 2006 the European Food Safety Authority (EFSA) confirmed that there were 5 710 food-borne outbursts comprising of 53 568 persons, 5525 were admitted in hospitals and 50 died. In 2008 the figures declined, only 5 332 food-borne outbursts were confirmed, comprising of 6 230 people admitted in hospitals and 32 fatalities. Consequently, in 2010 the EFSA confirmed that almost 48.7% of foodborne diseases were related to food preparation or food service institutions (Sani and Siow 2014:210). In 2006 Portugal had the least number of confirmed food-borne illnesses, with only 13 outbursts that consisted of 177 persons and 69 individuals admitted in hospitals (Martins, Hogg, and Otero 2012:184).

According to the World Health Organisation (WHO 2007), the number of people affected annually has increased and the economic losses that are caused by food-borne diseases still continue to be a major public health concern in developed countries such as South Africa and it is a country in transition. The percentage of people that have been diagnosed with foodborne diseases every year has been 30% in industrialized countries, while in developed countries most of the foodborne epidemics are not identified, reported and investigated on time (Department of Health 2009:1). Moreover, in South Africa food poisoning and other food related illnesses are mild and less reported since people are less likely to seek out medical help. Correspondingly, Niehaus, Apalata, Coovadia, Smith and Moodley (2011:693) reported that foodborne disease epidemics are customary in South Africa but the literature reporting the incidences is limited. There were approximately 1180 cases of foodborne illnesses that were reported in the Mpumalanga Province in 2009, which was a huge increase from 2008 (Department of Health 2009:1).

2.7.1 Causes of food-borne illnesses

Food-borne investigations all over the world have revealed that the majority of outbreaks results from "poor practice during food preparation in small food businesses, canteens, residential homes, catering establishments and other places where food is prepared for human consumption" (Martins, Hogg, and Otero,2012:185; Soon, Singh and Baines 2011:824; Sharif and Al- Malki 2010:55-56; Çakıroğlu and Uçar 2008:9-10; Giritlioglu, Batman and Tetik 2011:838; Egan, Raats, Grubb, Eves, Lumbers, Dean and Adams 2007:1180). Furthermore, major factors such as importation of food from developing countries, modified eating patterns, employment of unskilled labourers, newly emerging pathogens and an increase in the number of vulnerable individuals were contributing towards the huge number of reported outbreaks in the last decade (Santos, Nogueira, Patarata and Mayan 2008:387).

A number of researchers have different views with regard to the actual causes of foodborne diseases. The Food and Drug Administration (FDA) believe that quite a number of elements could be the cause of food borne illness in Food Service Units (FSU). These elements are: a) dirty utensils, b) inferior personal hygiene practices, c) incorrect food keeping/retaining temperatures, d) food prepared way beforehand, e) insufficient cooking and warming temperatures, f) cross- over infection between uncooked and cooked food, and g) foodstuff obtained from hazardous and infected suppliers (Hanekom 2010:4002-4003; Nyachuba 2010:258; da Cunha *et al*. 2013:662; Bolton, Meally, Blair, McDowell and Cowan 2008:291-292; Campbell 2011:9-10, Sani and Siow 2014:210). On the other hand, Mukhopadhyay *et al.* (2012:21) confirm that the problem is more critical in developing countries owing to poor personal hygiene and food safety methods. What is more, approximately 70% of diarrheal diseases in emerging countries are alleged to be of foodborne source (WHO 2007; Jeo 2010:4382).

Micro-organisms such as bacteria, viruses, parasites, fungi (yeasts and mould) and chemicals are implicated as other causes of food borne diseases (Mukhopadhyay *et al.* 2012:21; Nyachuba 2010:262; WHO 2007). Table 2.2 below display specific examples of micro-organisms that causes food borne diseases.The Morbidity and Mortality Weekly Report (2010:973-974) suggest that not all bacteria are poisonous to human beings. Moreover, certain harmful bacteria's are already in food when food is bought from the markets or grocery shops. Raw foods such as meat, poultry, fish and shellfish, eggs, unpasteurized milk, dairy products, and fresh produce usually have bacteria that cause foodborne illnesses. However, during growth, harvesting, slaughter, processing, storage, and shipping; bacteria can infect food thus causing it to be unsafe to eat. Furthermore, cross –contamination (the distribution of bacteria from infected food to uninfected food) may occur if the food handlers do not ensure good hygiene practices such as washing hands properly, using colour coded chopping boards, cleaning kitchen equipment and regularly sanitising work surfaces. The report further outlines the bacteria that cause foodborne illnesses and the types of food that are mostly affected (Morbidity and Mortality Weekly Report 2010: 973-974):

Salmonella which is mainly found in raw and undercooked poultry, meat, dairy products and seafood. Salmonella can also be found on egg shells and inside eggs.

Shigella is a bacterium found in the stool of the sick person, and can easily spread if the infected individuals do not properly wash hands after using the toilet. Food prepared or handled with dirty hands and water poisoned with infected stool can easily transmit the disease to the produce in the field.

Campylobacter jejuni (C. jejuni) is found in uncooked or rare chicken and unpasteurised milk.

Escherichia coli (E. coli) has a different strains and the one that causes infection in humans, is the E. coli O157:H7 and is mainly found in unpasteurised fruit juices and milk, fresh produce and very rare hamburger.

Vibrio a bacterium that may infect fish or shellfish

Listeria monocytogenes (L. monocytogenes), is found in raw and undercooked meats, unpasteurized milk, soft cheeses, and ready-to-eat deli meats and hot dogs. **Clostridium botulinum (C. botulinum),** a bacterium that infect salted fish, smoked fish and incorrectly canned foods The table below display examples of viruses, bacterias, parasites and chemicals that cause foodborne diseases.

Table 2.2: Pathogens causing food borne diseases (Mukhopadhyay *et al.* 2012; Nyachuba 2010; Morbidity and Mortality Weekly Report 2010).

Bacterias	**Viruses**	**Parasites**	**Chemicals**	**Physical Hazards**
Salmonella	Hepatitis A	Giardia	Aflatoxins	Bones
Campylobacter	Calicivirus	Cyclospora	Pesticides	Stones
Listeriamonocytogenes	Rotavirus	Trichinella	Sanitizers and cleansers	Leaves
Yersinia	Noroviruses	Cryptosporidium	Non–food grade lubricants	Shell pieces from nuts, and eggs
Shigella		Toxoplasma gondii		Shell pieces from shellfish
Vibrio				
Clostridium				
Escherichia coli (E.coli)				

In addition to the above causes of food borne diseases, Giritlioglu, Batman and Tetik 2012:838; Soon, Singh and Baines (2011:824) state that inappropriate food handling continues to be the life terrifying issue with the outbreaks of foodborne illnesses affecting the public health and the financial system. Research conducted in USA suggested that improper food handling practices contributed to approximately 97% of food-borne illnesses in food service establishments and homes (Bas, Ersun, and

Kivanc 2006:318). Soon *et al.* (2011:825) further explain that the majority of the food-borne related diseases in Malaysia were associated with epidemics in organizations; 62% of the incidents in schools, followed by educational institutions with 17%, and the public accounted for 8% (Soon *et al.* 2011:825). The majority of these incidences were as a result of unhealthy handling of food and lack of hygiene in food preparation establishments. While staphylococcus aureus is deemed to be the third crucial cause of food borne diseases on earth (Soares, Almeida, Cerqueira, Carvalho andNunes 2012:207).

Gordon–Davis (2011:109) is of the view that foodborne illnesses are regularly spread by food washed in dirty water, shellfish that has been living in unclean water, raw or unsterilized milk and food handlers. Previously researchers (Çakıroğlu and Uçar 2008:13; Malhotra, Lal, Prakash, Dagaand Kishore 2007:456) believed that hands of the food service personnel were the cause of foodborne diseases, and that belief was strengthened by the study done on hands of food service staff. The hands of food service staff were tested, and it was discovered that the naked hands had more bacteria compared to the hands that were covered with gloves. However, Sharif and Al- Malki (2010:56) believe that the recent increase in foodborne diseases is primarily "due to dramatic changes in animal production, industrialization of animal production especially in poultry, mass production in food processing and distribution, globalization of food trade, and increase number of tourist around the world".

In addition, Nyachuba (2010:258 – 261) explains that eating food outside the home also promoted foodborne illnesses. Travel and leisure industry, social, economic, and lifestyle changes are some of the factors causing more people to dine out. Even food prepared by street vendors has been in demand. Dining out is believed to have health effects and a substantial number of foodborne illnesses arise from food service businesses. In America, 50% of foodborne epidemics reported happened in restaurants, thus the danger of foodborne illness related to dining out is more than that of consuming food prepared at home (Nyachuba 2010: 261).

On the other hand Bertolatti and Theobald (2011:795) referred to some foodborne diseases that are not prevalent, but may have severe effects, for example, *E. coli 0157* is the major source of hemolytic uremic syndrome that causes kidney malfunction, and *L. monocytogenes* can result in impulsive abortion or even miscarriage in pregnant women. Similarly, there are foodborne diseases that are not predominant and are as a result of food toxins. Examples are *Clostridium botulinum* which can cause swallowing, speaking and breathing complications, dry mouth, dizziness and distorted vision.

2.7.2 Symptoms and identification process of food-borne illnesses

According to Linscott (2011:41), symptoms of foodborne illnesses include vomiting, nausea, dehydration, abdominal pain, headaches, fever and diarrhea which normally last for 2 – 3 days in most human beings. On the other hand some patients encounter major complications such as hospitalisation,

stillbirths, blurred vision, swallowing, speaking and breathing difficulties, reactive arthritis, nerve paralyses and death (Linscott 2011:41; Bertolatti and Theobald 2011:795).

The majority of foodborne illness cases are not reported (Campbell 2011; Soon *et al*. 2011). The South African Department of Health (DoH) 2009 and da Cunha *et al*. (2013) confirmed that it is due to the lengthy reporting and monitoring process that need to take place before the formal enquiry is completed (Soon *et al*. 2011: 824). Figure 2.6 below outlines the steps taken during the process of identifying foodborne illnesses Soon *et al*. (2011: 824) believe that this is owing to inadequate funds to perform a thorough "trace back investigation". Hence, the International Health Regulations 2005 (IHR) has considered reinforcing the procedures that would assist in speeding up the uncovering process, and the inhibition of food borne disease epidemics (Mensah, Mwamakamba, Kariuki, Fonkoua and Aidara-Kane 2012:6338).

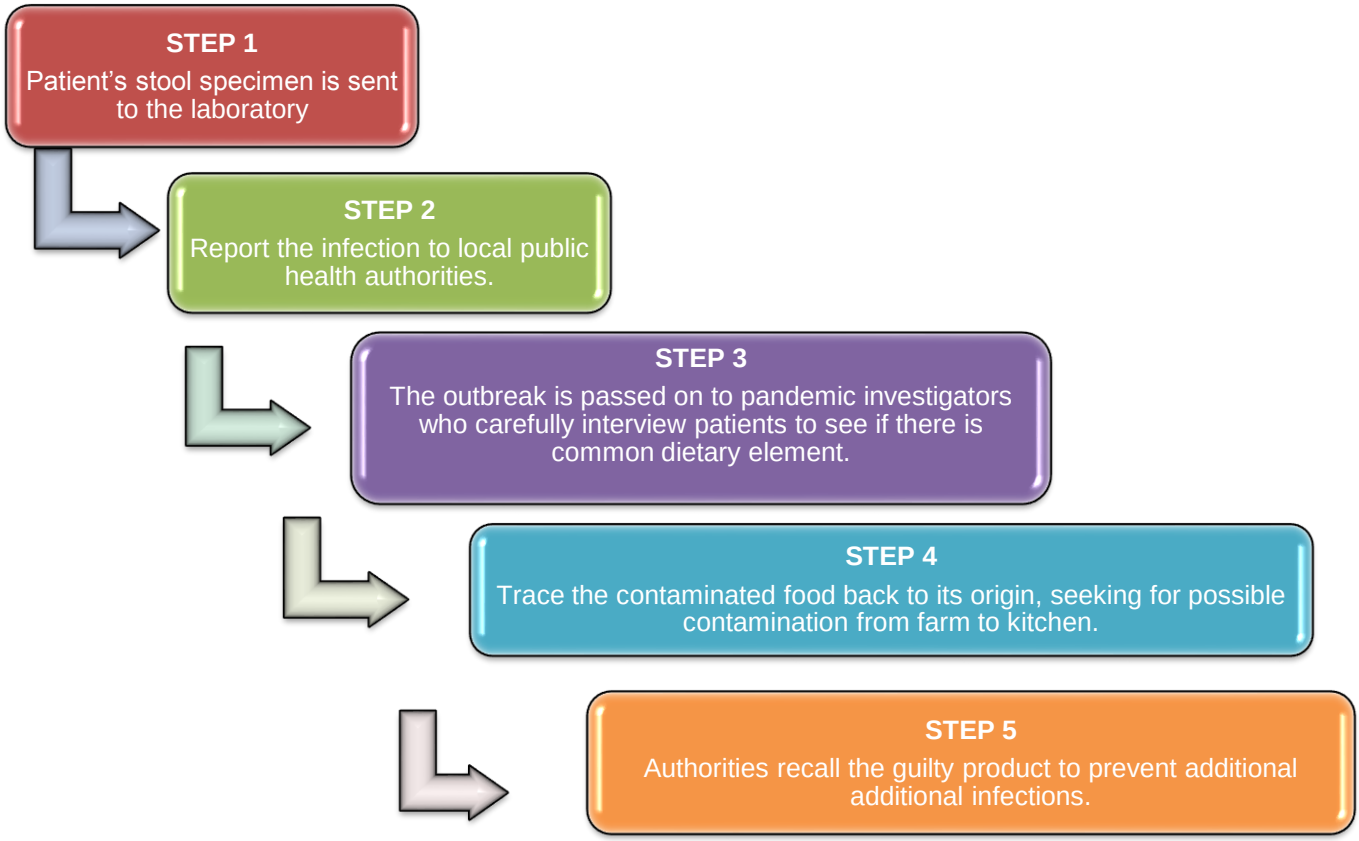

Figure 2.6: The process of identifying foodborne illnesses (Adapted from Soon *et al*. 2011:824)

2.8 FOOD SAFETY LEGISLATION IN SOUTH AFRICA AND OTHER COUNTRIES

Jia and Jukes (2013:237) describe food legislation/food law as " the complete body of legal texts (laws, regulations and standards) that establish broad principles for food control in a country, and that governs all aspects of the production, handling, marketing and trade of food as a means to protect consumers against unsafe food and fraudulent practices".

The WHO (2007) defines food security as the physical and economic access to sufficient, safe and nutritious food to meet dietary needs. In addition, food safety is also an essential part of food security since it is about protecting the food supplied from all microbial, chemical and physical hazards that may occur during all stages of food production; preparing, transportation, storing and consumption in order to prevent food-borne illnesses. Most learners are only concerned about satisfying hunger and do not give any attention to food safety.

Outbreaks of cholera which occurs due to contaminated water are common in the African Region and bacteria, parasites and viruses are the major agents of food borne diseases in the above mentioned region. Therefore, relevant food safety systems are vital from the production of food to the consumption (WHO 2007). WHO also project annual mortality rates for diarrhea in all ages to be around 700 000, and massive dislocation and unhygienic conditions are the major contributors to the situation.

According Al-Kandari and Jukes (2012:33), in 1976 the WHO and the Food and Agriculture Organisation of the United Nations (FAO) started promoting operational food control systems and organised policies to provide emerging countries with plans to ease trade, and to protect community health. On the contrary, Saudi Arabia does not have a broad and cohesive legislature that embraces all food related matters. The food control system in Saudi Arabia has been regarded as incoherent due to the division of the executive officials. Numerous government departments and organisations have been issued with the task of food safety, and that caused repetition of supervisory actions, more rules and regulations and lack of harmonization and productivity.

Nationally and internationally people are becoming more mindful about the importance of food safety due to a numerous foodborne pathogens and risks from locally produced and imported foods. Numerous countries have been affected by risks such as salmonella, avian flu, contamination, and stemming from that, the community's trust in food safety procedures and management systems deteriorated (Al-Kandari and Jukes 2012:33).

Gordon-Davis (2011:9) explains that South Africa has two major executive food control government departments, that is the Department of Health (DoH) and the Department of Agriculture, Forestry and Fisheries (DAFF). The DAFF department is responsible for production, marketing and distribution of vegetables, meat and fish. Moreover, the above mentioned departments work in collaboration with the Department of Trade and Industry (DTI) which act for the South African Bureau of Standards (SABS). The DoH, DAFF, DTI and the SABS share common objectives which are to:

- Guard against community health by minimizing the prevalence of food-borne diseases.
- Guard customers against unhealthy, unhygienic, unbranded and poisoned foods.

- Encourage financial development by upholding client's faith in food structures and
- Offer a good monitoring system for national and international food business

In addition, the Disease Control Act guarantees that the food that has been brought into the country does not bring in diseases such as Avian Influenza (bird flu) and Foot and Mouth Diseases since that has serious health repercussions.

The municipal health inspectors or environmental health officials are in charge of implementing the R918 Regulations Governing the General Hygiene Requirements for Food premises and the Transport of Food (Republic of South Africa 2012:7-8). Moreover, the functions of the municipal inspectors include administering applications, checking sites and supply permits. After receiving a health permit application, the environment health officer at the municipal office examines the premises, and if the premises meet the prerequisites, a health permit will be approved. The permit must be in the public domain at all times and is not transferrable from one person to another (Gordon Davies 2011:13).

2.8.1 Standards and requirements for food premises in South Africa

According to the policy (Department of Health 2012:8-11) food sites must be positioned, designed and built without causing any health risk and must afford hygienic processing of food to avoid adulteration. Walls, ceilings and floors must be washable to avoid food adulteration, and each room must be well aerated either by artificial or natural aeration. Furthermore, there must be sufficient lighting.

Food sites must:

- Have a wash- up area with both hot and cold water for washing equipment.
- Be pest free.
- Have preventative measures to guard against flies and other insects in food preparation areas.
- Have a proper water- discarding system that has been approved by the local municipality.
- Have hand- washing facilities for employees and customers.
- Have a discrete changing area with a storeroom for staff.
- Have a separate storeroom for food and equipment.
- Have water –proof containers with tight fitting lids for garbage disposal.

Above all, food sites must not have straight access to areas that have gasses, odours or vapours that might infect food. Working tops, tableware, and silverware must be clean, glossy, not damaged and free of rust. Work tops must be cleaned before and after working with food (Department of Health 2012:8-11)

2.8.2 Functions of the manager of the food site

Not only is the site manager responsible for organizing food preparation; he/she also has to make sure that the food site is rodent proof, free of garbage, clean and tidy garbage storage area, washing and fumigation of garbage containers and a working waste water discarding system. Moreover, the manager needs to ensure that food handlers attend food hygiene training courses, and inform and document any diseases to the health inspector. The person in charge also needs to ensure that food handlers do not wear excessive jewelry that might contaminate food, and food preparation areas are not used as rest rooms or clothes washing areas (Department of Health 2012:14-15; Gordon Davies 2011:17).

2.8.3 Duties of the food handler

Food handlers need to safeguard against any act that might cause food adulteration or food wastage Hence food handlers must adhere to the following: (Department of Health 2012:15)

- Hands must be cleaned carefully with soap and water at the beginning of the shift, after smoking and after breaks,
- Hands must be cleaned after visiting the lavatory, after blowing the nose, sweating, and touching hair.
- Food handlers must ensure that hands and fingernails are short and clean all the times.
- Hands must also be washed thoroughly after working with raw vegetables, fruits, fish, meat or eggs and prior to working with ready - to - use food.
- A food handler that is not well, carrying infectious diseases, has a blister, or cut that is not covered by plaster is prohibited from handling food.
- Food handlers are also not allowed to spit, cough, sneeze or smoke cigarette in food areas
- Food handlers are prohibited from walking, standing or sitting over food and from using the hand sink for cleaning purpose (Gordon Davies 2011:18; WHO 1996).

In a study conducted in Pietermaritzburg, KwaZulu-Natal, on National School Nutrition Programmes (NSNP) Meaker (2008:3) explained that compromised nutritional status of food consumed by students will have a short and a long term negative outcome in educational achievements. Particularly in those learners who are from the lower socio – economic backgrounds. The researcher further emphasizes the fact that educational and economic status of any community is closely linked to its health status. Improving nutrition and health will strengthen education and the economy, thus improve people's living standards.

2.9 METHODS TO IMPROVE FOOD VENDOR PRACTICES

Internationally food vendor services are increasing at an alarming rate because they cater for a vast number of people including students, daily travelers, office employees, workers in the manufacturing

business, city residents etc. Moreover food vendors offer services at a very affordable price, despite the lack of proper facilities (Choudhury *et al*. 2011:1233).

Studies conducted in different countries around the world on food safety knowledge and the impact of training food handlers reveals that extensive training on hygienic handling of food, and how food transfer diseases is essential. Training prior to fulltime employment and re-assessment training for all food vendors should be compulsory before food vendors are issued with a permit to trade. Furthermore, essential infrastructure such as decent food stalls with proper facilities for cooking, storage, washing and garbage removal is needed to offer healthy and safe food to customers(Seaman and Eves 2010:1038; Choudhury *et al*. 2011:1233; WHO 2006; Aluko *et al.* 2014:169).

Strict regulations of SFV's should be enforced; the implementation of the globally recognised Hazard Analysis and Critical Control Point (HACCP) system is paramount since the system detects key hazards and critical control points where contamination can either be reduced or avoided (FAO, and WHO 2007). Previous researchers (Sani and Siow 2014:210) suggest that food handlers should be coached and observed to confirm thorough hand washing, satisfactory cleaning and effective hygiene practices to minimize the risk of cross-contamination.

DUT in conjunction with the Department of Innovation Technology Business Incubator (InvoTech) situated at DUT provide business support to the food vendors by offering courses relating to the nature of business. When interviewed on 15 July 2014, Khanyile (InvoTech Business Development Officer) stated that the Innovation Programme was intended to support "start-up businesses to commercialization of innovations in Green technology, digital creative designs and Software applications within DUT and support communities". Khanyile further highlighted that InvoTech resulted from the merger and integration between the old TABEISA (Technical and Business Education Initiative in South Africa) programme which offered training to food vendors. InvoTech has since adopted the food vendors even though the new programme is focusing on innovation and technology, Khanyile's department is responsible for mentoring the vendors, monitor their sales and determining the type of training needed. InvoTech offers courses suitable for the food vendors.

2.10 NUTRITION NEEDS OF YOUNG ADULTS

According to Whitney and Rolfes (2013:537), energy and nutrient requirements are larger during the youth stage than in any other time of life, excluding pregnancy and lactation. In the same way the basic

requirements for nutrients increase throughout the juvenile stage and intensify in puberty, and then stabilize as the youngster matures. Furthermore, the energy requirements of the juvenile differ according to sex, the development rate, bodily activity, and body composition. Whitney and Rolfes (2013:537) further mentions that boys grow faster than girls and develop slim bodies; therefore boys' energy requirements are exceptionally high compared to the girls.

The Nutrition Society of South Africa, in conjunction with the Association for Dietetics in South Africa (ADSA) and the DoH approved the eleven South African Food Based Dietary Guidelines (FBDG); which are meant to boost a healthy lifestyle for all South Africans. The South African FBDG are intended to "change the eating behavior of the general population towards more optimal diets that meet energy and nutrient requirements, while simultaneously helping to protect against the development of non-communicable diseases"(Voster, Badham and Venter 2013:S5) . According to the South African FBDG, individuals are advised to eat a variety of foods, be physically active, eat sufficient vegetables and fruits daily, eat dairy products daily, consume starchy foods regularly, daily consume fish, chicken and lean meat, minimize the usage of hard fats, minimize the consumption of food and drinks that have high sugar content, and lastly minimize the consumption and the usage of salty food. The eleven FBDG can be categorized into three groups as shown in figure 2.6 (DoH, 2007).

THE SOUTH AFRICAN FOOD BASED DIETARY GUIDELINES

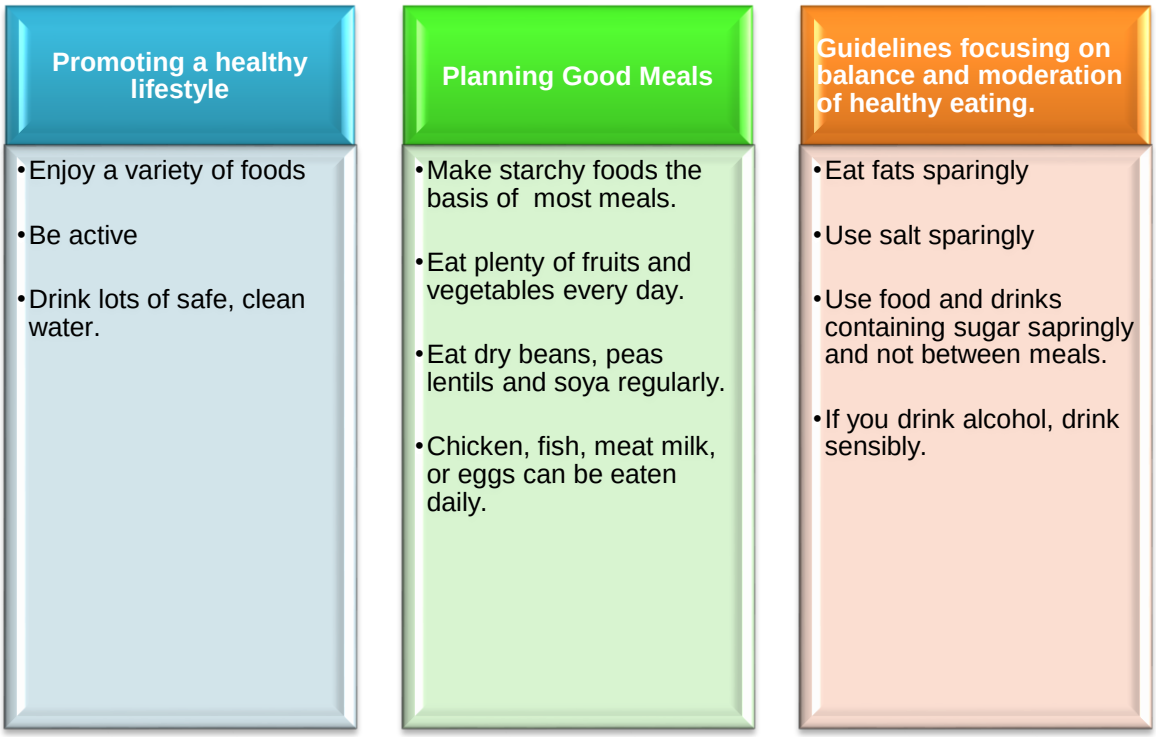

Figure 2.7: The eleven South African Food Based Dietary Guidelines (DoH 2007).

Geyer, Mogotlane and Young (2009:425) maintain that the main nutrients needed by the body to avoid malnutrition are carbohydrates, protein, fat, vitamins and minerals. Therefore, the discrepancy in nutrients needed by the body, and the amount the body receives causes under nutrition or over nutrition.

2.10.1 Definition of Malnutrition

Malnutrition is a broad term used to define poor nutritional status, resulting from insufficient quantity or imbalance of macronutrients such as carbohydrates, protein, lipids, vitamins and other micronutrients that are needed by the body (Saunders, Smith and Stroud 2010:45; Macallan, 2009; Chermesh, Papier, Karban, Kluger and Eliakim, 2011:41; Meier and Stratton 2008:167). Likewise, Hickson (2006:2, Whitney and Rolfes (2013:21), Geyer, Mogatlane and Young (2009:425) define malnutrition as a state of being insufficiently nurtured through deficiency of nutrients where shortage of nutrients is regarded as under nutrition and the surplus of nutrients known as over nutrition. When defining malnutrition, Faber and Wenhold (2007:393) used the graphic illustration (refer Figure 2.8) which clearly classifies malnutrition into under nutrition and over nutrition:

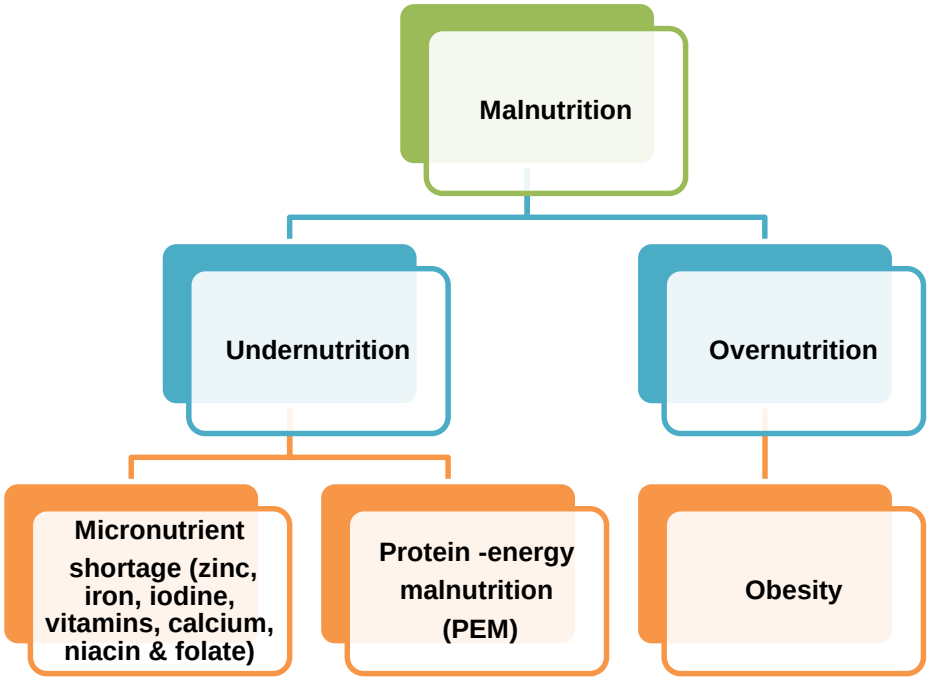

Figure 2.8: Taxonomy of malnutrition (Faber and Wenhold 2007:393)

According to Nordqvist (2013:5), there are numerous ways of detecting whether the person is undernourished, in danger of malnutrition or overweight. One of the major instruments used to detect malnutrition quickly and correctly especially in adults is MUST (Malnutrition Universal Screening Tool) developed by Stratton and colleagues. MUST is an instrument with five steps, and is used by all health care workers in hospitals, health care sites and health societies to individuals in danger of malnutrition. Five steps of MUST:

- Step 1 –Measure height and weight to obtain BMI (body mass index) total
- Step 2 – Register the percentage of unplanned weight loss and total
- Step 3 – Verify if there is any core illness, e.g. psychological condition and total
- Step 4 – Add totals from steps 1, 2, and 3 to find the overall danger of malnutrition
- Step 5 – Use management guiding principles or provincial policy to obtain care plan

In brief, MUST is only utilised to detect adult individuals that are in danger of malnutrition, it is not intended to find shortages or excesses in vitamins or in minerals consumption (Nordqvist 2013:5). Waltons and Allen (2011:418) state that identification of malnutrition is through measuring the body size using anthropometry and clinical signs.

Previous researchers agree that malnutrition of micronutrients is common amongst people with chronic diseases and the elderly. Furthermore malnutrition tends to be severer in patients that are hospitalised, resulting in an extended stay in hospital (Chermesh *et al*., 2011; Meier and Stratton 2008:168). According to Saunders, Smith and Stroud (2010:45), internationally, more than 3.5 million mothers and children under the age of 5 perish every year as a result of malnutrition, and approximately 178 million children have impeded development. The FAO reported that in 2009, more than 1 billion people were

undernourished worldwide and that number decreased to 925 million in 2010 (WHO 2011). Furthermore, WHO (2011) states that malnutrition is the main contributor towards death internationally (Nordqvist 2013:5).

Macallan (2009:526) explains that there are different levels of malnutrition, and the levels are classified by body mass index (BMI). Table 2.3 below indicates the different classification of BMI.

Table 2.3: BMI Classification (WHO 2000; 2004a)

Classification	BMI(kg/m)	
	Principal cut-off points	Additional cut-off points
Underweight	**<18.50**	<18.50
Severe thinness	**<16.00**	<16.00
Moderate thinness	16.00-16.99	16.00-16.99
Mild thinness	17.00-18.49	17.00-18.49
Normal range	**18.50-24.99**	18.50-22.99
		23.00-24.99
Overweight	**≥25.00**	≥25.00
Pre-obese	**25.00-29.99**	25.00-27.49
		27.50-29.99
Obese	**≥30.00**	≥30.00
Obese class I	**30.00-34-99**	30.00-32.49
		32.50-34.99
Obese class II	**35.00-39.99**	35.00-37.49
		37.50-39.99
Obese class III	**≥40.00**	≥40.00

2.10.2 Definition of Overnutrition

Studies reveal that obesity and overweight are familiar models of over nutrition, furthermore obesity relates to several chronic diseases namely gallbladder, type –II diabetes, hypertension and heart disease (Geyer, Mogotlane and Young 2009:426; Chourdakis, Tzellos, Papazisis, Toulis and Kouvelas 2010: 722).

Obesity is believed to be an international pandemic since it is a swiftly growing form of undernourishment across all ages, nations, educational levels and in both sexes (Whitney and Rolfes 2013:262; Chourdakis *et al*. 2010:722). According to Rattue (2011:2) almost 1.5 billion adults are obese, and the international approximation of over 40 million children under the age of five is obese.

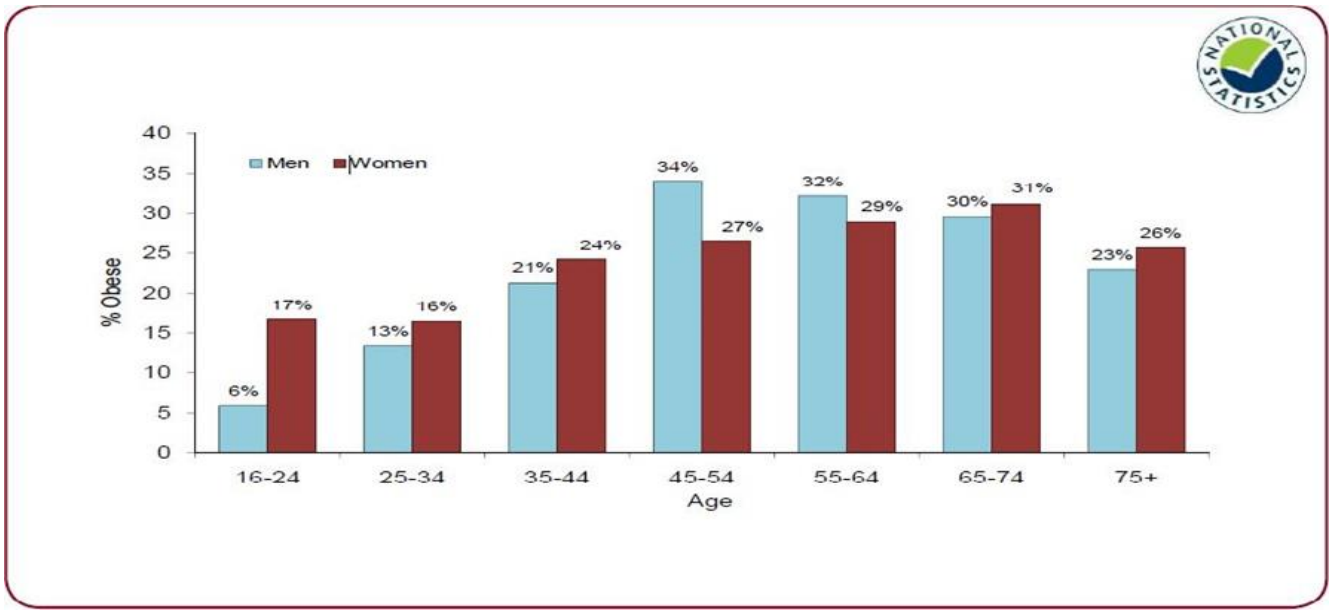

Figure 2.9: Levels of obesity between men and women in England (Martins 2012)

Figure 2.9 indicates that women in England between the ages of 16-44 are more obese than men. Surprisingly men from the ages of 45-64 are more obese then the females counterparts. According to the WHO (2011), in 2008 1.5 billion adults worldwide were overweight and approximately 300 million were women while over 200 million were men. Furthermore, overweight is regarded as one of the 10 primary threat factors for mortality in developed and developing countries. Obesity impacts on morbidity, mortality and sometimes inequity in employment opportunities (Kruger, Puoane, Senekal and van der Merwe 2005:492).

According to the report that was released in 2007 by the South African Medical Research Council (MRC), 56% of adult women and 29% of adult men were obese /overweight. The MRC further stated that nearly 60% of people die from obesity – allied diseases every day in South Africa (Wand and Ramjee 2013:1). However, the survey conducted by the South African National Health and Nutrition Examination Survey (SANHANES) in 2012 revealed that the prevalence of obesity between the ages 0f 18-24 is 22% in females and 3% in males, while the prevalence of overweight between the same age group is 25% for females and 5% for males (SANHANES 2013:20).

2.10.3 Definition of under nutrition

UNICEF (2006) define undernutrition as a product of deficient “food intake (hunger) and repeated infectious diseases”, correspondingly Shetty (2006:524) refers to undernutrition as inadequate dietary status, which can lead to starvation. On the other hand, the DOH (2003) describes undernutrition as the aftermath of inadequate ingestion of macro and micro-nutrients needed by the body for growth and maturity which in turn results in malnutrition. As far as Freijer, Tan, Koopmanschap, Meijers, Halfens and Nuijten (2013:137) are concerned, undernutrition is similarly known as disease related malnutrition (DRM). Freijer *et al.* (2013) believes that DRM is another form of under nutrition that is triggered by the

adjustments of the body's metabolic rate and the high demand of nutritional food owing to sickness. Furthermore, DRM negatively affects all the body tissue and cause bodily and poor mental health which then intensify illness and death.

The incidence of malnourished people in Africa is 30.6% in Eastern Africa, 25.3% in Central Africa, 8.6% in Northern and 13.6% in Southern Africa, while West Africa has 26.8% (Oldewage – Theron, Dicks and Napier 2006:796).

2.10.4 Causes of malnutrition

The UNICEF (2009b) Framework classifies the three levels of the causes of malnutrition as: immediate causes operating at the individual level, underlying causes influencing households and communities, and basic causes around the structure and processes of societies.

CAUSES OF MALNUTRITION

Conceptual framework of malnutrition

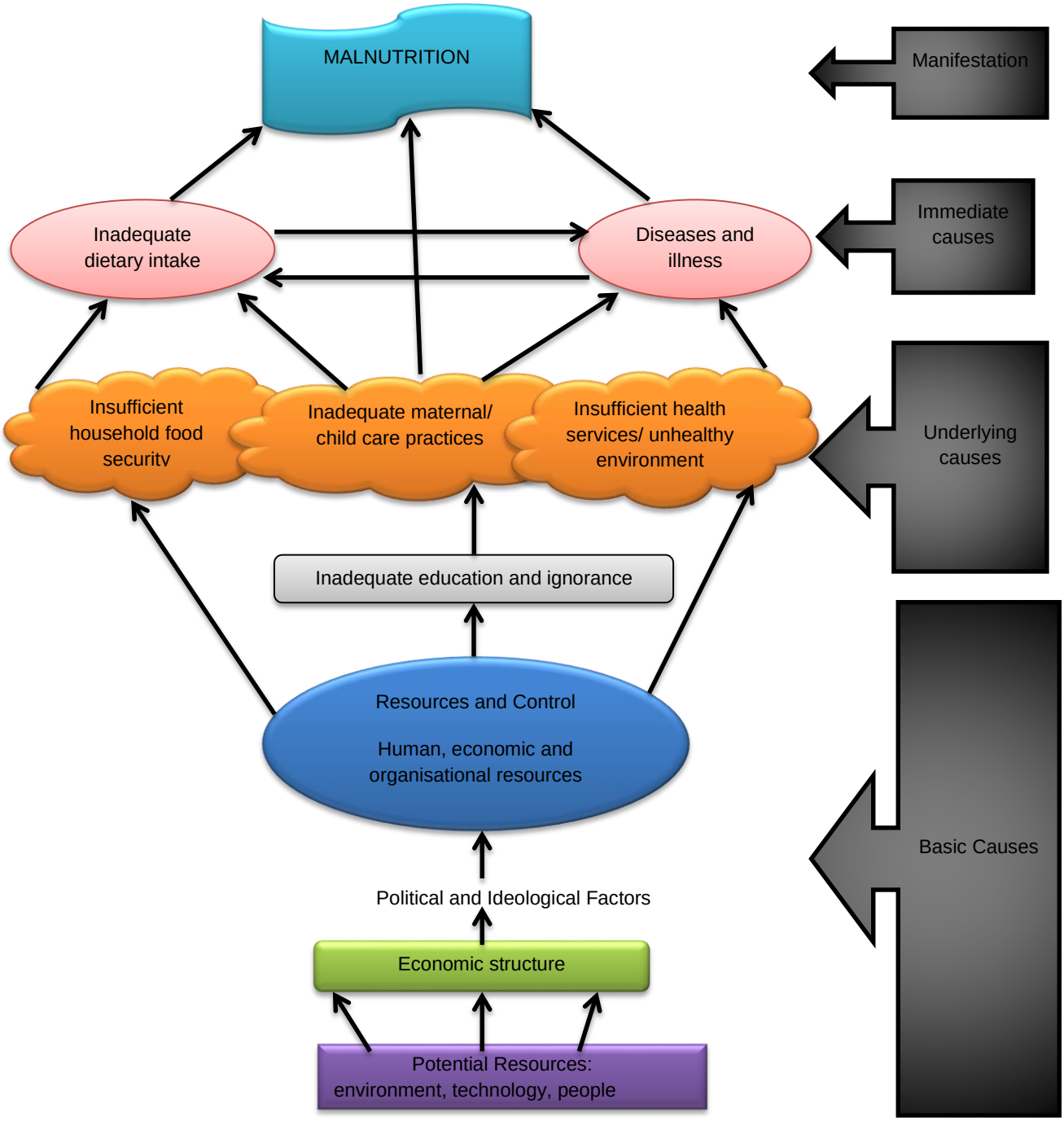

Figure 2.10: Framework of malnutrition (UNICEF 2009b)

Malnutrition results from the shortage of vital nutrients in the body; several researchers suggest the following conditions might be the cause (refer figure 2.10): (UNICEF, 2009b, Nordqvist 2010:4; Shetty 2006:524; Taylor, Dangour and Reddy 2013:490-491):

- **Gastro-intestinal disorders and stomach conditions** – when certain individuals eat healthy food bodies do not absorb all the essential nutrients. People suffering from diarrhea or vomiting also lose nutrients, thus causing the body to be susceptible to malnutrition.
- **Poor nutrition** – individuals that do not eat adequate healthy food endure malnutrition. The reason for poor diet might be inadequate food stock or mothers not making enough effort of preparing nutritional food for families.
- **Alcoholism** – prolonged disease such as alcoholism weakens the body's capability to process food and absorb certain vitamins.
- **Poverty** – in some countries, food shortage is a major cause of malnutrition.
- **Slimming and mental health problems** – individuals that starve because of the obsession to lose weight normally suffer from anorexia which is a form of malnutrition. Mental conditions e.g. depression may also lead to malnutrition due to poor eating behaviour.
- **Deprivation of breastfeeding** – health professionals believe that depriving infants and children breast milk advance to malnutrition. Some mothers abort breastfeeding because of the pain and discomfort felt when the baby tries to latch (Nordqvist 2010:4; Shetty 2006:524; Taylor, Dangour and Reddy 2013:490-491; Whitney and Rolfes 2013: 667-668).

UNICEF (2002a) stated that the absence of nutrition knowledge is another major contributing factor to malnutrition. Nutrition knowledge helps individuals to comprehend the connection between good nutrition and the significance of eating food that is loaded with nutrients on a daily basis to avoid malnutrition. Furthermore, nutrition education includes inspiring people to eat different macro and micro nutrient rich food.

According to the DOH (2008), another cause of malnutrition is insufficient care for children and women. Different household and professional chores limit the amount of time women have to prepare decent healthy meals for families and also attend seminars or workshops on proper infant feeding habits. Figure 2.10 indicate the conceptual framework that was designed by UNICEF to illustrate the multi-sectorial causes of malnutrition. The causes of malnutrition are classified into three levels, the immediate causes, underlying causes and basic causes. According to UNICEF (2009a) the immediate causes involves individuals, the underlying causes concerns families and the basic causes involves the society and the nation at large.

2.10.4.1 Inadequate dietary intake

The two immediate causes of malnutrition are in inadequate food intake and unsatisfactory health conditions which lead to diseases or illnesses. Furthermore, transmittable disease like acute respiratory diseases (ARI) and diarrheal diseases (DD) are liable for almost all the nutrition health problems in advancing countries (UNICEF 2009).

Whitney and Rolfes (2013:538) advise that the recommended daily allowance (RDA) for vitamins such as vitamin D which is vital for bone growth and development, usually intensify during the youthful stage. Moreover, the necessity for calcium consumption escalates since the youthful stage is the vital stage for bones to grow.

In addition Geyer, Mogotlane and Young (2009: 425) stated that the nutritional status of an individual influence well –being, body functioning, growth and development as well as resistance to diseases. Steyn and Temple (2008:24) believe that in order to reach recommended dietary requirements, food must be of adequate, quantity and quality to provide energy and macronutrient essentials for mental and physical growth.

2.10.4.2 Diseases and illnesses

According to Whitney and Rolfes (2013:667) infectious diseases such as diarrhea, measles, malaria and acute respiratory illnesses (pneumonia and coughing) are some of the major causes of malnutrition in children. In adults malnutrition may be triggered by diseases such as hypertension, anaemia, diabetes and coronary heart diseases. Diarrhea is linked to insufficient nutrition and unhealthy food handling; as a result when vomiting or suffering from diarrhea the body is incapable of keeping nutrients that are needed by the body (UNICEF 2012). Figure 2.11 below further illustrate more causes of malnutrition.

Naude, Labuschagne and Labadarios (2008:758) stated that “TB is a leading killer of young adults in their most productive years and the treatment in South Africa is considerable higher than in other countries”. While Beksinska, Pillay, Milford and Smit (2014:676) believe that the psychological changes coupled with the emotional changes in the South African youth community continue to put the youth at risk of HIV, the survey conducted in 2007 revealed that in 2012, the prevalence of 7.3% between the ages of 15-24 was reported by the South African National HIV Prevalence Incidence and Behavior Survey.

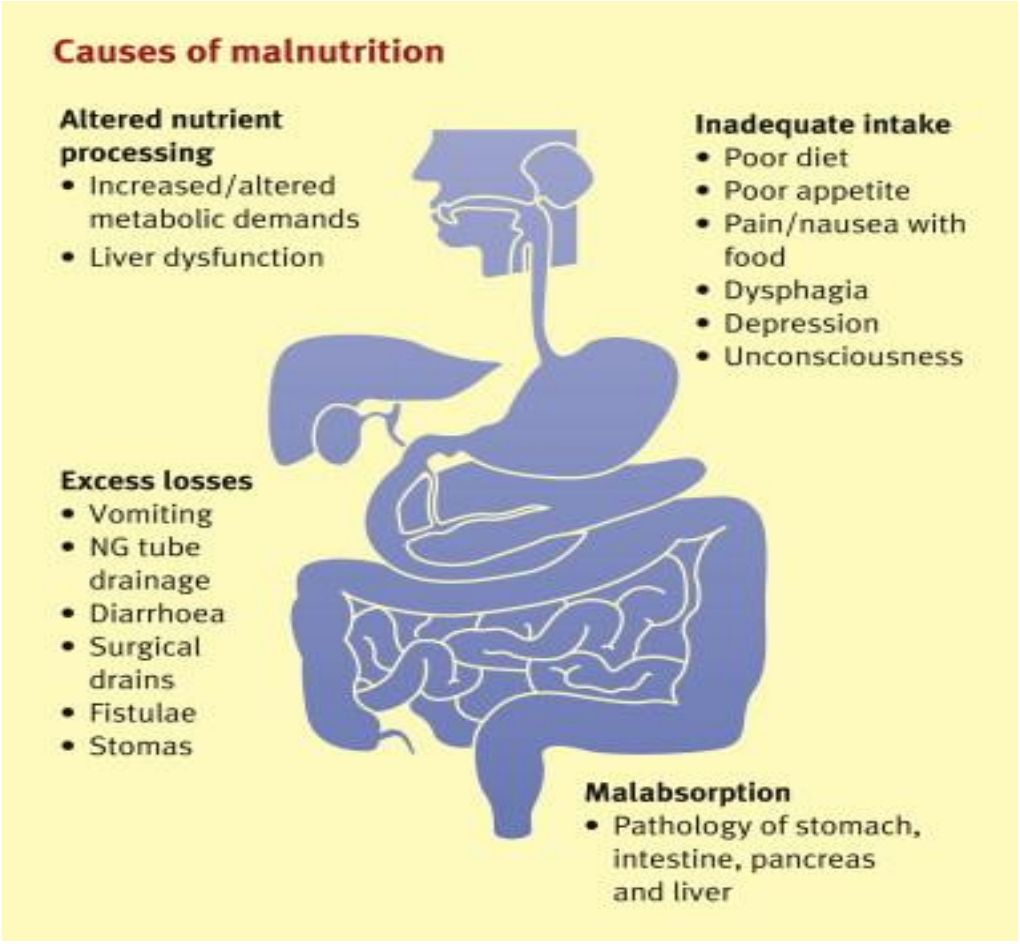

Figure 2.11: Causes of malnutrition (Saunders, Smith & Stroud 2010)

2.10.5 Causes of over nutrition

Over nutrition is caused by eating excessive food that is rich in fat and sugar content, while the body lacks physical activity. People that are not regularly active do not use the energy supplied by the food ingested, and the extra calories are stored by the body as fat. Moreover, lifestyle choices such as drinking too much alcohol, frequently dining out, eating large portions of fast food high in fat and watching too much television is also associated with poor eating conduct (Whitney and Rolfes 2013: 266-267; Zolfagharifard 2013:1; WHO 2014). In the television interview that was conducted by Nikiwe Bikitsha on E-news channel about obesity in South Africa, dietician Celynn Erasmus agreed that easy access to wrong food that is high in kilojoules is the reason why 60% of South Africans are overweight or obese. Erasmus suggested that engaging in a healthy lifestyle and exercise will help to combat the pandemic problem. Corresponding to the levels of obesity in England (Figure 2.9), South African women are more

obese than men and approximately 60 people die every day from diseases related to obesity (WHO 2014).

Zolfagharifard (2013:1) interviewed University students and reported that almost two-thirds of university students increase weight continuously in the first three years of university life. During the interview, students admitted that depending on convenience foods (known in South Africa as take-away or fast foods), was the root of unhealthy eating. Consuming what is known as (junk food in South Africa), frequently dining out, peer pressure, home sick, absence of support, lack of cooking resources and cooking expertise were some of the causes of being overweight (Zolfagharifard 2013:2). In another study conducted in Ghana on factors associated with central overweight and obesity in students, researchers discovered that female students were dominantly overweight (69.7% and obese 27.3%, while male students were slightly lower at 55.9% and 0% respectively. Lack of physical activity was the main attribute to the health status of students. (Mogre, Aleyira and Nyaba 2014:71).

The recent study conducted at the University of KwaZulu-Natal on eating behavior, attitude and body mass index of dietetic students versus non –dietetics revealed that a larger percentage (66.7%) of first year dietetics students displayed a normal BMI, while 42.1% of non-dietetics students were overweight. Nutritional knowledge acquired during the year is believed to be the main element towards the student's eating conduct (Kassier and Veldman 2014:112).

In South Africa, the main cause of obesity in Black African people is the move from the old traditional foods that was loaded with fibre and low in fat, to dairy and meat products that have excessive levels of vegetable oils and saturated fats. Moreover lack of exercise intensifies the growth rate of obesity and also increases the risk of acquiring cardiovascular and chronic diseases. (Senekal, Mchiza and Booley 2008:490; Mogre, Aleyira and Nyaba 2014:71).

2.10.6 Causes of under nutrition

Shetty (2006:524) and Black, Allen, Bhutta, Caulfield, de Onis, Ezzati, Mathers and Rivera (2008:243), confirm that under nutrition is caused by poor diet, resulting in widespread contagious diseases such as diarrhea. In addition, undernutrition is the result of lack of access to health care, underprivileged environment and housing, big family sizes, shortage of food and lack of knowledge about nutrition or cooking. For University students, the different atmosphere encourages change in different phases of life. Moreover, lack of physical activity coupled with poor dietary behaviors contribute to a variety of health problems. Students prefer processed snacks to fresh food because the responsibility of buying and preparing food seem very challenging. Environmental and social factors such as restrained access to healthy food and peer encouragement in healthy eating play a key role in student's eating habits (Racette, Deusinger, Strube, Highstein and Deusinger 2005:249); Kelly, Mazzeo and Bean 2013: 304). Racette *et al*. (2005:249) Meier and Stratton (2008:168) and Charlton, Ferreira and du Plessis

(2008:559) agree that the major cause is inadequate food consumption which might be caused by several factors such as:

1) Eating and ingesting problems, (e.g. when teeth or dentures are in a bad condition eating can be painful or hard) and eating disorders such as anorexia.
2) Taste organs being dysfunctional, (loss of appetite due to loss of taste and smell senses)
3) Social factors such as low income or poverty, not being mobile, depression, living alone, drug and alcohol addiction.
4) Medical conditions such as nausea and vomiting, diarrhea, loss of appetite due to medical treatment.

Gopalan (2000:556) is of the view that under nutrition is caused by destitution, poor family earnings, lack of education, shortage of proper housing, shortage of health facilities, big families and insufficient to food supply. Martins (2012:5) believe that people living in the disadvantaged areas have a limited number of supermarkets that sell a wide range of fruits and vegetables; instead they have access to more convenience shops. As a result, poor communities rely mainly on processed food which is high in fats and salt.

2.10.7 HIV / AIDS and its impact on nutritional status of students

Human immuno deficiency virus (HIV) is the virus that causes acquired immunodeficiency syndrome (AIDS) and HIV, and Aids has been one of the main causes of malnutrition. In 2007 a projected number of 33 million people were infected with HIV, 15 million women, as well as 2 million children younger than 15 years (Fields – Gardner and Campa 2010:1105; Du Plessis, Labuschagne and Naude 2008:364). Kruger (2014:5) states that, according to the national statistics, 8.5% of adolescents (15-24years) were HIV infected in 2013. Moreover, in South Africa transmittable diseases like HIV and Aids, diarrhea, respiratory infections, and measles are aggravated by malnutrition. Thus weak nutritional status comprising of over nutrition and under nutrition impinge on immune function separate from HIV infection (Fields – Gardner and Campa 2010:1106).

According to research on HIV Prevalence, Incidence, Behavior and Communication conducted in 2008 by the Human Sciences Research Council, the biggest increase in incidence was in KwaZulu-Natal from just under 12% to about 16%. Inter-generational sex with older men (sugar daddies) was identified as a major risk factor which increases susceptibility to HIV infection amongst young women.

Szetela and Gąsiorowski (2010:81) recommend that patients who are HIV positive need at least 1.2g of protein per kg per day, but if the sickness is unrestrained the dosage need to increase to 1.8g/kg/day. The ingestion of basic energy also needs to increase by 8-15% in constantly HIV sick people; furthermore, vitamin B, C and E supplements enhance the immune system. In general, the utmost

nutrients required by the body in order to prevent malnutrition are vitamins, minerals, proteins and carbohydrates (Labuschagne and Naude 2008:364; Szetela and Gąsiorowski 2010:81).

To aid the reduction in rate of the epidemic, in August 2012 DUT through the University's Isolempilo Clinic launched the antiretroviral (ARV) roll-out programme. According to Gwala and Pillay (2010:8) four segments of the institution (student governance and development, housing, sports, and Dean of students subsidized the initiation payment. Isolempilo has since been an accredited HIV counselling and testing centre. In addition the ARV project coordinator Soorie Ward then highlighted that "Students often lost a lot of valuable study time because of the long queues at public health care facilities and that is the reason we felt the need to implement this essential service," adding that at the clinic students have to make appointments before coming in. Above all, the new plan is more convenient because it eliminate transport costs for the students.

2.10.8 Consequences of Malnutrition

According to the World Bank (2006), malnutrition hinders the physical ability and results in losses in productivity. Malnutrition is correlated to approximately 60% of all child mortality and even slightly malnourished children are almost at double the risk of death compared to well-nourished children. Figure 2.12 demonstrates the consequences of malnutrition.

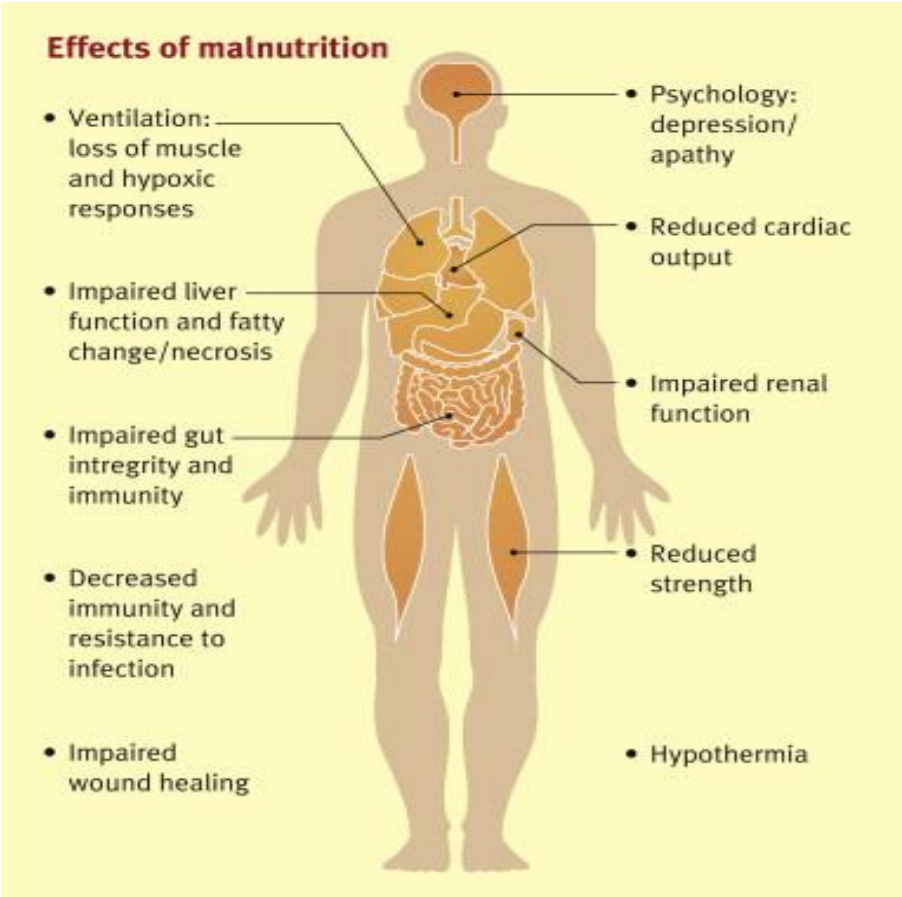

Figure 2.12: Effects of malnutrition (Saunders, Smith and Stroud 2010)

2.10.9 Economic impact of malnutrition

Malnutrition is one the most disturbing crises globally (World Bank, 2006). However, Whitney and Rolfes (2013:667) are of the view that malnutrition affects economic growth and impacts on destitution through the lack of production and poor health status of workers which in turn escalate the government's health budget. The South African Department of Agriculture (2002) further indicated that the South African Reconstruction and Development Programme (RDP) warranted retirement income, construction finances for upcoming agriculturalists and vegetable garden enterprises for senior citizens.

Taylor, Dangour and Reddy (2013:490) state that in Africa and Asia, approximately 11% of state's financial throughput is wasted due to undernutrition. On the other hand, the study conducted in United Kingdom (UK) on economic impact of malnutrition, found that underweight patients used up more funds than patients that were not underweight. Moreover underweight patients visited the General Practitioners (GP) more often than the overweight patients. As a result, underweight patients were admitted to hospital for a longer period (Guest, Panca, Baeyens, de Man, Ljungqvist, Pichard, Wait and Wilson 2011:424).

Guest *et al.* (2011:24) further explain that over the period of six months the National Health Service (NHS) fee for patients diagnosed with malnutrition was approximately £1753 per underweight patient and £750 per non-overweight patient. Likewise, in the European Union countries nearly 20 million patients are suffering from Disease Related Malnutrition (DRM) which cost the authorities € 120 billion yearly.

2.10.10 Impact of malnutrition on a country's health system

The Department of Health (2010), states that the different stages of malnutrition are closely related to food insecurity and poor quality of life, thus causing the major impact on the development of the economy in South Africa. Similarly the World Bank (2006) signified that malnutrition destabilizes the economy of the country and propagates destitution. The Department of Health (2010) also re-iterates what was previously raised by other researchers that, the nutrition status in South Africa is worsened by the lack of nutrition information and knowledge. Hence people need adequate education and expertise to produce, process, transport, buy, prepare and consume a selection of food with relatives.

Rattue (2011:1) suggests that suitable treatment for severe malnutrition, is boosting the intake of staple foods with vitamins and minerals such as folic acid and iron, and encouraging mothers to breastfeed will assist in defeating malnutrition. On the other hand, in 2011 the WHO initiated the Internet program known as "Evidence for Nutrition Actions" (eLENA), to prevent millions of malnutrition fatalities. The latter program presents life-saving involvements to help the healthcare centers and the government to fight against all forms of malnutrition (Rattue 2011:1).

The World Bank, (2006) explains that malnutrition is one of the major contributors to poor economic growth and also impacts largely on poverty. Direct losses in production due to poor physical status of personnel, indirect losses through expensive health cost, are all absorbed by the government. What is more, the World Bank approximates 6-12% economic loss of the Gross National Product (GNP) of emerging countries as a result of malnutrition. Clearly, malnutrition expenses are extremely high since productivity losses cost more than 10% of personnel's life expectancy salaries.

2.11 STUDENTS' NUTRITIONAL NEEDS

According to Escott – Stump and Earl (2008:338) when establishing the nutrients needs of students, several models are used for planning and assessing food and food stocks for people. As a result, different countries have different guiding principles suitable for the needs of people. Moreover, the (WHO) and the Food and Agriculture Organisation (FAO) created the universal standards of food value, safety and nutrient guidance. The Food and Nutrition Board (FNB) then established the structure for the advancement of nutrients known as dietary reference intakes (DRIs).

2.11.1 Dietary Reference Intake (DRIs)

DRI is a general term that comprises of four types of nutrient recommendations for healthy people; estimated average intake (EAR), adequate intake (AI), recommended dietary allowance (RDA), and tolerable upper level (UL); established and used in the United States and Canada (Peckenpaugh 2010:84; Escott-Stump and Earl 2008:338; Nutrition Information Centre of the University of Stellenbosch (NICUS) 2003).

2.11.2 Adequate Intake (AI)

AI is the suggested intake of vitamins and minerals created on observation of nutrient intake by a group of healthy people presumed to be enough. This measure is utilised when recommended dietary allowance cannot be established (Whitney and Rolfes 2013:19; Peckenpaugh 2010:84; Escott-Stump and Earl 2008:338).

2.11.3 Estimated average requirement (EARs)

EAR is the average requirement of nutrients for healthy people. The EAR is the amount of nutrient with which approximately one half of people's nutritional needs based on life stage and gender (Peckenpaugh 2010: 84). The EAR should be utilized for measuring the nutrient adequacy of populations, not individuals (Escott-Stump and Earl 2008:338; Whitney and Rolfes 2013:17).

2.11.4 Recommended dietary allowance (RDAs)

RDA is the average daily dietary intake needed to meet the requirements of nearly all (97% to 98%) of the healthy population (Peckenpaugh 2010: 84; Lee and Nieman 2010:17). The RDA for a nutrient should serve as a goal for intake for individuals, not as a benchmark of adequacy of diets of populations (IOM 2005:22; Whitney and Rolfes 2013:18; Escott-Stump and Earl, 2008:338).

2.11.5 Tolerable upper intake level (UL)

UL is the uppermost level of daily nutrient intake that is likely to have any unfavourable health effects for almost all individuals. It was established for many nutrients to minimize the danger of toxic effects from increased consumption of nutrients in concentrated forms, either alone or combined with others or from enrichment and fortification (Soqele and Bruyns, 2006:61; Whitney and Rolfes 2013:19; NICUS, 2003; Escott-Stump and Earl, 2008:338).

2.12 MACRONUTRIENT REQUIREMENT FOR STUDENTS

Berdanier and Zempleni (2009:1,13) ; Whitney and Rolfes (2013:537) and Peckenpaugh (2010:49) explain that nutrients needs are more during youth stages, and young adults need both macronutrients and micronutrients to maintain healthy living, and the principal function of macronutrients is to deliver energy which is calculated in kilojoules (kJ). The energy found in the food comes from proteins, fats, and carbohydrates which are collectively known as macronutrients. Furthermore, lack of protein- rich food may weaken growth and escalate the risk of iron – shortage (anemia) and prolonged growth, and affect sexual development. Not eating dairy products will lessen bone mass, thus increasing the possibility of osteoporosis, while the lack of fibre in the diet causes constipation, and intensifies the danger of colon cancer (Stang 2008:255).

2.12.1 Proteins

As far as Peckenpaugh (2010:59) is concerned, protein is the most important basic element of life. Moreover, protein is a blend of amino acids and nitrogen. The WHO (2003), Mahan, Escott –Stump and Raymond (2012:415) and Lee and Nieman (2010:238) suggest that for students, the RDA for protein is approximately 0.8 gram per kilogram of body weight per day (0.8g/kg/day). Muscles have the highest intensity of protein, both the red and white meat. Mahan and Escott-Stump (2008:250) warned that regular dieting; food security problems and prolonged illness may reduce the consumption of protein in adolescents. Furthermore, inadequate protein ingestion can cause delayed or stunted growth.

2.12.1.1 Sources of protein

Proteins are found in everybody cell in the human body and are used in many essential processes; as a result it needs to be constantly replenished. Furthermore proteins are grouped into two groups, namely complete or incomplete. Complete proteins such as meat, cheese, fish, eggs, milk, yoghurt and poultry contain all the necessary amino acids to meet the body's requirement. Incomplete proteins such as grains, nuts, beans, seeds and corn have an insufficient amount of amino acids. Lastly, complementary foods such as a peanut butter sandwich on seeded bread, cereal and milk, pea soup with toast, French toast and cheese sandwich are important for students (Geyer, Mogotlane and Young 2009:404; Berdanier and Zempleni 2009:169).

According to Whitney and Rolfes (2013:181), food that originate from animals such as poultry, meat, eggs, seafood and milk offer high quality proteins. Moreover, proteins that originate from plants such as seeds, vegetables, grains, nuts, have more variety of needed amino acids.

2.12.1.2 Functions of Protein

Geyer, Mogotlane and Young (2009:404) and Whitney and Rolfes (2013:180) stated that proteins form the basic structure of all the cells and tissues of the body and are vital in the maintenance of body tissues, including the development and repair thereof. Protein also plays a fundamental role in the normal functioning of the immune system as it helps in creating lymphocytes and antibodies. In young adults, a light - sensitive protein called Rhodopsin is crucial for normal vision. Protein also provides energy and glucose if required. It plays an important role in transporting vitamins, fats, oxygen, minerals around the body. Furthermore protein can be converted to glucose to provide energy if carbohydrates are not enough. Another important function of protein is that it gives strength and shape to the skin, muscles, tendons, membranes, bones and organs (Geyer, Mogotlane and Young 2009:404).

2.12.2 Fats

Peckenpaugh (2010:75) suggests that a minimum of 20g of fat in the diet is enough to satisfy the body's need for vital fatty acids. The WHO (2003) recommends that the overall daily energy consumption must not surpass 15-30% of which <10% is supplied by saturated fat. On the other hand, Mahan and Escott-Stump (2008:251), recommend that fat ingestion for adolescents should not surpass 30% to 35% total energy intake, of which <10% of energy is supplied by saturated fatty acids.

2.12.2.1 Sources of fats

According to Whitney and Rolfes (2013:144-146) and Geyer, Mogotlane and Young (2009:408), the sources of fat are milk, yoghurt and cheese group. Items that are in the group are available in fat free, reduced fat and whole – fat varieties. Moreover, dark meat has a higher fat content as compared to white meat, and shellfish is high in cholesterol, but low in fat and saturated fat content. The other sources of fats are meat, poultry, fish, dry beans, eggs and nuts. Plant items in the group are cholesterol free and have little or no saturated fat.

Fruits and vegetables do not have a significant amount of fat, except for coconut, olives and avocado.

2.12.2.2 Functions of fats

The functions of fats have been summarised by Swart and Dhansay (2008:407) and Geyer, Mogotlane and Young (2009:407) as lipids that are the main sources for the absorption of fat soluble vitamins A, D, E, and K. Moreover, the lipids are responsible for maintaining the condition of skin and hair; acting as a lubricant and protecting the skin and hair. Fats are responsible for building up the central nervous system and for maintaining a regular body temperature. Fats also improve the flavour and the texture of food. Another important function of fat is that, fats are responsible for storing extra fat cells that are not needed by the body for later use. In young adults essential fatty acids form part of retinal and brain tissue. Lastly, fats add to the feeling of fullness.

2.12.3 Carbohydrates

The Institute of Medicine (IoM) 2005) recommends that the EARs for carbohydrates are approximately 100g/day for young adults. According to the WHO (2003), carbohydrates have to contribute 55-75% of daily energy in the diet, and the consumption is regulated by the individual's activity and growth. Young adults, who are not active or have long – lasting illness, may need fewer carbohydrates compared to active young adults who may need extra carbohydrates to maintain adequate energy consumption (Mahan, Escott-Stump and Raymond 2012:415).

2.12.3.1 Sources of Carbohydrates

Berdanier and Zempleni (2009: 218-219) and Geyer, Mogotlane and Young (2009:402) cluster the sources of carbohydrates into the following groups: Dairy group: milk, yoghurt and cheese contain sugar lactose. The fruit group: dried fruits have a higher content than fresh fruits, the removal of water increases the sugar concentration. Grains: bread, cereal, rice and pasta. The vegetable group: starchy vegetables e.g. peas, corn, potatoes and legumes. Lastly dried beans are also high in carbohydrates such as starch.

2.12.3.2 Functions of carbohydrates

According to Berdanier and Zempleni (2009: 218-219) and Geyer, Mogotlane and Young (2009:401), carbohydrates provide the basic molecules necessary for the synthesis of non-essential amino acids by the liver. Furthermore, carbohydrates have a protein sparing effect; glucose ensures that body protein is conserved and not broken down for energy. Carbohydrates also provide a quick source of energy for the body and prevent ketosis during energy production. Lastly, lactose, a disaccharide, aids in the absorption of calcium and phosphorus, as well as in the growth of intestinal bacteria that manufacture certain B – Complex vitamins (Berdanier and Zempleni 2009: 218-219).

2.13. MICRONUTRIENTS REQUIREMENTS FOR STUDENTS

Geyer, Mogotlane and Young (2009:4010) explain that micronutrients are important vitamins and minerals needed by the body for tissue growth and body maintenance. Moreover vitamin A, B, C and D are regarded as the most important micronutrients required by young people.

Table 2.4: Micronutrients requirements for the age group 18-30 (IoM 2005; Swart and Dhansay 2008:407; Mahan, Escott –Stump and Raymond 2012:57–113; Geyer, Mogotlane and Young 2009:401).

MICRONUTRIENTS	DRIs	SOURCES	FUNCTIONS
Vitamin A	485mcg/day (EAR)	Sweet potatoes, egg yolk, kidney, liver, yellow and dark green leafy vegetable, enriched margarine	-growth and development -reproduction -essential for integrity of night vision -functions as antioxidant
Vitamin B6	1.0 mg/day (EAR)	Cereal bran, egg yolk, meat, oatmeal, pork, legumes, glandular meat.	-haemoglobin production -antibody formation -essential for normal growth -fat and protein utilisation
VitaminB_{12}	2.0 mcg/day (EAR)	Eggs, fish, oysters, muscle meat, liver, kidneys, milk and dairy food	-blood cell formation -play a role in metabolism -cellular and nutrient metabolism
Vitamin C	56mg/day (EAR)	Kiwi, pineapple, tomato, strawberries, melon, citrus fruit, peppers, greens, raw cabbage, guava, potato	-infection resistance -healing and allergic reaction -digestion, fine bone and tooth formation. -important in immune responses, wound healing and allergic reactions.
Vitamin D	5mcg/day (AI)	Egg yolk, irradiated food, milk fat, salmon, tuna fish, liver	-important for the formation of and maintenance of normal bones and teeth. -essential for normal growth and development. -influence absorption and metabolism of phosphorus and calcium.
Calcium	1300mg/day	Oysters, sardines, kale, tofu, mustard greens, milk	-essential for iron transport across cell membranes.

	(AI)	and milk products, clams, turnip greens	-for strong bones and teeth
Iron	7.9mg/day (EAR)	Dark molasses, liver, legumes, egg yolk, shrimp, dark green vegetables, oysters, whole grains, meat	-is a component of haemoglobin and myoglobin. -is important in oxygen transfer
Iodine	95mcg/day (EAR)	Sea food, iodised table salt, water and vegetables in region without goiter	-T_4 functions in the control of reactions involving cellular energy. -synthesize triodothyronine(T_3) and thyroxin (T_4)
Phosphorus	1055mg/day (EAR)	Fish, cheese, egg yolk, milk, and almost all other foods.	-important for pH regulation -is a component of every cell and metabolites. -plays a role in bones and teeth
Zinc	7.5 mg/day (EAR)	Legumes, wheat-bran, liver, shellfish, herring, oysters, legumes	-is important for nucleic acid metabolism. -helps in the stabilization of protein and in transport processes, immune function and expression of genetic information. -is a constituent of many enzymes

Research indicates that when students first enter the tertiary environment, it is a crucial phase of life which impacts on health. Students often neglect the nutritional health needs due to a number of factors such as lifestyle change, peer pressure and limited savings (Gerlach 2013:15). On the contrary, the study conducted by Sakamaki, Toyama Amamoto, Liu and Shinfuku (2005:2) on “nutritional knowledge, food habits and health attitude of Chinese university students,” recommends that colleges and universities should play an important role in encouraging a healthy standard of living.

In developing countries between 21-36% of adolescents have a BMI of over 25, placing these students in the overweight or obese categories (UNICEF 2011). Overweight and obesity is increasing among young people in both low and high income countries (WHO 2010). Detecting health problems, adequate advice on food and macronutrient supplementation at this stage of life is the foundation and a necessity for good health in to adulthood (WHO 2010).

A frequent intake of fast food is associated with poor diet quality and increased weight gain. Various studies indicate that there is a need for nutritional interventions to address fast food intake of adolescents (Larson, Neumark-Sztainer, Story, Wall, Harnack and Eisenberg 2008:79-80).

Larson *et al.* (2008) also reported in a study in the USA that young people reported fast food intake of >3 times per week. The researchers recommend that healthy and packed lunch options that could be brought from home or guidelines managing portion sizes and selecting nutrient dense options from fast food menus should form the basis of nutrition education of college students (Larson *et al.* 2008:80).

According to Berdanier and Zempleni (2009:195) young people need both macronutrients and micronutrients to maintain a healthy life. The principal function of macronutrients is to deliver energy which is calculated in kilojoules (kJ).

It is important to address the underlying causes of inadequate food consumption which results in a poor nutritional status. Availability and accessibility of healthy foods, the frequency of family meals, and parental intake and parenting practices are important factors to assist adolescents in making healthy choices. Household food availability and accessibility also play a major role in the young adult's food intake (Labadarios *et al*. 2008:245).

2.13.1 Student's food choices

Jaime and Lock (2009:45), Rovner, Nansel, Wang and Iannotti (2011:13) and Hood, Colabianchi, Terry-McElrath, O'Malley and Johnston (2013:143) believe that the environment in the educational institution has a huge impact on students' food choices. The availability of less-nutritional food at universities such as food available from vending machines is one of the factors that contribute to students' food choices. Similarly, van der Merwe, Kempen, Breedt and de Beer (2010:11) and Kolarzyk, Shpakou, Kleszczewska, Klimackaya and Laskiene (2012:397) state that University students are well known for "nutritionally poor food choices", which include eating unhealthy snacks, avoiding important meals like breakfast, eating food high in sugars, sodium and saturated fat. On the other hand, Takomana (2012:132) believes that a transformation in life encourages tertiary students to participate in unhealthy activities such as drinking alcohol, smoking and unhealthy eating behavior.

A pilot study conducted in California by Shive and Morris (2006:33) discovered that the main factors contributing to students unhealthy diets are: financial constraints, dining out regularly, time limitations, peer pressure, weight consciousness, change in living agreements and lack of proper nutritional knowledge. While van der Merwe *et al*. (2010:11) believe that University students usually discover that eating healthy is challenging with a busy lifestyle and does not accommodate "meal planning". The study on "Factors influencing students' food choices when shopping for food" by Li (2011:165) also found that food prices, moral beliefs, and food advertisement are some of the factors which influence the student's food choices (Gerlach 2013:15).

In a study by Ansari, Stock and Mikolajczyk (2012:5) conducted in four European countries, the following were concluded:

- Students not residing with parents at home are more susceptible to poor eating behavior than those residing with parents because students living with parents do not have to pay for food, hence do not suffer financially. Furthermore, a variety of healthy and nutritious food might be prepared at home and be made easily accessible.
- In general, students not living at home consumed fewer fruits and vegetables, but students staying at home with parents ate more fruits and vegetables that parents have a very influential role in the children's diet.
- Female students' diet was different from that of male students. In all four countries, male students consumed more refreshments than female students, while female students consumed more fruits and vegetables than their male counterparts. It was also discovered that men regularly consume more meat than women.

The above findings led to the conclusion that female students lived a better life in terms of eating nutritional food than male students. Furthermore, a self-regulating lifestyle proved to have detrimental effects on student eating behavior (Ansari, Stock and Mikolajczyk 2012:5).

2.14 CONCLUSION

The main objective of the review was to explore the latest information on food safety knowledge, hygiene practices and the nutritional value of the food prepared and sold by vendors. The literature has evidently revealed that there are serious health concerns around the safety and the quality of food prepared and sold by street vendors. Hence the larger part of the literature review reflects on the methods to improve food vendor practices, government's approaches towards improving street vending, and discussing malnutrition in depth.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

The aim of the study was to ascertain food hygiene practices and knowledge, food safety practices and the nutritional value of the food served by various food vendors at DUT in Durban. The key goals of this study were to determine the demographic characteristics of the vendors, determine the food safety and hygiene practices of the food handlers, assess the nutritional adequacy of menus offered to students and lastly to observe the food and safety practices of the vendors. The elements used to collect data in this study comprised of the following:

- Demographic questionnaire for managers and food handlers
- Management questionnaire
- Food handlers questionnaire
- Observation sheet, and
- Menu item recording sheet

The research instruments used in the study were carefully chosen to meet the goals of the study and were previously used in similar studies, firstly in the study by Meaker in 2008 on the investigation of foodservice management and general management practices in school running the National School Nutrition Programme (NSNP) in the formal and informal urban areas of Pietermaritzburg. Secondly, in the study conducted by Louw, Bekker and Wentzel-Viljoen in 2001 on external evaluation of certain aspects of primary school feeding.

This chapter's focal points will be on the planning and administration of the study, as well as the study design. The study population, data collection procedures, sampling process and instruments used will be discussed. The data capturing process and the method of data analysis will be explained. Legal and ethical aspects of the study will also be covered.

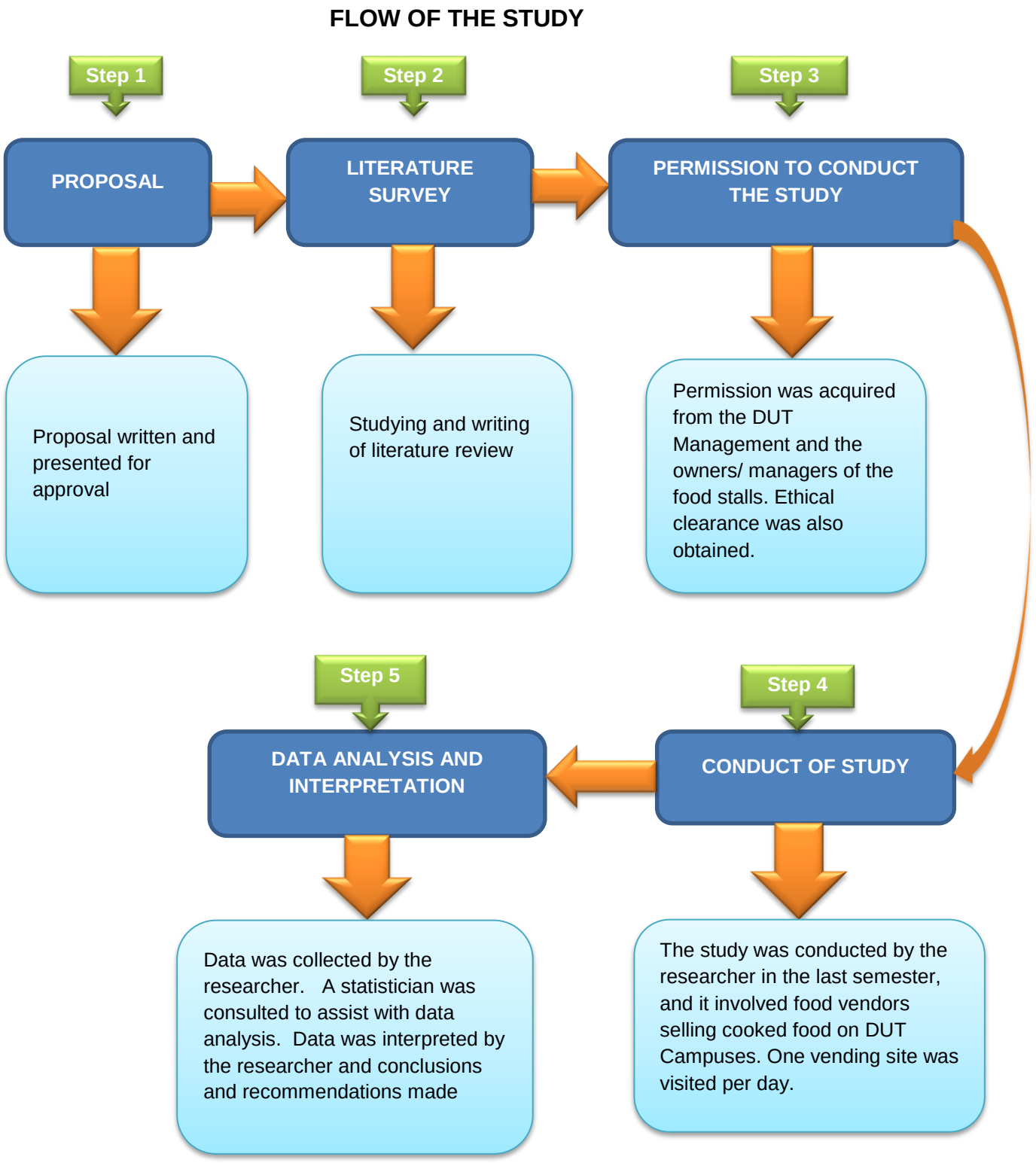

Figure 3.1: The research project process

3.2 PERMISSION TO CONDUCT THE STUDY

Approval from the Institutional Research Committee (IRC) was obtained to conduct the study at DUT since the study pertains to the formal and informal vendors that are contracted to the institution. Refer to Annexure A for the letter of permission. The Faculty of Applied Sciences Research Committee (FRC) approved the research proposal in 2013. Ethical clearance was also granted (Ethics number IREC 078/13) by the Institutional Research Ethics Committee (IREC) at DUT, in line with the Human Sciences Research Council (HSRC) guidelines. Ethical clearance was renewed twice during the duration of the study. Refer to Annexure I for the letter of permission.

Prior to commencement of the study, all targeted owners/ managers of vending stalls were visited on sites by the researcher to enlighten them about the study. During the visits, objectives of the study, as well as the data collection process, were discussed in detail. The information sheet (Annexure B) was presented during the visits, and the researcher explained that on the day of conducting the study, Informed consent forms (Annexure C) would be issued to both the owner/manager and the food handlers to sign, after the permission was granted. All potential participants agreed to participate in the study, and on the day of the study all vendors enthusiastically assisted.

3.2.1 Participation and confidentiality

All participants were notified that participation was entirely voluntary and that they may withdraw from the study at any time or refuse to participate without any penalties. The information obtained will be kept confidential and no names will be used during the study; instead participants will be given numbers. Participants were also informed that there were no benefits to participating in the study other than the possible enhancement of the lives of students, participants and the community.

All personal information of participants will be stored in the Department of Food and Nutrition Consumer Science in a locked cupboard for a period of five years, and after this period it will be disposed of by shredding. Only the researcher and Supervisor will have access to the information. Lastly, participants were assured that neither their jobs nor their level of services will be affected by their participation or refusal to participate in the study.

3.3 STUDY SETTING

The study was based at the Durban University of Technology (DUT), which is located in Durban in the Berea area, +/- 5km from the city centre. DUT resulted from the merger of two former Technikons (Natal and ML Sultan Technikon). The Institution has four campuses in Durban, and has a total number of +/- 23 000 students enrolled. All four campuses were part of the study. The University only offers contact learning and enrolls full time and part-time students. Most of the students residing outside Durban live in student residences owned by the Institution. Furthermore, a large percentage of students at DUT rely /depend on National Student Financial Aid Scheme (NSFAS) to fund tuition and accommodation costs. As part of the Financial Aid package, students also get meal allowances. Students granted financial aid by NSFAS can purchase food from all the food vendors on Campuses as well as from the nearby franchise stores using the student card. The rest of the students and DUT staff also buy food and drinks from the food vendors using cash.

DUT has a total number of 16 food vending stalls across its four Durban campuses. Steve Biko Campus has the largest number of food vendors. There are nine informal vendors, all situated at Steve Biko campus and seven formal vendors, (four at Steve Biko campus, one in Ritson Road campus, one at ML Sultan campus and one at City campus). One informal vendor was excluded from the study because of the qualifying criteria, and the qualifying criterion was that food items had to be prepared or cooked in the stall. That brought the total number of vendors who participated in the study to 15.

On appointment, all DUT vendors are issued with renewable lease agreements and each vending stall pay a monthly rental to the Institution. Furthermore, the majority of food vendors have service agreements with the Institution that allows students to purchase food items using student cards; as a result the Institution is entitled to a certain percentage of total sales made by vendors per month. Service operation is governed by the department that is in charge of policy planning and projects for the university since all vending stalls are within DUT premises. Durban Municipality is responsible for the street vendors that are situated outside DUT premises, on the roads. The Health and Safety Department, together with the Safety Health Committee from the University are responsible to oversee the hygiene and the food safety aspects while the department of Small Enterprise Development Agent (SEDA) is responsible for offering different forms of training to the vendors. The study was carried out by the researcher in September and October 2013.

3.4 STUDY TYPE

The study was predominantly of a descriptive nature, and the data collected was of a quantitative nature with two sets of questionnaires (Managers' questionnaires (Annexure E) and Food Handlers' questionnaires (Annexure F). A detailed observation sheet (Annexure G) and a sheet for recording the weighed prepared and pre-prepared food menu items served were also used (Annexure H).

3.5 STUDY VARIABLES

The variables of the study were as follows:

- **Study area:** Food vendors in and around the Durban University of Technology's four Durban campuses.
- **Sampling strategy:** All food vendors selling food items prepared and served on site.
- **Study setting:** Only food vendors contracted to the DUT participated in the study since the objective was to investigate the hygiene practices, food safety knowledge and the nutritional adequacy of food vendors at DUT.
- **Human resources:** Participants and researcher.
- **Assessment instruments:** Demographic and management questionnaire, food handler's questionnaire, observation sheet and the menu item recording sheet for recording prepared and pre-prepared food menu items served.

DATA COLLECTION PROCESS

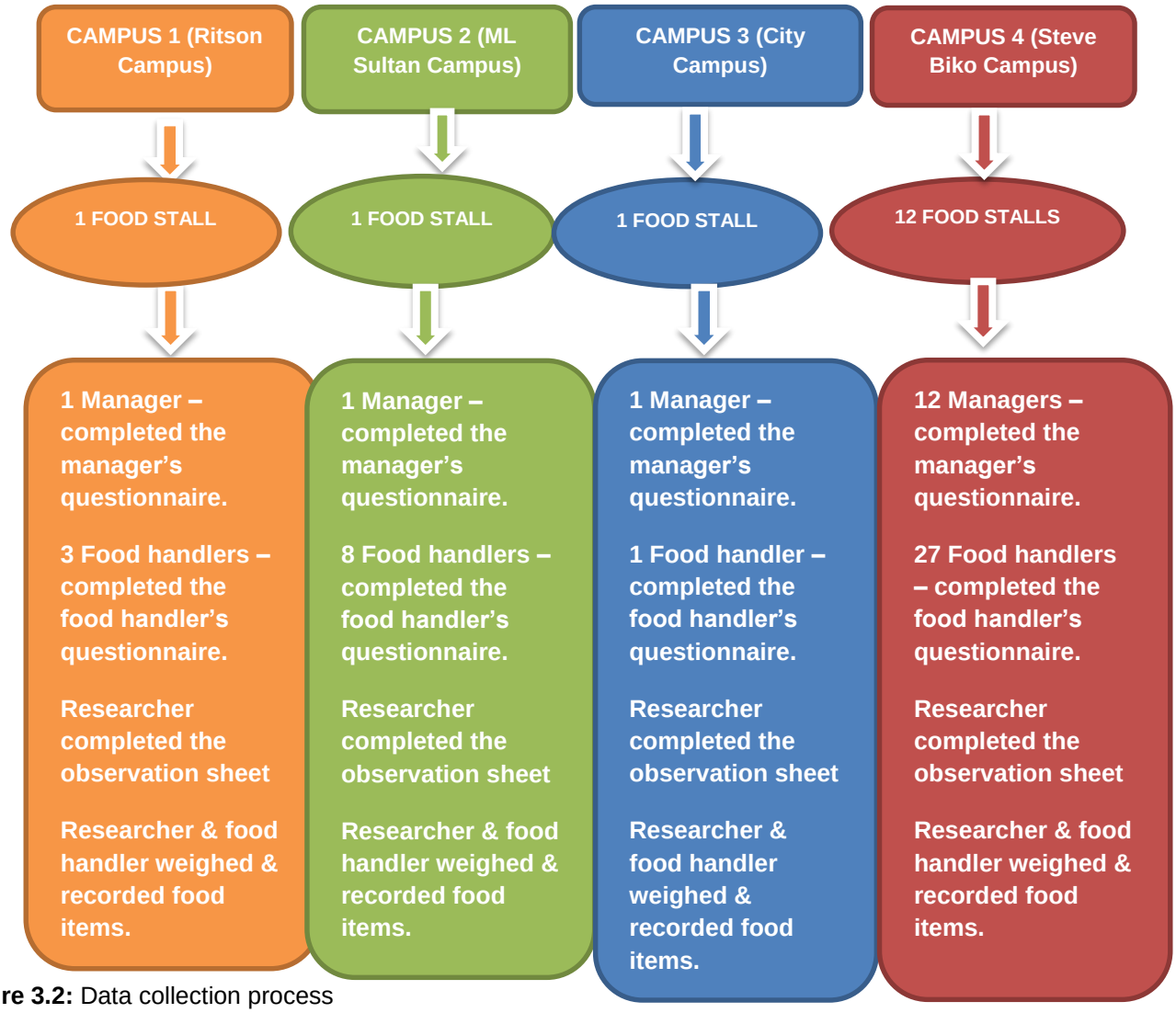

Figure 3.2: Data collection process

3.6 SAMPLING PROCEDURE

The study sample applied in this study included all the informal and formal food vendors on the DUT Campuses, in order:

- To be demonstrative and big enough to draw effective conclusion
- To provide sufficient reflection of the study population and
- Lastly to accommodate for non-responses.

The questionnaires used were valid and reliable questionnaires developed by (Campbell 2011 and Meaker 2008). Permission to use the questionnaires was granted from the original sources (Annexure D). All 15 targeted vendors participated in the study, and purposive sampling was used. Croucher and Cronn- Mills (2015:95) recommend purposive sampling when aiming at a specific group of individuals. Moreover, the targeted population accomplished the purpose of the study, and complied with the specific inclusion and exclusion criteria of the study. In this study all the food vendors preparing and selling food within the DUT campuses were targeted and the qualifying criteria was that food items had to be prepared or cooked in the stall. Food vendors also had to operate within a stall or formal premises, vendors selling from tables and on the street outside the campuses were excluded from the study.

3.6.1 Sample size

A total number of 15 food vending stalls at DUT campuses participated in the study, 8 informal vending stalls and 4 formal vending stalls were clustered together in one campus. The other 3 formal vending stalls were situated on the other campuses. Each food stall had a different number of employees, depending on the intensity of the menu items produced in the stall. Because the study was conducted during the second semester and some students had started writing exams, there were limitations to the study. The study limitations will be discussed in Chapter 5.

3.6.2 Inclusion Criteria

Inclusion criteria were as follows:

- All vendors offering a cooking vending service at DUT campuses in Durban.
- All employees (managers and food handlers) in the vending stalls.
- Only food vendors operating within a formal structure were included.

3.6.3 Exclusion criteria

Exclusion criteria were as follows:

- Vendors outside the gates of the DUT.
- Vendors selling only pre-packaged food items.
- Food vendors operating from tables or movable structures were excluded.

3.7 ADMINISTRATION OF MEASURING INSTRUMENTS

Three methods of data collection were utilised to ascertain hygiene practices, food safety knowledge and the nutritional adequacy of food by vendors at DUT. Permission to use the questionnaire was granted from the original sources; refer to Annexure D for the permission letters. The three methods consisted of the following:

3.7.1 Face to face interviews with managers and food handlers.

Interviews were carried out utilising three different kinds of questionnaires. Each participant completed a demographic data questionnaire. The food handling and practices questionnaire was completed by the owners/managers, and the food handlers. The managers' and food handlers' questionnaires consisted of six similar sections with similar questions to ascertain the similarity of the responses between the manager/owner and the food handlers in each stall. Only the first section (the general section) was different. The general section for the managers' questionnaire had questions pertaining to the managers and the food handlers' questionnaire contained questions pertaining to food handlers. The study variables covered the education level, work experience, training, food safety and hygiene knowledge, wastage, food holding and serving, personal hygiene, purchasing and receiving, and lastly storage.

The researcher conducted interviews in English since all the participants understood the language and Zulu translation was offered by the interviewer on very rare occasions where the participants didn't understand the meaning of the particular term used in the questionnaire. Interviews were carried out inside the kitchens or vending stalls and each questionnaire took approximately 20 minutes to complete. A total number of 15 owners/managers and 39 FH's in 15 stalls/vending sites working with cooked food participated during September and October 2013 when the study was conducted. The researcher conducted the research herself to increase the validity.

3.7.2 Observation sheet to observe food handlers during food preparation and cleanliness.

After the questionnaires were completed, the interviewer completed the observation sheet for each stall. An observation sheet with different sub-headings was adapted from Meaker 2008 and Louw *et al* who had conducted the similar study on National School Nutrition Programme. This observation sheet was designed mainly to focus on foodservice management and also to monitor the following procedures: General management of food stalls, storage, food preparation, holding and serving, wastage and hygiene practices. Completing the observation sheet took +- 8 hours a day due to the intensity of the checklist. The observation sheet (Annexure G) had 71 questions and each question was answered by ticking or circling a "Yes"

or “No” or “N/A” where appropriate. The interviewer spent an entire day in each stall to ensure that all the questionnaires were properly completed and to monitor students’ conduct (e.g. do the students wash hands before eating? do the students eat all their food.) and all aspects of the food preparation process. The observation sheet was only completed once, due to time constraints and a repeat was not initially integrated in the methodology.

The completion of an observation sheet has limitations because the participants perform well when they noticed that they are being monitored. On the other hand, the observation check list plays an important role because it confirms or refutes what was said by the participants in the questionnaires.

3.7.3 Recording and weighing of food menu items.

In each vending stall, the three most popular food items identified by the manager on the menu were weighed individually, using an electronic food scale (Scales 2000; model ACS-Micro CW, 1g – 30kg). Food items were served on standardised take-away packaging, and the weight of the packaging was measured and recorded separately. Recordings were done on the menu item recording sheet that was formulated by the researcher (Annexure H). Standard prepared and pre-prepared food menu items served were weighed in order to determine portion sizes and to allow for accurate nutrient analysis. Weighing of food menu items was also done once, usually when the stall was not busy. The researcher together with the food handler weighed and recorded the three most popular food items on the menu. For example, beef burger served with chips. Each item that was on the burger and the portion of chips were weighed separately using the food scale and the recordings were written on the menu evaluation sheet. Only one portion was weighed and the exercise was not repeated.

During the study, the researcher spent one full day in each food stall. Morning hours were utilised to conduct the one- on- one interview and during this time the questionnaires were completed. During the course of day the researcher inspected general management, receiving, food storage, food and hygiene practices, food holding and serving procedures and wastage. The observation sheet was completed during the inspection by the researcher.

3.8 DATA ANALYSIS AND STATISTICS

Before leaving the food stall, the researcher ensured that the manager’s questionnaire, food handler’s questionnaire, the observation checklist and the menu evaluation sheet were completed thoroughly to avoid gaps. Cooper and Schindler (2000: 412) stress the importance of double checking to ensure that all the interview documents have been completed correctly; “when gaps are present from the interviews,

a call-back should be made rather than guessing what the respondent 'probably would have said', self – interviewing has no place in quality research" (Cooper and Schindler 2000:412). Completed managers', FH's' questionnaires and observation checklist data were captured on an Excel spread sheet by the researcher and transferred to the statistical software known as the Statistical Package for the Social Sciences (SPSS) version 21, 0 for descriptive data analysis.

The three most popular menu items served by the vendor was identified by the manager and food handlers, menu items and weight per main ingredient were recorded on the menu and portion size identified. The identified menu items were analysed using the Food finder 3 software of the Medical Research Council (MRC) (Wolmarans, Kunneke and Laubscher 2009). The data were presented in macro nutrients for comparisons to daily requirements of the students.

Comparisons were drawn between the answers presented by the managers and food handlers where questions overlapped on the two questionnaires.

3.9 CONCLUSION

In this chapter an overview of the research methodology used to ascertain food hygiene practices, food safety knowledge and the nutritional value of the food served by food vendors at DUT in Durban has been broadly discussed. All the suitable instruments used in the study and the data collection process have been outlined. Chapter 4 will uncover the comprehensive report of the results of the study.

CHAPTER 4: RESULTS AND DISCUSSION

4.1 INTRODUCTION

This chapter present the full report on the results and the findings obtained in this study. All the information gathered from the questionnaires, the menu evaluation sheet and the observation sheet will be encapsulated and demonstrated in table formats and graphs. A comparison between the results of the Managers' questionnaires and the Food Handlers' (FH's) questionnaires will be drawn. The differences between what was said by the managers and food handlers and what the researcher observed will also be discussed.

4.2 DEMOGRAPHIC DATA - MANAGERS

The socio- demographic results display the study population in percentages grouped in the following categories:

- Personal information
- Length of business
- Level of education
- Business Infrastructure

The demographics characteristics of the participants are shown in Table 4.1.

Table 4.1: Demographic profile of managers/owners

Variables	Number (n=15)	Percentages (%)
Age		
<30 years	3	20.00
30 year and above	12	80.00
Total	**15**	**100.00**
Gender		
Male	5	33.33
Female	10	66.67
Total	**15**	**100.00**
Education level		
Std 6-9/Grade 8-11	3	20.00
Std 10/ Grade 12/ Matric	11	73.33
Post – matric diploma/ Technikon	1	6.67
Total	**15**	**100.00**
Ownership		
Owner	15	100.00
Length in business		
1-2 years	1	6.67
2-3 years	2	13.33
3 or more years	12	80.00
Total	**15**	**100.00**
Employment creation		

2 employees	2	13.33
3 employees	1	6.67
4 or more employees	12	80.00
Total	**15**	**100.00**
Work experience in food service		
Yes	11	73.33

The total number of 15 food vendors participated in the study. The majority of the respondents 80.00% (n=12) were owners of the business and were 30 years of age and older. Remarkably, 66.67% (n=10) of the business owners were women with matric / grade 12 as the highest level of education. Only 6.67% (n=1) had a tertiary qualification and 20.00% (n=3) achieved a Std 6-9/ grade 8-11 qualification. The majority of the respondents 80.00% (n=12) were in the food vending business for more than three years, and 80.00% (n=12) of the owners had hired four or more staff members. Out of the 15 managers who participated in the study, only 26.67% (n=4) did not have previous work experience in the food service industry. The other 73.33% (n=11) worked in food establishments either preparing or serving food.

4.2.1 Business infrastructure

Figure 4.1 indicates access to water used by the food vendors in the institution.

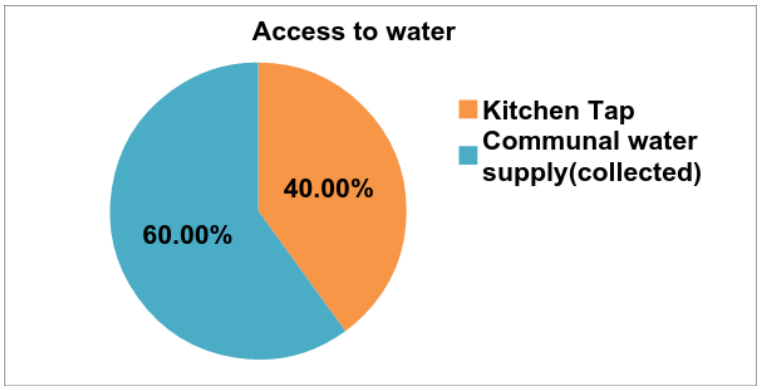

Figure 4.1: Vendors' access to water

Forty percent of the vendors obtained running water from the kitchen taps while 60.00% obtained water from a communal sink tap situated a few meters from the food stalls. Hot and cold water were available from the communal sink and water for food preparation and washing of hands was collected by buckets or containers. All the dishes and utensils used during food preparation and serving were washed outside in the communal sink.

Figure 4.2 indicates the type of power supply used by the food vendors in the institution.

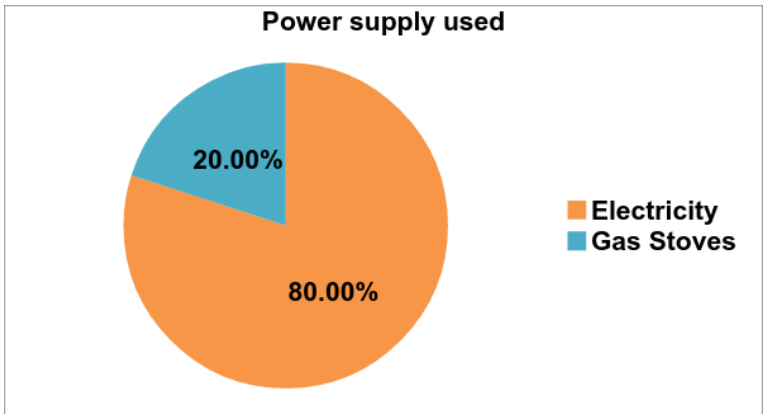

Figure 4.2: Power supply used by food vendors

The results displayed in Figure 4.2 indicate that most of the vendors (80.00%) used electricity when preparing food and the rest (20.00%) used gas stoves.

4.2.2 Demographic Data – Food Handlers (FH's)

The socio- demographic results of FH's display the study population in percentages grouped in the following categories: number of employees, duration of employment, working experience, and business infrastructure.

The demographics characteristics of the participants are shown in Table 4.2 below.

Table 4.2: Demographic profile of FH's

Variables	Number (n=39)	Percentages (%)
Number of FH's per food stall/vending site		
No. of stalls	**Number of FH's**	
1	8	20.51
7	4	10.26
4	3	7.69
3	2	5.13
Duration of employment		
Number of months/years	**Number of FH's**	
2 months	1	2.56
4 months	1	2.56
9 months	4	10.26
2 years	7	17.95
3 years	14	35.90
4 years	5	12.82
5 years	1	2.56
6 years	1	2.56
7 years	3	7.69

8 years	1	2.56
10 years	1	2.56
Total	**39**	**100.00**
Any previous experience in food service?		
Yes	21	53.85
Is there a menu in your vending facility?		
Yes	37	94.87
Reason for using the particular menu		
Economical	1	2.56
Locally available foods	3	7.69
Student's favourite foods	32	82.05
Other (Chinese speciality)	1	2.56
Not applicable (no menu)	2	5.13
Total	**39**	**100.00**
Water facilities per food stall		
Kitchen tap	21	53.85
Communal water supply	18	46.15
Total	**39**	**100.00**
Power supply used to prepare food		
Electricity	34	87.18
Gas	5	12.82
Both electricity and gas	27	69.23

The results displayed in Table 4.2 indicate that the number of FH's employed spread across the (vendors) vending facilities with eight (20.51%) being the highest number in one vending stall and two (5.13%) being the lowest number of FH's. The number of FH's was generally determined by the (intensity) complexity of the menu and the size of the food stall. The duration of employment varied, only 15.38% (n=6) FH's had been employed for less than one year and the rest ranged from two years to ten years as demonstrated by Table 4.2. The majority of FH's 53.85% (n=21) had prior experience in food service.

The vast majority [94.87% (n=37)] of food vendors had a menu on site and the majority of the participants [82.05% n= (32)] indicated that the main reason for using the particular menu was that the menu had students favourite food. Most of the respondents [53.85% (n=21)] indicated that water was obtainable from kitchen taps and 46.15% (n=18) obtained water from the communal water supply. The power supply mostly used by FH's was electricity 87.18% (n=34) and 69.23% (n=27) used both gas and electricity.

4.2.3 Training

This section explains the data of training received by the managers and FH's as presented in the managers and food handler's questionnaire.

Table 4.3: Food safety training

Variables	Managers % (n=15)	Food Handlers % (n=39)
Has food safety and hygiene training been provided?		
Yes	73.33 (n=11)	56.41 (n=22)
Training on menu planning?		
Yes	26.67 (n=4)	33.33 (n=13)
Training on food preparation?		
Yes	46.67 (n=7)	61.55 (n=24)
Training on prevention of contamination?		
Yes	40.00 (n=6)	51.28 (n=20)
Training on prevention of cross-contamination of food?		
Yes	40.00 (n=6)	51.28 (n=20)
Training on illness in the workplace?		
Yes	33.33 (n=5)	51.28 (n=20)
Training on injury in the workplace?		
Yes	33.33 (n=5)	56.41 (n=22)
First Aid course?		
Yes	40.00 (n=6)	53.85 (n=21)
Training on personal hygiene?		
Yes	46.67 (n=7)	58.97 (n=23)
Training on hand washing?		
Yes	46.67 (n=7)	46.15 (n=18)

The results in Table 4.3 reveal that most of the managers 73.33% (n=11) were trained in food safety and hygiene, while 56.41% (n=22) of the FH's responded positively to food safety and hygiene training. According to the above statistics, managers did not have as much training in most of the food safety aspects as FH's had. A total of 61.55% (n=24) FH's received training on food preparation compared to 46.67% (n=7) managers; training on prevention of contamination were received by 51.28% (n=20) and 40.00% (n=6) respectively by the FH's and managers, prevention of cross– contamination 51.28% (n=20) and 40.00% (n=6) respectively, illness in the work place 51.28% (n=20) versus 33.33% (n=5), first aid course 53.85% (n=21) versus 40.00% (n=6), personal hygiene 58.97% (n=23) versus 46.67% (n=7) and 46.15% (n=18) of both the FH's and managers received hand washing training.

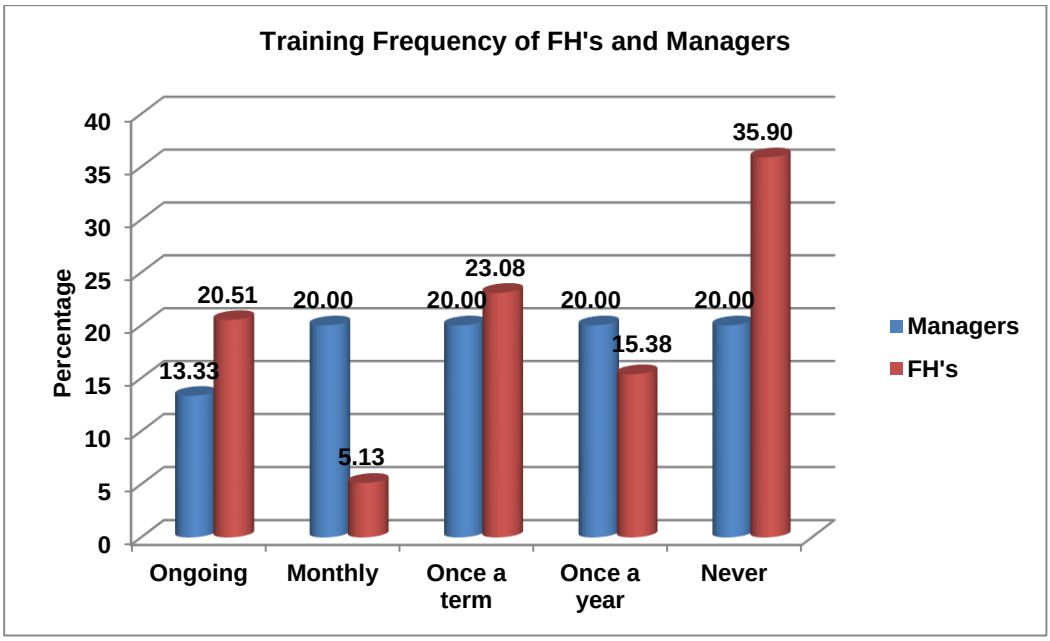

Figure 4.3: Training frequency of FH's (n=39) and Managers (n=15)

Figure 4.3 illustrates the differences between the manager's responses and the FH's in terms of the frequency in training. About one third of the FH's 35.90% (n=14) and 20.00% (n=3) of managers indicated that training was never conducted, while 5.13% (n=2) of the FH's and 20.00% (n=3) of managers indicated that training was conducted monthly. It was also noted that even though 35.90% (n=14) of the FH's indicated that training was never conducted, 20.51% (n=8) of FH's confirmed that training was conducted regularly.

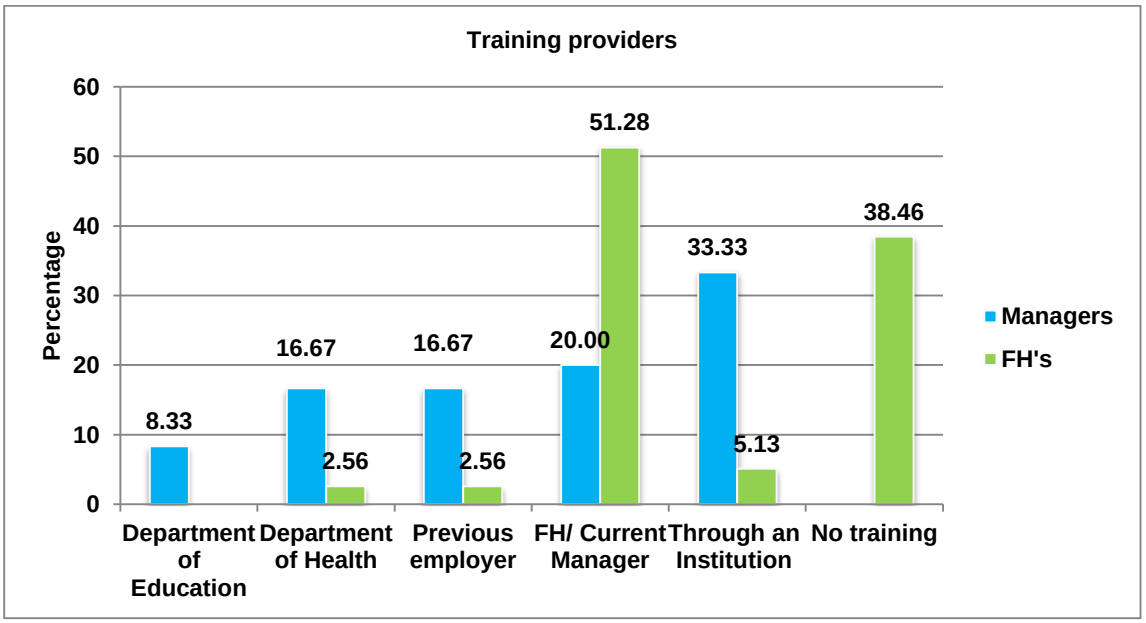

Figure 4.4: Training providers for managers (n=15) and FH's (n=39)

Figure 4.4 displays that 33.33% (n=5) of the managers received training through an institution while only 5.13% (n=2) of the FH's indicated that training was provided by Invo Tech (training service provider) through the Institution. However, a large percentage of FH's namely 51.28% (n=20) indicated that training was received from current managers. It was also noted that 38.46% (n=15) of the FH's confirmed that training was never conducted.

Some of the managers indicated that most of the knowledge was acquired from reading and also through the years of experience, while some claimed to have undergone some training years before being employed by the current employer.

4.2.4 Food safety and hygiene knowledge

This section presents the data on the food safety and hygiene knowledge of the managers and FH's as presented in the managers and food handler's questionnaire.

Table 4.4 Cleaning

Variables	Managers % (n=15)	FH's % (n=39)
Is a hot tap water available for hand washing?		
Yes	80.00 (n=12)	82.05 (n=32)
Is a cold tap water available for hand washing?		
Yes	100.00 (n=15)	100.00 (n=39)
How frequently are the utensils cleaned?		
During preparation	26.67 (n=4)	35.90 (n=14)
After the food is ready	33.33 (n=5)	33.33 (n=13)
After the work is done	40.00 (n=6)	30.77 (n=12)
How often is the preparation area cleaned?		
During preparation	26.67 (n=4)	33.33 (n=13)
After the food is ready	40.00 (n=6)	46.15 (n=18)
After the work is finished	33.33 (n=5)	20.51 (n=8)
How frequently is the stove cleaned?		
During preparation	26.67 (n=4)	2.56 (n=1)
After the food is ready	20.00 (n=3)	38.46 (n=15)
After the work is finished	53.33 (n=8)	58.97 (n=23)
How are cooking utensils washed?		
Hot water and detergent	93.33 (n=14)	94.87 (n=37)
Cold water and detergent	6.67 (n=1)	5.13 (n=2)
Are work areas sanitised?		
Yes	93.33 (n=14)	92.31 (n=36)
If yes, how often?		
Frequently during the day	40.00 (n=6)	41.03 (n=16)
Daily	53.33 (n=8)	53.85 (n=21)
Seldom	0 (n=0)	2.56 (n=1)
Is soap available for hand washing?		
Yes	93.33 (n=14)	100.00 (n=39)
When should hands be washed?		
After being in toilet and before food preparation	100.00 (n=15)	92.31 (n=36)
Before preparing food	0 (n=0)	7.69 (n=3)

Wiping cloths can spread microorganisms?		
Yes	100.00 (n=15)	94.87 (n=37)
Are correct cleaning chemicals available?		
Yes	100.00 (n=15)	94.87 (n=37)
Are there enough cleaning tools, e.g. brooms, mops cloths etc.?		
Yes	100.00 (n=15)	97.44 (n=38)

Table 4.4 illustrates that all 100.00% (n=15) of the managers responded positively to the questions pertaining to the availability of cleaning chemicals and tools. Similarly, all managers 100.00% (n=15) and the majority 97.44% (n=38) of FH's positively indicated the availability of cleaning chemical and tools. Regarding the frequency of cleaning the utensils, 40.00% (n=6) of the managers indicated that utensils were cleaned after all the work was done, while 35.90% (n=14) of the FHs indicated that utensils were cleaned while food preparation was in progress.

The results from the "Cleaning and the Preparation Area," question answered by both managers and FH's confirmed that the golden rule "Clean as you go" was not practised or was unknown. Forty percent (n=6) of the managers and 46.15% (n=18) of FH's indicated that the preparation area was cleaned after the food was ready. Furthermore, on the frequency of cleaning the stove the majority of both the managers 53.33% (n=8) and the FH's 58.97% (n=23) indicated that the stove was cleaned after all the work was finished. Knowledge on how to clean cooking utensils, hand washing and sanitising of work areas was relatively good for both the parties.

Table 4.5: Food Safety and Hygiene Knowledge

Variables	Managers % (n=15)	FH's % (n=39)
Wiping cloths can spread microorganisms?		
Yes	100.00 (n=15)	94.87 (n=37
The same cutting board can be used for raw foods and cooked foods		
Yes	33.33 (n=5)	46.15 (n=18)
Cooked foods does not need to be thoroughly reheated		
True	40.00 (n=6)	64.10 (n=25)
Cooked meat can be left out of the fridge to cool overnight before refrigerating		
True	33.33 (n=5)	56.41 (n=22)
Wash fruits and vegetables before eating / preparing		
True	100.00 (n=15)	100.00 (n=39)
Cooked foods should be kept very hot before serving		
True	100.00 (n=15)	92.31(n=36)
Safe water can be seen by the way it looks		
True	60.00 (n=9)	69.23 (n=27)
Thawing food can be done on the counter		
Agree	60.00 (n=9)	58.97 (n=23)
Frequent hand washing is advisable during food preparation?		
Agree	100.00 (n=15)	100.00 (n=39)
Raw food needs to be stored separately from cooked food?		
True	100.00 (n=15)	100.00 (n=39)
Food need to be inspected for freshness to ensure quality ingredients		
Agree	100.00 (n=15)	100.00 (n=39)
Food that has reached its expiry date must be thrown away		
Agree	100.00 (n=15)	100.00 (n=39)
Keeping kitchen surfaces clean reduces the risk of illness		
Agree	100.00 (n=15)	100.00 (n=39)

Keeping raw and cooked food separate helps prevent illness		
Agree	93.33 (n=14)	100.00 (n=39)
It is unsafe to leave cooked food out of the refrigerator for more than two hours		
Agree	86.67 (n=13)	87.18 (n=34)

The majority of the respondents seem to have good food safety knowledge as illustrated by table 4.5. Food safety questions such as: checking the expiry dates on food items, keeping kitchen surfaces clean, inspection of food for freshness and quality all received a 100.00% response from both the managers and the FH's. Knowledge on prevention of cross contamination through frequent hand washing during food preparation and separating raw and cooked food received a good response of 100.00% from both parties while the statistics indicate that both the parties (managers 33.33% (n=5) and FH's 46.15% (n=18) were uninformed that chopping boards could cause cross-contamination.

Food temperature control before serving received a positive response of 100.00% (n=15) and 92.31% (n=36) respectively. Statistics display that the respondents were not knowledgeable on the rules and regulations regarding thawing of food as the majority of managers and FH's (60.00% (n=9) and 58.97% (n=23) respectively) incorrectly answered by indicating that food can be thawed on the counter. Similarly, both the managers and FH's (60.00% (n=9) and 69.23% (n=27) respectively) incorrectly believed that clean water is visible and does not need to be tested to ensure cleanness.

4.2.5 Food storage

The following section presents information on storage, use and availability in vending facilities.

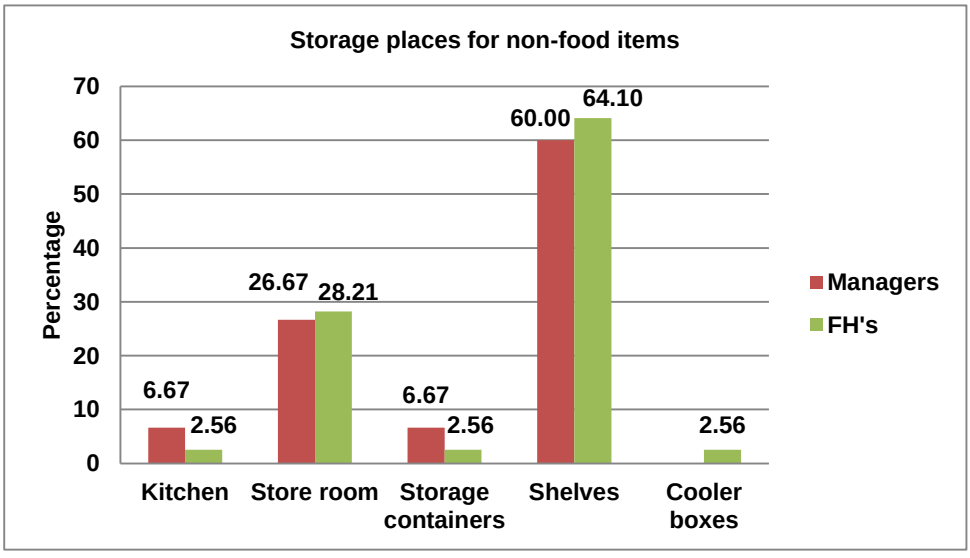

Figure 4.5: Storage of non – food items as reported by the managers (n=15) and FH's (n=39)

Both groups of participants – managers and FH's 60.00% (n=9) and 64.10% (n=25) - indicated that non-perishable food items were stored on shelves that were constructed inside the stalls due to shortage of space. Thirty three percent (n=5) of the vendors had designated storerooms for the non – perishable items because space was not an issue, while 66.67% (n=10) used storage containers to store non – food items. A small percentage 2.56% (n=1) of FH's indicated that non – perishable items were stored in cooler boxes and some items were stored in the kitchen where food was prepared due to lack of space.

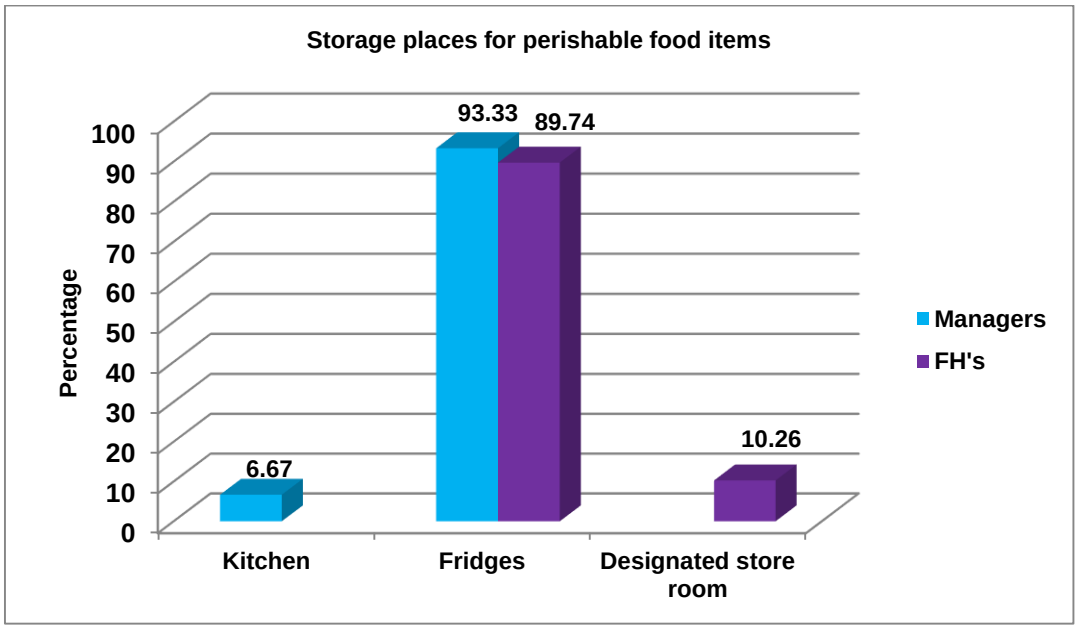

Figure 4.6: Storage places for perishable food items as reported by managers (n=15) and FH's (n=39)

Figure 4.6 illustrates that the majority of the managers 93.33% (n=14) and FH's 89.74% (n=35) confirmed that perishable food was stored in fridges. A small percentage 6.67% (n=1) of managers indicated that perishables are stored in the kitchen, while 10.26% (n=4) of FH's indicated that perishables are stored in the designated storeroom.

Table 4.6: Storage area and stock

Variables	Managers % (n=15)	FH's % (n=39)
Is there a regular cleaning schedule for the storage areas?		
Yes	46.67 (n=7)	66.67 (n=26)
How often is the storage area cleaned?		
Once a week	26.67 (n=4)	12.82 (n=5)
Less than once a week	0 (n=0)	2.56 (n=1)
Twice a week	6.67 (n=1)	7.69 (n=3)
Every day of the week	13.33 (n=2)	41.03 (n=16)
No proper store-room	53.33 (n=8)	35.90 (n=14)
How often is stock checked for quality and expiry dates?		
Once a month	13.33 (n=2)	2.56 (n=1)
< Once a week	6.67 (n=1)	5.13 (n=2)
> Once a week	13.33 (n=2)	10.26 (n=4)
Every day of the week	66.67 (n=10)	82.05 (n=32)
How often is stock – take done?		
Once a month	13.33 (n=2)	7.69 (n=3)
Once a week	20.00 (n=3)	12.82 (n=5)
Twice a week	26.67 (n=4)	12.82 (n=5)
Three times a week	6.67 (n=1)	2.56 (n=1)
Every day of the week	33.33 (n=5)	64.10 (n=25)
Is stock rotation in place?		
Yes	100.00 (n=15)	100.00 (n=39)
If yes, how is it done?		
Delivery dates	6.67 (n=1)	10.26 (n=4)
Expiry dates	60.00 (n=9)	71.79 (n=28)
First in First out	33.33 (n=5)	17.95 (n=7)

According to Table 4.6, a large percentage of the food stalls did not have proper storage facilities; hence 53.33% (n=8) of the managers and 35.90% (n=14) of the FH's indicated that there was no regular cleaning schedule of the storage area. The frequency of checking the stock expiry dates received a good response from both managers and FH's (66.67% (n=10) and 82.05% (n=32) who indicated that the quality of the stock was checked daily by looking at the expiry dates. Both managers 33.33% (n=5) and FH's 64.10% (n=25) indicated that stock – take was done every day of the week because orders were limited to daily usage due to shortage of space.

On the question of stock rotation, all respondents 100.00% agreed that stock rotation was in place, and both managers and FH's confirmed that stock taking was done by checking the expiry dates.

4.2.6 Purchasing and receiving

The following sections were only applicable to managers since managers were responsible for purchasing and receiving of stock; 15 managers completed this section.

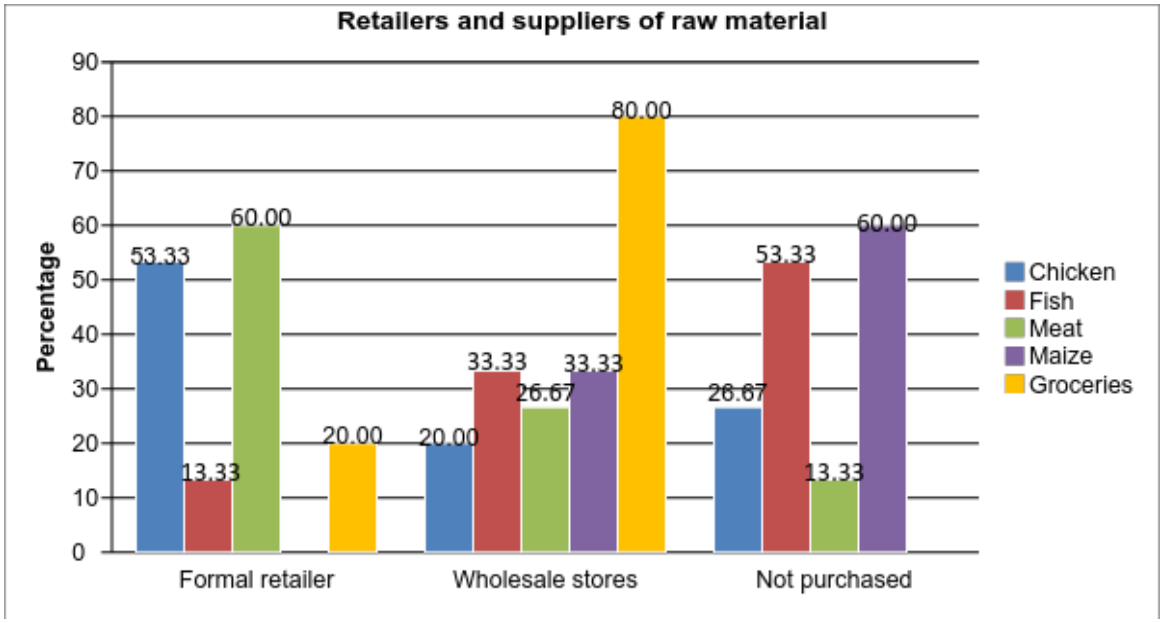

Figure 4.7: Places where raw material is purchased

Figures 4.7 and 4.8 indicate the different places used by managers when purchasing stock items. According to figure 4.7 the majority of the managers 53.33% (n=8) purchased raw chicken from formal retailers, 20.00% (n=3) from wholesale stores and 26.67% (n=4) did not have chicken items on the menus, therefore did not purchase chicken. Most of the food stalls 53.33% (n=8) did not have fish items on the menus, while 33.33% (n=5) purchased fish from the wholesale stores, and 13.33% (n=2) from a formal retailer. Red meat appeared to be the most popular item on the menus, and only 13.33% (n=2) did not sell meat items. A larger percentage 60.00% (n=9) purchased red meat from formal retail stores, and 26.67% (n=4) purchased red meat from wholesale stores. Figure 4.7 also illustrates that the majority of food vendors 60.00% (n=9) did not have maize items on the menus, and therefore did not purchase it, while 33.33% (n=5) purchased maize from wholesale stores, and 6.67% (n=1) purchased maize from formal retailers. The majority of managers 80.00% (n=12) confirmed that most of the grocery- items were purchased at wholesale stores, while 20.00% (n=3) purchased groceries at formal retail stores.

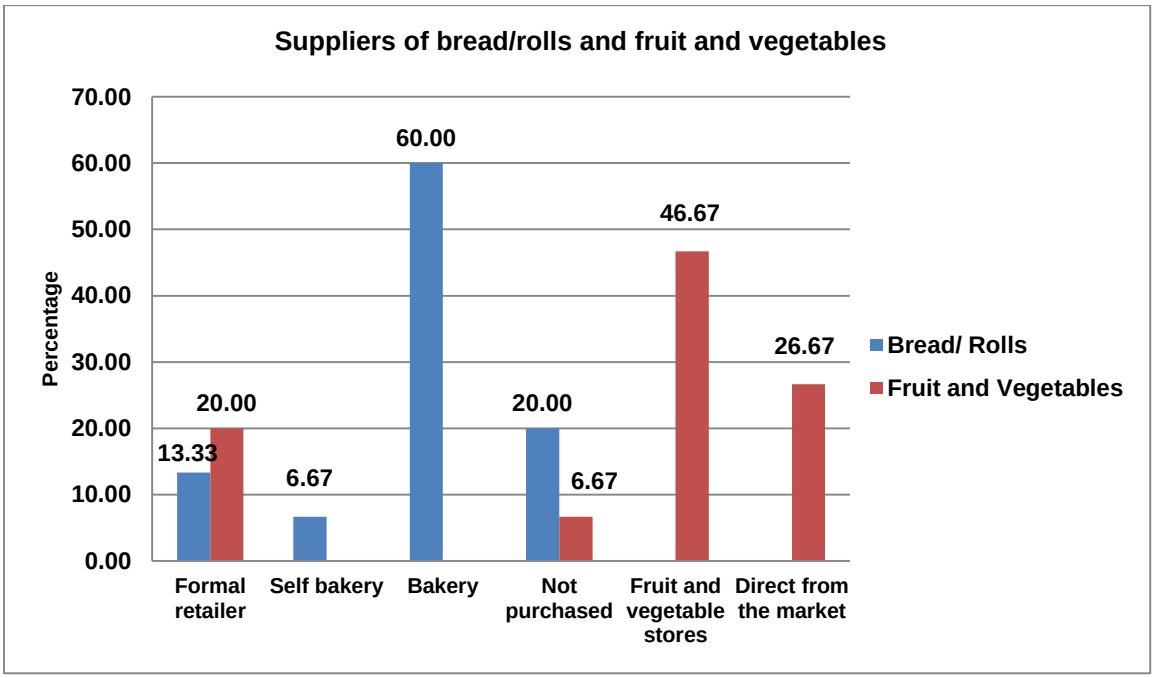

Figure 4.8: Suppliers of prepared bread/rolls, fruits and vegetables

Figure 4.8 displays that a large number of managers 60.00% (n=9) purchased bread rolls / bread from the bakery, 13.33% (n=2) from formal retailers, 6.67% (n=1) baked own bread rolls / bread, and 20.00% (n=3) did not have bread rolls / bread items on menu; therefore bread items were not purchased. Fruits and vegetables were mostly 46.67% (n=7) purchased at fruit and vegetable stores, 26.67% (n=4) bought fruits and vegetables direct from the market, 20.00% (n=3) from formal retailers, while only 6.67% (n=1) did not use any fruits and vegetables hence these were not purchased.

Table 4.7 Receiving of goods

Variables	Managers % (n=15)
Are there formal contracts with the suppliers?	
Yes	53.33 (n=8)
Is there a planned delivery schedule?	
Yes	73.33 (n=11)
The person delivering the suppliers	
Commercial supplier	60.00 (n=9)
Commercial supplier & local member	6.67 (n=1)
Owner	33.33 (n=5)
How is the non – perishable food delivered?	
Closed truck	33.33 (n=5)
Car	66.67 (n=10
How is the perishable food delivered?	
Closed truck	13.33 (n=2)
Refrigerated truck	13.33 (n=2)
Car	73.33 (n=11)
Is the food of adequate quality?	

Yes	100.00 (n=15)
Where are the perishable foods stored?	
Fridge/freezer	93.33 (n=14)
Cool drink fridge	6.67 (n=1)
How is the quality of food assessed?	
Brand	53.33 (n=8)
Expiry date	40.00 (n=6)
Grade	6.67 (n=1)
What do you do with food that is of inadequate quality	
Returned to supplier	86.67 (n=13)
Received and used	13.33 (n=2)
Who receives the deliveries?	
Owner	46.67 (n=7)
Manager/supervisor	53.33 (n=8)
Is it the same person every day?	
Yes	80.00 (n=12)
Is there food specification manual to check the quality of food against?	
Yes	40.00 (n=6)
Do the delivery note /invoice get checked?	
Yes	100.00 (n15)
If yes, how?	
Counted	60.00 (n=9)
Weighed & counted	40.00 (n=6)

The results presented in Table 4.7 indicate that majority of the managers 53.33% (n=8) had contracts with the suppliers and 46.67% (n=7) did not have contracts with suppliers, hence most managers 73.33% (n=11) had a planned delivery schedule, and only 26.67% (n=4) did not have such scheduled deliveries. Most of the deliveries 60.00% (n=9) were done by commercial suppliers, 6.67% (n=1) by both the commercial supplier and local community supplier, and 33.33% (n=2) by the owners. A large number of managers 73.33% (n=11) preferred to buy and deliver perishable products themselves, while 13.33% (n=2) used refrigerated trucks and another 13.33% (n=2) used closed trucks for the delivery of perishable products. All managers 100.00% (n=15) indicated satisfaction with the quality of the products used and 53.33% (n=8) said that the brand determined the quality of the products, while 40.00% (n=6) looked at the expiry date and only 6.67% (n=1) judged the quality by the grade.

Even though the majority of the managers 60.00% (n=9) confirmed that there was no specification manual to check the quality of food against, 86.67% (n=13) indicated that food that was regarded as of inferior quality was not accepted but returned to the suppliers. Only 13.33% (n=2) accepted and used food that was of sub-standard.

All managers 100.00% (n=15) indicated that the delivery notes were checked at all times when accepting deliveries. However, the majority 60.00% (n=9) counted items against the invoice, while 40.00% (n=6) weighed and counted items. A large percentage 80.00% (n=12) confirmed that deliveries were accepted by one person at all times.

4.2.7 Food holding, serving and wastage

This section will present the data on food holding, serving and wastage as presented in the manager's and food handler's questionnaire.

Table 4.8: Food holding, serving and wastage

Variables	Manager % (n=15)	FH's % (n=39)
How long is the food held after cooking and before serving?		
Less than 15 minutes	66.67 (n=10)	74.36 (n=29)
15-30 minutes	26.67 (n=4)	17.95 (n=7)
30-45 minutes	6.67 (n=1)	2.56 (n=1)
More than 45 minutes	0 (n=0)	5.13 (n=2)
Is there adequate space for serving?		
Yes	40.00 (n=6)	58.97 (n=23)
Are there adequate ladles?		
Yes	60.00 (n=9)	64.10 (n=25)
Are there adequate measuring equipment?		
Yes	33.33 (n=5)	41.03 (n=16)
Are there adequate serving spoons?		
Yes	93.33 (n=14)	97.44 (n=38)
Are there adequate tongs?		
Yes	100.00 (n=15)	100.00 (n=39)
Are there adequate serviettes?		
Yes	93.33 (n=14)	94.87 (n=37)
In your opinion, are the students happy with portion sizes?		
Yes	93.33 (n=14)	100.00 (n=39)
What happens to the food that is prepared but students do not finish?		
Thrown away	13.33 (n=2)	7.69 (n=3)
Given to a friend	6.67 (n=1)	10.26 (n=4)
Taken home	26.67 (n=4)	7.69 (n=3)
Kept for the next day	13.33 (n=2)	10.26 (n=4)
Food handlers eat it	40.00 (n=6)	64.10 (n=25)
How much left over (not served or sold) food is thrown away after every day		
None	33.33 (n=5)	35.90 (n=14)
Less than quarter	60.00 (n=9)	58.97 (n=23)
Don't know	6.67 (n=1)	5.13 (n=2)
Is left over food reheated and served the next day?		
Yes	13.33 (n=2)	12.82 (n=5)

No	86.67 (n=13)	76.92 (n=30)
No left – over food	0 (n=0)	10.26 (n=4)
If yes, how is it reheated?		
On the stove	6.67 (n=1)	2.56 (n=1)
In the microwave	6.67 (n=1)	7.69 (n=3)
In the food warmer	0 (n=0)	5.13 (n=2)
Not applicable	86.67 (n=13)	84.62 (n=33)
Is there a designated rubbish bin?		
Yes	100.00 (n=15)	100.00 (n=39)

According to Table 4.8 the majority of managers 66.67% (n=10) indicated that food was held for less than 15 minutes after cooking and before serving, while 26.67% (n=4) indicated that the holding period for food was 15 – 30 minutes. Very few managers 6.67% (n=1) revealed that the holding period for food was 30 – 45 minutes. Most of the managers 60.00% (n=9) complained about the shortage of serving space; however, 58.97% (n=23) of the FH's indicated that there was sufficient serving space. The availability of serving equipment such as tongs and serving spoons received a positive feedback (Yes) from both the managers and the FH's. Thirty-three percent of managers and 41.03% (n=16) of FH's revealed that measuring equipment was available and being used.

When asked whether the students were satisfied with the food portion sizes, both the managers 93.33% (n=14) and the FH's 100.00% (n=39) believed that students were satisfied with the food portion sizes and only 6.67% (n=1) of the managers indicated that students often complained about the portion sizes. With regards to the question of left-over prepared food, 40.00% (n=6) of the managers and 64.10% (n=25) of the FH's revealed that food handlers ate left-over food; on the other hand 26.67% (n=4) of the managers and 7.69% (n=3) FH's indicated that food was taken home by the food handlers.

The statistics from both the managers 60.00% (n=9) and FH's 58.97% (n=23) indicated that left overs were minimal, less than a quarter; moreover 86.67% (n=13) of the managers and 76.92% (n=30) of the FH's agreed that left- overs were not reheated and used the following day.

4.2.8 Food Preparation

In this section the results of the food preparation section of the questionnaire, as answered by the 39 FH's, will be presented.

Table 4.9: Food preparation (Answered by FH's only)

Variables	Percentages (n=39)
Place where food is prepared	
Designated kitchen	46.15 (n=18)
Inside the stall	53.85 (n=21)
Person preparing the food	
The cook/FH	100.00 (n=39)
Is there adequate space for food preparation?	
Yes	56.41 (n=22)
Is there adequate space for cooking?	
Yes	53.85 (n=21)
Are there enough food preparation utensils (knives)?	
Yes	100.00 (n=39)
Are there enough chopping boards?	
Yes	79.49 (n=31)
Are there enough mixing tools?	
Yes	100.00 (n=39)
Are recipes available?	
Yes	30.77 (n=12)
Do you check the expiry date on food items?	
Yes	100.00 (n=39)
Meaning of the expiry date	
Food is spoilt Food cannot be used/eaten its spoilt Food should not be eaten Must be thrown away Not suitable to eat/use It has expired Must be sent back to the suppliers	

According to the FH's some food vendors 46.15% (n=18) had designated kitchens where food was prepared, whereas other 53.85% (n=21) prepared food inside the stalls with no designated kitchen. In all the food stalls, food was prepared by FH's 100.00% (n=39) and the majority of the FH's 56.41% (n=22) openly indicated the unhappiness with food preparation and cooking space. Statistics displayed complete satisfaction 100.00% (n=39) by the FH's on the sufficiency of food preparation utensils. All FH's 100.00% (n=39) perfectly defined the term "expiry date", and agreed that expiry dates were checked on all food items.

4.3 OBSERVATION FINDINGS

This section outlines the results of the observational findings of the researcher. The statistics displayed below revealed mainly the positive ("yes") feedback obtained from the 15 observational questionnaire, and where necessary negative ("no") feedback is highlighted.

Table 4.10: Observational findings on general management and receiving procedures

Variables	Positive observation (Yes) % (n=15)
GENERAL /MANAGEMENT	
Is there a menu?	86.67 (n=13)
Evidence of monitoring procedures?	80.00 (n=12)
Evidence of policies and procedures	53.33 (n=8)
Is there service level agreement between DUT and the vendors?	80.00 (n=12)
RECEIVING	
Is the delivery date written on to the product?	40.00 (n=6)
Are the delivery temperatures checked?	20.00 (n=3)

Table 4.10 indicate that a large percentage 86.67% (n=13) of the vendors displayed menus on premises and the few stalls that did not have menus were specialising in one major item such as fat cakes. In terms of policies and procedures there was nothing displayed, but managers and FH's were given certain rules and regulations by the Institutions governing how the vendors should operate. Most of the vendors 80.00% (n=12) had service agreement with the Institution which allowed students to purchase food items using student cards.

When receiving food items the researcher observed that managers were mostly responsible for receiving stock, and a small number of food stalls 40.00% (n=6) recorded the delivery date of food items. Managers relied on the delivery note to check when the stock was received. Delivery procedures were conducted well, except for checking the temperatures. When stock was delivered by retail companies, temperatures were visually checked by managers, Some food stalls had merchandise delivered by owners / manager's cars.

Table 4.11: Observational findings of the researcher with regard to storage facilities.

Variables	Positive observation (Yes) % (n=15)
STORAGE	
Is perishable food stored in a cold room/fridge?	100.00 (n=15)
Is non- perishable food stored in a separate room?	40.00 (n=6)
Are cleaning items stored with food?	13.33 (n=2)
Are the storage areas kept locked?	26.67 (n=4)
Is there adequate light in the storage area?	33.33 (n=5)
Is there adequate space in the storage area?	40.00 (n=6)
Is the food stored in original packaging?	86.67 (n=13)
Are the products clearly labelled?	86.67 (n=13)
Are there expiry dates on food items?	100.00 (n=15)

Have some food passed the expiry date?	100.00 (n=15) NO
If products are transferred to storage containers, is the expiry date recorded?	6.67 (n=1)
Any expired food items being used?	100.00 (n=15) NO
Are all containers covered?	73.33 (n=11)
Are there any old or stale food items?	100.00 (n=15) NO
Any evidence of decay in fresh produce?	100.00 (n=15) NO
Are the storage areas clean?	26.67 (n=4)
Are the storage areas neatly arranged?	33.33 (n=5)
Any food stored directly on the floor?	80.00 (n=12)
Is refrigerated storage available?	100.00 (n=15)
Is the stock sheet kept?	80.00 (n=12)
Is the old stock used before the new stock (FIFO)?	100.00 (n=15)
Any evidence of pest (rodents/insects) infestation?	26.67 (n=4)
Any unpleasant odours in the storage area.	46.67 (n=7) NO

The results presented in Table 4.11 illustrate that all 100.00% (n=15) vendors stored the perishable food items in the cold room or fridge. Forty percent of vendors had a separate storeroom for the non-perishable food and cleaning items, while 60.00% of vendors used shelves, tables, cupboards and fridge tops for storing non – perishable food and cleaning items. The researcher observed that food items were delivered in original packaging with an expiry date and then emptied to storage containers and the expiry dates were not recorded on storage containers. Food orders were kept to a minimum due to a shortage of space, and also because most students had exhausted meal funds received from the National Student Financial Aid Scheme (NSFAS) at the time of the data collection period. As a result, all food items were used before reaching the expiry dates and there was no evidence of stale or decaying food used. Except for flies and ants in some of the vending stalls, infestation by pests was observed mainly around the bin areas.

Table 4.12: Observational findings on food preparation, serving and wastage

Variables	**Positive observation (Yes) % (n=15)**
FOOD PREPARATION	
Is there adequate space for food preparation?	46.67 (n=7)
Is there enough space for serving /portioning?	53.33 (n=8)
Are recipes available?	6.67 (n=1)
Are the recipes standardised?	13.33 (n=2)
Is the internal temperature of food checked?	6.67 (n=1)
Is water for cooking easily available?	66.67 (n=10)
SERVING AND WASTAGE	
Are there adequate food serving utensils?	100.00 (n=15)
Are there adequate eating utensils?	60.00 (n=9)
Are the portion sizes standardised?	60.00 (n=9)
Is all the prepared/cooked food served?	80.00 (n=12)
If not, is the left-over food stored properly?	20.00 (n=3)
Do the students finish their food?	100.00 (n=15)
Are there any plate waste/ food thrown away?	6.67 (n=1)
Is there a designated rubbish bin?	100.00 (n=15)
Are the dust bins covered?	73.33 (n=11)
Are the dust bins clean?	53.33 (n=8)
Are there waist lying outside the dustbins?	33.33 (n=5)

Table 4.12 revealed that only two 13.33% (n=2) of the vending stalls used standardised recipes and one food stall had the recipes neatly displayed in the kitchen. Most of the managers maintained that recipes were no longer being used because FH's were familiar with the dishes prepared. Furthermore, vendors had insufficient space for preparation and serving food. All food vendors had adequate serving utensils and where necessary eating utensils were provided. The researcher also noticed that most students shared meals hence plate waste was very minimal.

All 100.00% (n=15) food stalls had rubbish bins, 73.33% (n=11) of food stalls had bins with lids and 53.33% (n=8) bins were clean. Only 33.33% (n=5) of food stalls had waste lying outside the dustbins.

Table 4.13: Observational findings on hygiene practises by FH's and students

Variables	Positive observation (Yes) % (n=15)
HYGIENE	
Are the kitchens utensils clean?	86.67(n=13)
Is the kitchen equipment clean?	73.33 (n=11)
Are the correct cleaning chemicals available?	93.33 (n=14)
Are there adequate cleaning supplies: cloths, scourers etc.?	100.00 (n=15)
Are the work areas clean?	73.33 (n=11)
Is the area cleaned frequently during preparation?	66.67 (n=10)
Is the area sanitised following food preparation?	33.33 (n=5)
Is there water available for cleaning?	93.33 (n=14)
Do the FH's wash their hands regularly	53.33 (n=8)
Is there water available for the FH's to wash hands?	80.00 (n=12)
Is there soap available for hand washing?	100.00 (n=15)
Are the food handlers clothes clean?	86.67 (n=13)
Do the servers wash their hands before serving?	40.00 (n=6)
Do the students wash their hands before eating?	100.00 (n=15) NO
Is cooked food kept separately from raw food items?	100.00 (n=15)

Table 4.13 indicates that all the food stalls 100.00% (n=15) had cleaning supplies and 93.33% (n=14) stalls had cleaning detergents. Only 73.33% (n=11) of the food stalls had work areas and kitchen utensils that appeared clean. Food vendors that had no tap water inside stalls kept a bucket of soapy water for

washing hands and small equipment. The researcher noticed that most of the FH's wore uniforms and clothes that appeared to be fairly clean, and the work areas were regularly cleaned probably because the FH's were aware of the presence of the researcher. It was noted with great concern that students did not wash hands prior to eating food, despite the availability of tap water within the vicinity of the dining area.

4.4 NUTRITIONAL ANALYSIS

One of the objectives of this study was to determine the nutritional value of the food served by food vendors at DUT Durban campuses, in order to ascertain the nutrient quality of food served to students. A total of 37 meals were identified as displayed by Annexure J, but the top 15 meals will be discussed and were ranked from the highest energy (kJ) content downwards. The daily energy requirements for students aged 19-30 years is **12 881 kJ** for men and **10 093kJ** for women.

Table 4.14 Top 15 meal items ranked according to kilojoule content. Refer to Annexure J for the energy distribution table.

Dietary Factor	Total weight of the meal	kJ content of the meal	% Total fat contribution to energy intake	% Total Carbohydrates + fibre contributing to energy intake	% Protein contributing to energy intake
WHO Goal % of total energy			**15-30%**	**55-75%**	**10-15%**
1. Grilled meat - Beef brisket (180g) and Boerewors (180g) served with stiff pap (350g).	710g	6908.30	63.50	18.69	17.65
2. Chicken wrap (158gchicken+131g wrap) with grated carrots (21g), shredded lettuce (21g) and sliced cheese (28g) served with French fries (187g).	551g	6876.48	50.99	32.56	16.48
3. Roasted chicken (230g) served with French fries (355g) and lettuce (12g) and tomato (11g) side salad.	608g	6657.60	45.95	35.24	18.94
4. Boerewors roll (89g boerewors + 60g roll) served with French fries (355g).	504g	6637.68	47.76	43.76	8.39

5. Vetkoek (plain)	426g	6492.68	42.97	48.97	8.03
6. Beef burger (102g burger pattie+ 66g burger bun) served with French fries (355g).	523g	6427.67	42.45	45.37	12.17
7. Roasted Chicken (225g) served with French fries roll (280g + 60g).	565g	6299.75	42.14	37.66	20.13
8. Vetkoek (372g) served with polony (28g) and sliced processed cheese (14g).	414g	6222.42	46.03	44.79	9.05
9. Beef curry (332g) served with maize meal (289g) and butternut (50g).	671g	5703.50	46.14	36.40	17.20
10. Beef Curry (304g) served with maize meal (268g) butternut (62g), beetroot (50g), mixed fresh vegetables (45g) and potato (68g) salads.	797g	5594.94	40.58	43.83	15.74
11. Giant Toasted Bacon (82g) and egg (94g) sandwich (149g) served with French fries (100g)	425g	5554.13	47.56	36.03	16.26
12. Beef curry (332g) served with maize meal/ samp / rice, (370g) and salad (grated carrots (12.5g), pineapple (12.5g), raisins and orange juice (12.5g+12.5g)	752g	5391.84	47.48	35.09	17.31
13. Russian (167g) foot long (101g) served with French fries (100g).	368g	5240.32	52.23	31.04	16.59
14. Mutton burger (83g patie+123g bun) grated carrots (20g) shredded lettuce (20g) served with French fries (217g).	463g	5130.04	34.59	49.86	13.50
15. Chicken curry (409g) served with rice (344g) and beetroot (50g) salad.	803g	5050.87	34.12	41.35	22.97
Mean	**572g**	**6012.52**	**45.63**	**38.71**	**15.36**

Table 4.14 displays the top 15 meals ranked according to kJ content, starting with the highest to the lowest. Energy contribution for each meal by each of the macronutrients fat, proteins, carbohydrates (CHO) and fibre is also displayed. According to WHO (2003), the recommended energy contribution of fat is 15–30%; CHO is 55-75% and protein 10–15%.

The calculated mean energy content of the meals was approximately 6012.52 kJ. These meals contribute approximately 47% of DRIs of energy requirement for males and approximately 60% for females.[1] Half of the meals (1-8) contribute approximately 51% of energy requirement for a day for males and 65% for females. The second half of the meals (meal 9-15), contribute approximately 42% of energy required for males and 53% of energy for females. Assuming that most South Africans consume three meals a day, each meal is expected to contribute 33% of energy requirements for a day. This study has revealed that male students on an average are consuming approximately 14% more kJ than recommended, and female students are consuming approximately 27% more kJ than recommended. Frequent consumption of such high energy meals can lead to overweight and obesity among young adults.

The mean energy contribution made by fat between meals 1 –15 is 45.63% which is higher than the recommended percentage (15-30%), with the highest contribution being 63.50% (meal 1 -grilled meat combo) and the lowest being meal 15 (chicken curry meal) with 34.12%. However, meal 14 (mutton burger – 34.59%) and 15 (chicken curry – 34.12%) were the closest to the recommended percentage of energy contribution of fat for the meal.

The CHO content of meals 1-15 were notable below the stipulated percentage of (55-75%) with the maximum percentage being 49.86% (meal 14 - mutton burger) and the minimum being 31.04% (meal 13 - russian sausage foot long). Meal 1 (grilled meat combo) was remarkably low in CHO content with 18.69% despite the fact that it was served with stiff pap.

The mean energy contribution of protein was 15.36% which is generally within the recommended percentage of 10-15%. Among the 15 meals, meal 15 (chicken curry) was the highest with 22.97% and meal five (vetkoek) was the lowest with 8.03%. The difference of the protein between the two meals could be attributed to the fact that chicken is naturally a source of protein while vetkoek is a CHO rich food because of ingredients. Interestingly the boerewors rolls meal had a low protein content of 8.39% even though boerewors is the source of protein. The only two meals that fell within the stipulated percentage (10-15%) as recommended by WHO (2003) was beef and mutton burger with (12.17% and 13.50%) respectively.

After analysing the macronutrients in Table 4.14, it was evident that the meals served by vendors at DUT were not nutritionally balanced. Consequently high fat meals were of concern as there were prospects of obesity, cholesterol, high blood pressure and heart disease which are non-communicable diseases.

[1]Energy contribution of the meals were calculated using the formula below:
Mean energy content DRI X100%

4.5 COMPARISONS TABLE

Table 4.15: Comparison between the managers and the FH's responses, and the researcher's observational findings.

Variables	Managers and FH's responses	Observational findings
Food safety and hygiene training	• Majority of both managers (73.33% n= 11) and FH's (56.41% n=22) indicated that food safety training had been received. FH's received training in most of the hygiene aspects than managers e.g. (58.97% n=23) of FH's versus 46.67% n=7 of managers received personal hygiene training. • On the frequency in training, about a third of FH's (35.90% n=14) indicated that training was never provided, while (20.00% n=3) of managers indicated that training was provided monthly, once a term and once a year.	• Knowledge in hygiene and food safety was poorly demonstrated despite indications that training was received. For an example, (40.00% n=6) of food servers washed hands before serving food, (33.33% n=5) sanitised work surfaces prior to food preparation.
Purchasing and receiving	• This section was answered by managers only.	• More managers (73.33% n=11) bought and delivered perishable items using own cars, as a result food temperature was not properly maintained • When receiving stock, delivery temperatures were checked by few managers (20.00% n=3), who only looked and touch to feel the temperature. However, (40.00% n=6) of managers ensured that the delivery dates were written on food products. • There were no proper temperature measures in all food stalls.
Storage and stock taking	• More managers (53.33% n=8) than FH's (35.90% n=14) admitted to having no proper storage facilities. • Majority of both parties (93.33% n=14) managers and (89.74% n=35) FH's indicated that perishable food items were stored in fridges. • A large percentage of both parties (60.00% n=9) managers and (64.10% n=25) FH's admitted that non-perishable food items were stored in built-in shelves inside the stalls.	• Most vendors (66.67% n=10) did not have proper storage facilities due to shortage of space. Very few (33.33% n=5) stalls had designated storerooms; non – perishable stock was stored in built – in shelves inside the stalls, storage containers, tables, fridge tops and cooler boxes. • All vendors had fridges for storing perishable food and cleaning items were stored away from food.

	• Both parties unanimously (100.00% for both) agreed that stock rotation was in place and the majority of both parties (60.00% n=9) managers and (71.79% n=28) FH's indicated that it was done by checking expiry dates.	
Food holding serving and storage	• Both managers and FH's (66.67% n=10 and 74.36% n=29) indicated that the holding time after cooking and before serving was less than 15 minutes. • Forty percent (n=6) of managers versus (58.97% n=23) of FH's felt that there was enough space for serving. • Both parties (93.33% n=14) managers and (100.00% n=39) FH's felt that students were generally happy about food portion sizes.	• Food items that were not on high demand were kept for more than 15 minutes and the most favourite ones were kept for less than 15 minutes. • Most of the vending stalls had inadequate space for food preparation and serving. Moreover, the internal temperature of food was not checked. • Students were generally happy about the portion sizes and sometimes shared the meals.
Food preparation	• Answered by FHs only. More FH's highlighted that there was insufficient space for food preparation and cooking.	• Few stalls (33.33% n=5) had designated kitchens for food preparation, the rest prepared and served food in one small area.

4.6 DISCUSSION OF RESULTS

A total number of 15 vending stalls qualified and participated in this study. Altogether, there were 15 mangers and 39 FH's. When analysing the results of this chapter, it was evident that the majority (66.67% n=10) of the owners/managers were females and this was consistent with the findings of the study conducted on hygiene features of street vending in Gauteng where most (90.50%) of vendors were also females (Martins 2006:21). Educational profile of vendors in the current study was much higher compared to other countries, since most of the food vendors (73.33% n=11) had secondary education. These findings were consistent with a studies conducted in Gauteng (48.00%), South Africa (60.00%), Zimbabwe (70.00%) and Nigeria (90.00%) where the vast majority of vendors had secondary education (Martins 2006:21; Mayrhofer and Hendriks 2010:598; Aluko *et al*. 2014:167). With regards to experience, most of the managers (80.00% n=12) had been in the business for more than three years, while the FH's duration of employment ranged from 14 years to one year. Moreover, both parties had prior experience in food preparation service. Similar findings were noted in the study conducted in Johannesburg where the larger percentage (47.00%) of vendors had three years and more of vending experience (Campbell, 2011:41).

In the study on promoting the nutritional quality of street foods to meet the micronutrients requirement of schools in urban areas, the FAO and Sokoine University in Tanzania (2007:33) discovered that food

vending businesses that were within the school complex did not have essential infrastructure such as garbage disposal areas, water supply etc. to improve hygiene and food safety. Similar situations were also noted in two previous studies, one conducted in Pretoria on the investigation of the food value chain of ready to eat chicken and the risk of staphylococcal food poisoning in Tswane Metropole, and the second one in Gauteng on socio-economic and hygiene features of street vending. In Pretoria, 55.20% of the respondents indicated that water was obtainable from the water tank outside the premises, while 31.60% indicated that water was brought from home. In Gauteng, only 17.50% of vendors had garbage disposal facilities (Oguttu, McCrindle, Makita, Grace 2014:91; Martins 2006:22). Positively, in the current study all food vending stalls had access to clean hot and cold tap water; (40.00% n=6) obtained water from kitchen taps within the premises, while (60.00% n=9) accessed clean water from a communal tap not far from the vending sites. However, the absence of sinks and tap water within the premises promote recycling of dirty water. A similar practiced was observed in two previous studies, one conducted in Durban titled *Street vending and hygiene practices and implications for consumers* and the second one conducted in Uganda titled *Practices, knowledge and risk factors of street food vendors in Uganda*. In both studies it was noted that vendors repeatedly washed utensils using containers with water that has been previously used (Kok, Balkaran 2014:190; Muyanga *et al*. 2011:1554). This habit encouraged cross-contamination from utensils to cooked food thus causing health risk to customers. Waste disposal procedure was also regulated well; most vendors (60.00% n=9) had a designated garbage area that was regularly cleaned, while (40.00% n=6) relied on the municipality services and university cleaners for the removal of garbage. For storage, both managers and FH's indicated that non – perishable food items were stored on built – in shelves within the stalls due to shortage of space, and only (33.00% n=5) of the vending stalls had designated store-rooms for non-perishable items. Perishable food items were stored in fridges. Furthermore, the area where the majority of food stalls were located had no shelter for rainy and windy days; as a result food preparation areas were exposed to dust and dirt.

On training matters, a larger percentage of FH's (61.55% n=24) received training in most of the food safety and hygiene aspects compared to managers (46.67% n=7), and that training was received from current employers and the institution. Majority of the participants scored highly on the questions pertaining to food safety and personal hygiene as both sections received mostly 100.00% (refer to table 4.5). Similarly, in the study conducted on hygiene knowledge and practices of street vendors in Johannesburg, results revealed that most of the respondents (70.00 - 90.00%) answered the hygiene and food safety questions correctly (Campbell 2011:54-59). On the contrary, in a previous study titled *Service provisions for street – based traders in Pietermaritzburg, KwaZulu – Natal: comparing local findings to lessons drawn from Africa and Asia*; 70.00% of the participants felt that training was not needed as participants believed that training did not bring any growth in the business (Mayrhofer and Hendriks 2010:599). Furthermore, in another study conducted in Pretoria on the exploration of the food value of cooked chicken and the risk of staphylococcal food poisoning 31.60% of the participants reported that training on food hygiene was received (Oguttu *et al.* 2014:91). It can therefore be assumed that in both studies, the level of training was very low.

In the current study, managers were responsible for receiving goods and majority (53.33% n=8) had contracts with suppliers and planned delivery schedules. Most managers (73.33% n=11) bought and delivered perishable goods themselves using own cars, while (13.33% n=2) used closed refrigerated trucks and another (13.33% n=2) used ordinary closed trucks. Since the majority delivered perishable goods using own cars, food temperatures were not properly maintained and controlled.

Observations made in this study regarding food safety and hygiene practices during peak hours are consistent with the findings of Sun, Wang and Huang (2012:163) where the researcher discovered that despite valuable positive feedback given on the food safety and hygiene knowledge questionnaire, FH's did not practice hygiene standards during peak hours; the main focus was on getting food out as soon as possible thus making more money at the end of the day. Similarly in the current study FH's did not wash hands as regularly as expected in the kitchen and working surfaces were not sanitised before and after food preparation. Table 4.8 illustrate that the holding time between cooking and selling of food items was satisfactory, both participants indicating that it was less than 15 minutes. These results indicated that vendors were aware of the importance of serving food while it was still hot. Similar results were confirmed by two studies conducted by Campbell 2011:48 and Oguttu *et al* 2014:93.

The results of this study presented evidence that the nutritional value of food served by vendors was not balanced. Most of the meals surpassed the recommended energy contribution balance from fat of 15-30%, and carbohydrates (CHO) contribution was smaller than the recommended percentage of 55-75% and that could be attributed to portion control when plating. The mean energy contribution of protein was within the stipulated range of 10-15% (refer to Annexure J). In all meals, the mean contribution made by fat ranged from 63.59% - 34.12%. The CHO content was below the recommended and ranged between 49.86% - 31.04%. The mean energy contribution of protein was within the stipulated percentage with the energy contribution of 15-36%. Moreover, the study also revealed that from the 12 881 kJ recommended for men, male students on average consumed approximately 14% more kJ than recommended. Out of the 10 093 kJ recommended for females, female students consumed approximately 27% more kJ than recommended from the meals.

In conclusion, it was evident that food vendors in the current study did not adhere to the Health and Safety Regulation as stipulated by the Department of Health (Refer to Chapter 2 page 33), as results in Table 4.4 indicated that the kitchen golden rule "clean as you go" was not practised. Food vendors did not abide by the Health and Safety regulation rule which says "the business area must be clean and in hygienic condition at all times and vendors need to ensure that food is prepared in hygienic environment and in accordance with the prerequisite of the Health Department" (Department of Health 2012:8-11). Moreover observational results illustrated that working areas were not sanitised after food preparation, and FH's serving food did not wash hands as frequently as required. The results further illustrated that the vending sites did not conform to the "Standards Requirements for Food Premises" set out by the Department of Health (Refer to Chapter 2 page 41). For an example, majority of the vending stalls (60.00% n=9) did not have a wash up area with hot and cold water, did not have preventative measures to guard against flies, did not have separate storeroom for food and equipment, and vending sites did not have hand-washing facilities for staff and customers. In addition, one of the functions of managers

(stipulated by the Department of Health), is that managers have to ensure that FH's attend food hygiene training; however managers in the current study did not conform to that rule (Department of Health 2012:8-11; Gordon Davies 2011:17) .

4.7 CONCLUSION

The results of the study revealed the urgent need for basic infrastructure such as a decent food kiosk with adequate working space, proper washing and storage facilities to improve food safety and hygienic practices. The literature revealed that even though food vendors claim to have received hygiene training, knowledge attained was not effectively practiced or used. That is consistent with the observational findings in the current study where 40.00% of FH's washed hands before preparation or serving food and 33.00% sanitised food preparation areas before and after food preparation. Furthermore, the nutritional value of food served by vendors was imbalanced with the majority of the meals exceeding the recommended energy contribution from fat of 15–30% and the CHO contribution being lesser than the stipulated percentage of 55-75%. If students initiate poor dietary patterns such as regular consumption of fast foods or high calories dense food at an early age, chances of chronic health problems are high. The nutritional status of DUT students is mainly influenced by the type of food offered by vendors on campuses; therefore urgent intervention from DUT management and government agencies is required to develop appropriate guidelines and food safety and hygiene policies for food vendors at DUT and surrounding areas.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

Chapter 4 discussed the findings of the research and ascertained relations to the conceptual framework and operations chapter of the study. Chapter 5 reports on the conclusions that were obtained from the study and compare the findings of the current study with the published literature and conclude with the recommendations established on the analysis of the study.

The aim of the study was to determine the current personal and food hygiene practices, food safety knowledge and the nutritional value of the food served by food vendors in an institution of higher learning in Durban, in order to ascertain the safety and nutritional adequacy of food served to students on campus. Information gained from the study corresponds with the objectives of the study as laid out in Chapter 1 and the findings are systematically outlined in this chapter.

The interpreted results of this study will assist in formulating practical recommendations to the management of the Institution and the owners of various food outlets in planning intervention activities such as training programmes for food handlers. Furthermore, the findings will also educate students about good food choices and the risks of consuming the type of food that is currently sold by food vendors.

5.2 LIMITATION OF THE STUDY

The study had the following limitations:

- The first limitation was the exclusion of the street vendors that were situated outside the DUT Campuses, even though the eliminated food vendors operated from the streets students utilised their services. The study only focused on the food vendors that were situated on campuses and contracted to the institution. Vendors outside DUT campuses did not have formal structures and were operating from tables or movable structures and also sold pre-packaged food items, not prepared food.
- Data collected from the Managers/owners and FH's depended on self – reporting, and that could demonstrate prejudice because no confirmation could be obtained from the respondents during the study. Moreover, although unannounced managers and FH's were aware of the presence of the researcher, and that could have influenced the application of knowledge and the

execution of hygiene practices during that period. For future research, unannounced **revisits** would be highly recommended.

- Observation had limitations as well. Due to limited space in some food stalls, the researcher had to stand outside, preventing adequate observation of activities inside the food stall during the observation period. That prevented the researcher from seeing everything inside the food stall.
- For future studies the researcher would like to recommend that a checklist is completed twice to monitor consistency in the findings.

5.3 MAIN FINDINGS

5.3 1 Literature

The literature in this study clarify that food vendors are widely known for being food service providers that are reasonable priced and located in convenient places such as bus terminals, train stations, schools, car parks, markets and other public places. Generally, vendors' clientele comprises of students, workers, travelers and city residents. Correspondingly, most of the vendors in the current study are situated close to the busy main road leading to DUT campuses and next to the taxi ranking area.

Previous studies in developing countries including South Africa have constantly revealed that lack of education and employment are the main important factors promoting street vending entrepreneurship. Furthermore, lack of employment alleviates poverty and food vending business provides means of income to millions of people and in turn contributes immensely to the country's economy. However, health and safety factors such as poor infrastructure, environmental conditions, unsafe storage, food handling, and the quality of ingredients used cause great concerns about food sold by vendors. Hence, there is a universal perception that street food is perilous. Findings of the current study confirm that poor infrastructure exists within the vending community at DUT. Since there are no sinks with taps within the food stalls, hands and food utensils get washed periodically, and not as often as expected. Moreover, reusing bucket water that is kept inside the stall increases the risk of contamination since hands are regarded as transmitters of microorganisms to food. Due to poor building structures, the invasion of pests such as rats, cockroaches, flies is inevitable. Literature further revealed that the above health and safety factors are key factors in the transmission of food borne diseases.

Major cities are now governed by municipal departments in terms of rules and regulations surrounding food vending operations. However, findings of the current study suggested that participating vendors were not governed by the Durban Municipality because the municipality administered only street vendors not vendors operating within the companies /institutions' premises. As a result, DUT vendors are not required to comply with the Municipality regulation and rules that are set out for all the vendors

around the city, and are fortunate not to face harassment such as confiscation of goods, bribes and dislocation from municipality officials.

In addition, the literature further reveals that food vendors need to be well educated on the role of food in disease transmission, food safety and personal hygiene. Even though all the participants indicated on the questionnaires that training in various aspects of food safety have been received, that information could not be verified and certain areas of food safety were not adhered to.

5.3.2 Socio-Demographic

In the present study, the socio- demographic variables assessed were socio- economic status, gender, length of service and cultural background. Durban is one of the cities where unemployment is on the rise, hence most people have resolved to food vending to earn a living. Previous studies discovered that the education level of most food vendors was generally low; however, the current study revealed that the majority of food vendors had secondary education and a large percentage had experience in food service. With regard to length of service, most of the participants had been employed for three years or longer.

In the past, entry into the vending industry was not well- coordinated and did not require massive savings, as a result vending became more prevalent to women. South Africa like other African countries, also presents the majority of food vendors being females. A similar pattern was observed with the vendors in the current study where the majority of the participants were females, and mostly owners of the businesses.

5.3.3 Food safety and hygiene practises (Managers and FH's)

The Managers and FH's questionnaires predominantly had similar questions and the intention behind that was to ascertain if both parties were speaking in one voice. One of the strengths from the current study was the results of the questionnaires obtained from both managers and FH's.

Both participating groups were well informed on food safety issues such as the need to store raw food separately from cooked food, the fact that wiping cloths can spread microorganisms, food that has reached the expiry date need to be thrown away, fruits and vegetables need to be washed first prior to preparation and the fact that it is unsafe to leave cooked food out of the fridge for more than two hours. Furthermore, on the issues of stock control both groups were knowledgeable on the importance of taking stock, doing stock take frequently and checking expiry dates on food items. The level of knowledge displayed on food holding and serving issues was adequate. Both groups indicated that the holding period for cooked food is less than 15 minutes and despite the shortage of serving space, all serving utensils were sufficient.

Even though both the participating groups demonstrated good results when answering the questionnaires, observational findings suggested that some of the practices were dishonestly magnified since what was written on the questionnaires was not always practiced. For an example, both group of participants indicated that work areas are sanitised before food preparation, but during the observational check the researcher discovered that very few vending stalls even have sanitisers. Furthermore, both groups indicated that hot and cold water were available for hand washing but the communal sink with taps was a few meters away from the stalls and even the water buckets that were placed inside the stalls for hand washing were not always used.

The data gathered on training received displayed a considerable difference between the number of FH's and managers that have received training on different aspects of food safety. Based on these findings it is suggested that managers should attend intensive advanced training then filter the information down to FH's daily at work (on the job training). Management's good attitude paired with FH's willingness to learn will influence the value of training.

5.3.4 Observational findings

During the study the following observations were made:

- In most of the vending premises FH's did not constantly and properly wash their hands with soap and use drying equipment. That was mainly because the bucket system (a small bucket of soapy water kept inside the stall) does not encourage frequent hand hashing as much as a tap and sink does.
- FH's did not wash hands after handling money, touching body parts, handling dirty utensils, garbage and before serving food. In most vending stalls, one person was in charge of collecting cash or swiping students' buying cards. The very same person was also responsible for handing over food to the customers. This act highly compromise food safety as some of the food containers did not cover food completely.
- Another observation made was poor temperature control during food preparation and improper food holding temperatures. Food items were prepared well in advance and kept in containers. During service, it was slightly reheated and served. Moreover, during peak hours reheating time was often insufficient to destroy micro-organisms that might have been present in the food. The literature obtained from this study clearly states that keeping food at high and relatively humid temperatures for an extended period is a main cause of food poisoning. Therefore, the current findings strengthen the need for food safety training to prevent food borne outbreaks.
- Proper store-room areas were not available in the majority of the vending stalls. Managers brought stock using cars every morning and some of the perishable stock was not covered properly during transportation. Furthermore food temperatures were not properly checked when stock was received. Because of that, the cold chain which ensures that safe temperatures are

kept at all times throughout transportation, storage, handling and cooking was broken. Mode of transport, food handling procedures and poor storage facilities exposed food items to contamination and risk of bacterial growth. In addition, non-perishable stock was stored in different places such as shelves, cardboards, floors, on top of fridges and underneath work surfaces due to shortage of space. Only perishable food stock was stored in the prescribed manner in a refrigerator.

- FH's did not value the importance of basic principles of food safety such as ensuring that correct temperature is maintained during food preparation and service. That could be attributed to insufficient space for food preparation and food service.
- The meals prepared and served by DUT vendors were all dominated by meat; only one stall had strictly vegetarian dishes on the menu.
- Students were not washing hands prior to eating food items purchased and most of the food items purchased were eaten by hands. These observations reinforce the need for proper infrastructure around the food courtyard and personal hygiene awareness.
- Lastly, a healthy living style is currently not the student's main priority. All that matters is buying food that is relatively cheap and filling without considering the nutritional value of the food item.

5.3.5 Nutritional value of vended food

The literature highlighted that healthy eating, sufficient nutrients and physical activities form the basis of good health for students. The research findings revealed that all top 15 meals that were identified had more than the WHO recommended 15-30% fat contributing to energy. From the findings it is evident that students that consumed two or three of the top 15 meals during the day exceeded the recommended intake of fat and energy for the day. This revelation causes great concern as South Africa is combating overweight and obesity.

Even though most of the food items were served with starch such as french fries, rice, pap and bread rolls, the results of this study disclosed that CHOs provided the lower proportion of energy than the specified percentage of 55-75%, it should however be kept in mind that this was only the food portion and no other sources of carbohydrates were included. However, the proportions of energy from protein in most of the meals was relatively within the stipulated range of 10-15%, and that was probably caused by the fact that meat was the most expensive item of the meal therefore portion sizes were restrained. Not only was the type of meat a great concern, but also the fact that it was processed meat like polony, russian sausages and burger patties.

Based on the information obtained from the present study, the following conclusion can then be drawn:

- Meals that are offered to students are unhealthy and nutritionally unbalanced. The kilojoule content of the top 15 meals represented more than half of the student's daily energy

requirements per meal. The macronutrient analysis suggests that the meals have a high fat content, is low in CHO and most consisted of a protein content that contributed more than 15% to the energy of the meal. Furthermore, current findings suggest that students consuming food from DUT vendors are at risk of developing chronic illnesses that are caused by poor eating habits. Examples of such chronic illnesses are high blood pressure, diabetes, cancer and heart diseases.

- Certain food groups that are part of the dietary guidelines and are highly recommended by the South African Food Based Dietary Guidelines (FBDG) were not part of the meals prepared by vendors e.g. fruits, dairy products, and vegetables. Vegetables were served in very small portions and very few stalls sold fresh fruit. Healthy fruit dishes such as fruit salads were not available at all, and that may have severe nutritional repercussions in terms of micronutrient deficiencies.
- Overall, there is a huge imbalance between macro-nutrients and micro-nutrients in the student's meals.

5.4 CONCLUSION

Advantages of informal trade namely, provision of employment, economic boost, income generating render informal trading a reputable business venture, while negative connotations such as safety and hygiene issues; poor infrastructure causes great concern nationwide.

Information gained from the study revealed that university life seems to be the advancement to poor nutritional lifestyle which might exaggerate if the Management of the Institution and the food vendors do not implement healthy eating programmes for the students and the surrounding community. When considering the number of students that consume food from the vendors, it is clear that student's main priority is buying food that is fairly low-priced and filling using the NSFAS meal allowance card, without considering the nutritional value of the food item.

The current study also reinforces the need for personal hygiene and nutrition education for both students and vendors. In addition, the literature also emphasises that healthy learners play a vital role in creating healthy citizens for the future.

5.5 RECOMMENDATIONS

5.5.1 Recommendations to DUT Management

- Several researchers highlighted poor infrastructure as one of the major causes of food borne diseases in the vending community. Likewise, findings of the current study revealed that DUT vendor's stalls lack proper working space, storage facilities and washing areas within each stall. The researcher would recommend that the management invest on improving the current infrastructure so that vending stalls operate as fully fleshed food service operations.
- The researcher would highly recommend that the management formulate policies that would regulate the preparation and the selling of food on all DUT campuses.
- DUT management, together with the Department of Health, should organise nutrition awareness programmes to enlighten students about the dangers of unhealthy eating habits. Research has highlighted that overweight and obesity is a huge health threat in South Africa, therefore promoting healthy eating will help eliminate dreadful diseases such as diabetes, obesity, cancer etc. which are influenced by the individual's bad eating habits.
- Operating contracts/licenses should only be awarded to vendors who have completed an extensive training programme. Courses to be included in the training should include food safety, hygiene and nutrition to minimise food borne diseases occurrences. Furthermore, operating licenses should be renewed annually provided the vendors comply with the formulated policies as per the first recommendation.
- Management should constantly monitor and assess hygiene standards, food safety and the quality of food sold to students. Moreover, management needs to stress the legal repercussions of preparing and selling hazardous food.
- In promoting a healthy lifestyle which is currently a national campaign, DUT management together with the Department of Health should work jointly to promote the South African food-based dietary guidelines as part of the nutritional intercession programme at tertiary institutions.
- The researcher noticed that there was one tap next to the vending sites, but it was not a proper hand washing facility for hundreds students. Management should provide proper hand - washing facilities and make it both accessible and visible to students so that students can practice personal hygiene.

5.5.2 Recommendations to the Food Vendors (FV's)

- Menu change would be highly recommended. Food vendors in collaboration with the Department of Food and Nutrition need to work together in formulating healthy and affordable menus to be offered by DUT vendors. This will assist students in making informed decision about healthy eating and improve students' choices and the nutritional status of the students.
- Students have budget constrained; therefore it would be highly recommended that food items on a healthy menu be cost effective and nutrient dense.
- Food vendors need to be considerate to the nutritional value of the meals provided on the menu by ensuring that meals are cooked using a variety of healthier cooking methods as opposed to deep frying and shallow frying that is currently widely used. Besides training, this could also be achieved through attending food seminars or food related exhibitions to increase knowledge in food preparation techniques.
- Managers and FH's are often subjected to injuries while preparing food; therefore immunisation against Hepatitis A would be highly recommended. Moreover previous research reveals that FH's are more susceptible to foodborne viruses owing to poor hygiene practices.

5.5.3 Recommendation to Durban Municipality

- After discovering that Municipality has no control over DUT vendors, the researcher recommends that location jurisdiction which is currently in place should be uplifted and the municipality should be in charge or at least have the right to assess all vendors to ensure consistency in training and regulation rules governing the vending community.
- Durban Municipality to provide proper infrastructure such as water, good drainage and proper sanitary facilities for all vending premises to ensure hygienic working environment.
- The researcher also recommends that all health and hygiene inspections conducted on formal outlets such as restaurants and cafeterias be conducted with all food vendors as well to maintain the same standard across all food outlets.

5.6 RECOMMENDATIONS FOR FUTURE RESEARCH

- More research on food vendors from other institutions of higher learning is crucial, in order to compare the results and engage the Health Department and other relevant stakeholders in advancing the future of food vending business in Durban.
- Further research on the role of vendors external to the University could add more information of student's food intake patterns and the role that these informal vendors play in student food provision.

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ANNEXURE A

Directorate for Research and Postgraduate Support
Durban University of Technology
Tromso Annexe, Steve Biko Campus
P.O. Box 1334, Durban 4000
Tel.: 031-3732576/7
Fax: 031-3732946
E-mail: moyos@dut.ac.za

17th September 2013

Ms Dawn Khuluse
c/o Department of Food & Nutrition Consumer Sciences
Durban University of Technology

Dear Ms Khuluse

PERMISSION TO CONDUCT RESEARCH AT THE DUT

Your email correspondence in respect of the above refers. I am pleased to inform you that the Institutional Research Committee (IRC) will grant permission to you to conduct your research at the Durban University of Technology.

We would be grateful if a summary of your key research findings can be submitted to the IRC on completion of your studies.

Kindest regards.
Yours sincerely

[redacted]

PROF. S. MOYO
DIRECTOR: RESEARCH AND POSTGRADUATE SUPPORT

ANNEXURE B

Participant Information Sheet

Department of Food and Nutrition Consumer Sciences

P.O. Box 1334, Durban 4000

Tel. (031) 373-2322

Fax (031) 373-2795

Participant Information Sheet:

Food safety knowledge, and hygiene practices of informal food vendors

Researcher: Dawn Khuluse BTech: Food and Beverage Management

Supervisor: Prof Carin Napier: DTech Food Service Management

Thank you for taking time to read through this document. My name is Dawn Khuluse, I am a student studying at Durban University of Technology (DUT) for a Master's Degree. I am trying to gather information on the food safety knowledge, and hygiene practices of food vendors. I would like you to participate in this study.

Why is this project important?

Street – vended foods were perceived as unsafe, and in South Africa were regarded as a practice that should be prohibited. To date limited research has been conducted on the food handlers operating as street vendors in Durban, hence the aim of the study is to determine the current personal and food hygiene practices, food safety knowledge and the nutritional value of the food served by various vendors in this Institution, in order to ascertain the safety of food served to students on campus.

Who are the participants?

The participants are all the owners/managers of the vending outlets and their food handlers in and around the Durban Campuses.

What do we expect from the participants in this study?

The researcher will approach all the owners/managers of the vending outlets to explain the study, issue an information letter and obtain written consent. Data will be collected through an interview using a questionnaire with the food vendors and food handlers employed by the vendors. The questionnaire

will be structured in four parts: Demographic and management characteristics of vendors, food safety knowledge, personal hygiene knowledge and practices, and observations of general food practices, hygiene and cleanliness. Portion sizes of individual menu items will be established through weighing and measuring, and nutrient content will be determined using the food finder version 3 computer software program. This will take approximately 30 minutes.

What can participants expect?

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

Can you withdraw from the study?

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 you not wish to participate. There are no benefits to participating in the study other than the enhancement of the lives of students and yourselves in your community. Neither your employment nor level of services will be affected by the participation or refusal to participate in the study.

For more Information/ Questions please consult

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

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

Supervisor: Prof. Carin Napier 031 373 2326

Researcher: Mrs Dawn Khuluse on 031-3735662

The Institutional Research Ethics administrator: 031 373 2900.

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

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

THANK YOU

ANNEXURE C

Department of Food and Nutrition Consumer Sciences
Tel. (031) 373-2322, Fax (031) 373-2795,
P.O. Box 1334, Durban 4000

CONSENT FORM

Food safety knowledge, and hygiene practices of informal food vendors

The project has been described to me in language that I understand and I declare that I voluntarily agree to participate. I have had the opportunity to discuss relevant aspects with the researcher, and I understand that my identity will not be disclosed and that I may withdraw from the project without giving reasons at any time.

Participant's number…….

Signature……

Date ……..

ANNEXURE D (1)

Dawn Sihle Khuluse

From: Jill Meaker <meakerj@gmail.com>
Sent: 07 February 2013 03:23 PM
To: Dawn Sihle Khuluse
Subject: Re: Research Work

Dear Dawn

You are welcome to use the questionnaires.

Good luck with your research.

Kind regards
Jill

On 7 February 2013 14:19, Dawn Sihle Khuluse <dawnk@dut.ac.za> wrote:

Dear Jill

My name is Dawn Khuluse, I am completing my M-Tech in Food & Consumer Sciences at the Durban University of Technology (DUT).

I was researching articles on the net and I managed to retrieve your dissertation. I would like to kindly request for your permission to use some of your questionnaires in my study. My research topic is: **Hygiene, safety and food practices of informal food vendors at a University of Technology in Durban.**

It would be much appreciated.

Kind regards

Dawn Sihle Khuluse

Lecturer – DUT

Dept of Hospitality & Tourism

Ritson Rd Campus

(031) 373 – 5662 /5729 (Office)

0832288198 (Mobile)

1

ANNEXURE D (2)

Dawn Sihle Khuluse

From: Penny Campbell <Campbp@health.gov.za>
Sent: 12 April 2013 12:42 PM
To: Dawn Sihle Khuluse
Subject: Questionnaire

Dear Dawn

You are most welcome to use any part or all of the questionnaire for your envisaged study.

Al the best in your study, but please keep me updated on the findings.

Kind Regards

Penny

Penny Campbell

Deputy Director: Biological Safety & Programme Support
INFOSAN Emergency Contact Point
RASFF Contact Point
Directorate:Food Control
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Directorate website: www.doh.gov.za/healthtopics.php?t=Food Control
Departmental website: www.doh.gov.za

Never look down on anybody
Unless you are helping them up

QUESTIONNAIRE

MANAGERS QUESTIONNAIRE

ANNEXURE E

Information to be obtained from the Owner/Manager of the Food Stall

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

PLEASE CIRCLE THE RESPONDENT'S ANSWERS

SECTION 1: GENERAL / MANAGEMENT

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**
	e.g. Vetkoek 60 %	60%
1.		
2.		
3.		
4.		
5.		
	Total	**100%**

NO.	**QUESTIONS**	**ANSWERS**
1.	Are you the owner or the Manager of the business	a) Yes b) No c) Don't know
2.	How many employees including you does the business have?	a) One b) Two c) Three d) Four or more
3.	How long have you been running the business?	a) <One year b) One to two years c) Two to three years d) Three or more years
4.	Gender	a) Male b) Female
5.	Age of respondent	a) < 30 b) 30 and above

6.	What is your highest level of education?	a) No education b) Std 1/Grade 1-3 c) Std 2-5 Grade 4-7 d) Std 6-9 Grade 8-11 e) Matric/Std 10/ Grade 12 f) Apprenticeship g) Post – matric diploma/Technikon h) University
7.	Do you have previous experience in food service?	a) Yes b) No
8.	Do you have a menu	a) Yes b) No
9.	Why is this menu used?	a) Economical b) Locally accepted foods c) Locally available foods d) Favourite foods e) Other (please specify) …….
10.	Where does the food stall get water from?	a) Outside tap (i.e. running water) b) Kitchen tap (i.e. running water) c) Water tank d) Communal water supply (collected) e) Other (please specify) …….
11.	What power supply is used to prepare the food?	a) Electricity b) Gas c) Fire d) Other (please specify) …….
12.	How often do you monitor your staff regarding their duties?	a) Daily b) Weekly c) Monthly d) Once a term e) Seldom f) Never
13.	Do you delegate any of the monitoring duties to any staff members?	a) Yes b) No
14.	If yes, to whom?	a) Food handler b) Managers assistant c) Other (please specify) …….

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

16.1	Receiving	Y	N
16.2	Storage	Y	N
16.3	Serving	Y	N
16.4	Hygiene	Y	N
16.5	Administration	Y	N
16.5	Other (please specify)	Y	N

SECTION 2: **TRAINING AND FOOD SAFETY ISSUES**

17. Has any training about food safety and hygiene been provided?

Yes	Y
No	N

18. Have you received training regarding the following? (Answer all options)

18.1	Menu planning	Y	N
18.2	Food preparation	Y	N
18.3	Prevention of food contamination	Y	N
18.4	Prevention of cross-contamination of food	Y	N
18.5	Illness in the workplace	Y	N
18.6	Injury in the workplace	Y	N
18.7	First aid	Y	N
18.8	Personal hygiene	Y	N
18.9	Hand washing	Y	N
18.10	Other (please specify)	Y	N

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

19.1	Department of Education	Y	N
19.2	Department of Health	Y	N
19.3	Another cook/ handler	Y	N
19.4	Previous employer	Y	N
19.5	Through and institution as part of studies		
19.5	Other (please specify)	Y	N

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

20.1	Ongoing	1
20.2	Last week	2
20.3	Last month	3
20.4	Last term	4
20.5	Last year	5
20.6	Never	6

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

Ongoing	1
Weekly	2
Monthly	3
Once a term	4
Once a year	5
Never	6

22. Is there any administrative support from the DUT?

Yes	Y
No	N

23. In the past, how frequently did a representative from the Department of Health visit your food stall?

Once a month	1
Once a term	2
Twice a year	3
Once a year	4
Less than once a year	5
Never	6
Do not know (not here at that time)	7

24. 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.
			3.
Your workers			1.
			2.
			3.

SECTION 3: CLEANING AND HYGIENE

25. Is there soap available for hand washing?

Yes	Y
No	N

26. Is there running tap water available for hand washing? (Answer all options)

26.1	Hot	Y	N
26.2	Cold	Y	N
26.3	None	Y	N

27. How frequently are utensils washed? (Mark all relevant options)

During preparation	1
After the food is ready	2
After the work is finished	3

28. How frequently is the stove cleaned? (Mark all relevant options)

During preparation	1
After the food is ready	2
After the work is finished	3
No stove	4

29. Are the correct cleaning chemicals available to clean the kitchen?

Yes	Y
No	N

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

Yes	Y
No	N

31. How often is the preparation area cleaned? (Mark all relevant options)

During preparation	1
After the food is ready	2
After the work is finished	3

32. Are the work areas ever sanitised?

Yes	Y
No	N

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

Frequently	1
Daily	2
Weekly	3
Seldom	4

34. How often is frying oil changed from the deep fat fryer

Frequently	1
Daily	2
Weekly	3
Seldom	4

SECTION 4: PURCHASING & RECEIVING
Mention & Circle those that apply

	QUESTIONS AND FILTERS	FOOD ITEM	CODING CATEGORIES
35a	Where do you obtain your raw materials from?	Chicken	a) Abattoir b) Formal retailer c) Wholesale stores d) Informal businesses e) Other (specify) ……
		Fish	a) Abattoir b) Formal retailer c) Wholesale stores d) Informal businesses e) Other (specify)
35b		Meat	a) Abattoir b) Formal retailer c) Wholesale stores d) Informal businesses e) Other (specify) ……
35c		Maize	a) Formal retailer b) Wholesale stores c) Informal businesses d) Other (specify) ……..
35d		Bread/ Rolls	a) Formal retailer b) Self (baked) c) Bakery d) Informal businesses e) Other (specify) ……
35e		Vegetables and fruit	a) Formal retailers b) Fruit & veg stores c) Direct from the farm d) Direct from the market e) Informal businesses
35f		Groceries	a) Formal retailer b) Wholesale stores c) Informal businesses d) Other (specify) ……
36.	Are there contracts with the suppliers?		a) Yes b) No
37.	Is there a planned delivery schedule?		a) Yes b) No

38.	Who delivers the supplies		a) Commercial supplier b) Local community member c) Both a & b d) Other (please specify)
39.	How is the non-perishable food delivered?		a) Open truck b) Closed truck c) Car d) Other (please specify) ……
40.	How is the perishable food delivered?		a) Open truck b) Closed truck c) Refrigerated truck d) Car e) Other (please specify) ……
41.	Is the food of adequate quality?		a) Yes b) No
42.	Where do you store your perishable products? (Interviewer explains the tem perishable). Circle all that apply.		a) Fridge/freezer b) Cooler box c) Newspaper d) Other (specify) ……
43.	How is the quality of the food assessed? (Mark all relevant options)		a) Brand b) Expiry date c) Grade d) Visually e) Other (please specify) ……
44.	What happens to the food that is judged to be of inadequate quality? (Mark all relevant options)		a) Returned to supplier b) Received and used c) Received an thrown away d) Other (please specify) ……
45.	Who receives the deliveries?		a) Owner b) Manager/supervisor c) Food handler d) Other (please specify) ……
46.	Is it the same person every time?		a) Yes b) No
47	Do you have a food specification manual to check the quality of food against?		a) Yes b) No
48.	Does the delivery note / invoice get checked		a) Yes b) No

49.	Are all the food items checked		a) Yes b) No
50.	If yes, how (mark all relevant options)		a) Weighed b) Counted c) Both a & b d) Other (please specify) ……

SECTION 5: FOOD SAFETY & HYGIENE KNOWLEDGE

50.	Do you use separate utensils/containers for raw products and cooked foods?	a) Yes b) No
51.	How are cooking utensils washed?	a) Hot water & detergent b) Cold water & detergent c) Other (specify) ……
52.	When should you wash your hands?	a) After visiting the toilet b) Before preparing food c) Both a & b d) Neither e) Don't know f) Other (specify) ……
53.	Wiping cloths can spread microorganisms	a) Yes b) No
54.	The same cutting board can be used for raw foods and cooked foods provided it looks clean	a) Yes b) No
55.	Raw foods need to be stored separately from cooked food	a) True b) False
56.	Cooked foods do not need to be thoroughly reheated	a) True b) False
57.	Cooked meat can be left out of the fridge to cool overnight before refrigerating	a) True b) False
58.	Cooked foods should be kept very hot before serving	a) True b) False
59.	Wash fruits and vegetables before eating/preparing	a) True b) False
60.	Safe water can be seen by the way it looks	a) True b) False
61.	Frequent hand washing during food preparation is worth the extra time	a) Agree b) Not Sure c) Disagree
62.	Keeping kitchen surfaces clean reduces the risk of illness	a) Agree b) Not Sure

		c) Disagree
63.	Keeping raw and cooked foods separate helps to prevent illness	a) Agree b) Not Sure c) Disagree
64.	Thawing food can be done on the counter	a) Agree b) Not Sure c) Disagree
65.	I think that it is unsafe to leave cooked food out of the refrigerator for more than two hours	a) Agree b) Not Sure c) Disagree
66.	I separate raw and cooked food during storage	a) Most Times b) Sometimes c) Never
67.	I inspect food for freshness to ensure quality ingredients	a) Agree b) Not Sure c) Disagree
68.	I think it is important to throw away foods that have reached their expiry date	a) Agree b) Not Sure c) Disagree

SECTION 6: STORAGE

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

Kitchen	1
Designated store room	2
Cooler boxes	3
Storage containers	4
Other (please specify)	5

70. Where are the non-perishable food supplies stored? (Mark all relevant options)

Kitchen	1
Designated store room	2
Cooler boxes	3
Storage containers	4
Other (please specify)	5

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

Yes	Y
No	N

72. How often is the storage areas cleaned?

Less than once a week	1

Once a week	2
Twice a week	3
Three times a week	4
Four times a week	5
Every day of the week	6

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

Not checked	1
Once a month	2
Twice a month	3
< Once a week	4
Once a week	5
Twice a week	6
Three times a week	7
Four times a week	8
Every day of the week	9

74. How often is stock – take done? (Select one)

Not done	1
Once a month	2
Twice a month	3
< once a month	4
Once a week	5
Twice a week	6
Three times a week	7
Four times a week	8
Every day of the week	9

75. Is stock rotation in place?

Yes	Y
No	N

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

Delivery dates	1
Expiry dates	2
Correct storage on delivery	3
First In First Out	4
Other (please specify)	5

Thank you for your participation

ANNEXURE F

FOOD HANDLERS QUESTIONNAIRE

Food Stall #	

Please CIRCLE the respondent's answers or fill in the relevant information.

SECTION 1

GENERAL:

1. How many cooks/ food handlers are working at this establishment?

Number	

2. How long have you been a cook/ food handler for? Record the number of years and months.

	FH 1	FH 2	FH3	FH4
Years				
Months				

3. Do you have previous experience in food service?

Yes	Y
No	N

4. Is there a menu?

Yes	Y
No	N

SECTION 2: FOOD STORAGE AND FOOD PREPARATION

5. Are the expiry dates checked on the foods?

Yes	Y
No	N

6. If the expiry date on the food packaging is 20 May '09, what does this mean?
   (Take a sample and show it to the cook / food handler)

……

7. Where is the food prepared?

Designated kitchen	1
Temporary/makeshift kitchen	2
Outbuilding	3
Other (please specify)	4

8. Who prepares the food?

The owner/ manager	1
The cook/ food handler	2
Other (please specify)	3

9. Is there adequate space for food preparation?

Yes	Y
No	N

10. Is there adequate space for cooking?

Yes	Y
No	N

11. Is there enough water for food preparation?

Yes	Y
No	N

12. Are there enough food preparation utensils? (Answer all options)

Knives	Y	N
Chopping Boards	Y	N
Measuring equipment	Y	N
Serving spoons	Y	N
Mixing tools	Y	N

13. Are recipes available?

Yes	Go to Q 14	Y
No	Go to Q 16	N

14. Are the recipes used?

Yes	Go to Q 15	Y
No	Go to Q 16	N

15. Where were these recipes obtained?

The owner/ manager	1
The cook/ food handler	2
DUT management	3
Other (please specify)	4

SECTION 3: FOOD HOLDING, SERVING & WASTE

16. How long is the food held after cooking and before serving? (Select one).

Less than 15 minutes	1
15-30 minutes	2
30-45 minutes	3
More than 45 minutes	4

17. How is the food kept warm?

……

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

……

19. How do you check the temperature?

……..

20. Is there adequate space for serving / portioning?

Yes	Y
No	N

21. Are there adequate food serving utensils? (Answer all options)

21.1	Ladles	Y	N
21.2	Measuring equipment	Y	N
21.3	Serving spoons	Y	N
21.4	Tongs	Y	N
21.5	Serviettes	Y	N

22. In your opinion are the students happy with the portion sizes of their food?

Yes	Y
No	N

23. What happens to the food that is prepared but the students do not finish? i.e. left overs. (Mark all relevant options).

Thrown away	1
Given to a friend	2
Taken home	3
Kept for the next day	4
Cooks/food handlers eat it	5
Other ([please specify)	6

24. How much left over food do you throw away after every day that was not served or sold? (Select one)

None	1
Less than a quarter	2
Half	3
More than half	4
Don't know	5

25. Is left over food reheated and served the following day?

Yes	Y
No	N

26. If yes, how is it reheated?

On the stove	1
In the microwave	2
In the food warmer	3
Other (please specify)	4

27. Is there a designated rubbish area?

Yes	Y
No	N

28. If yes, where is it situated?

In the kitchen food preparation area	1
In the serving area	2
Outside the food stall	3
Other (please specify)	4

29. How often is it removed /cleaned?

Once a day (morning / afternoon)	1
Twice a day (midday & afternoon)	2
Once a week	3
Other (please specify)	4

30. Does the rubbish bins have tightly fitting lids?

Yes	1
No	2
Some	3

SECTION 4: TRAINING & FOOD SAFETY

31. Have you received any training about food safety and hygiene?

Yes	Y
No	N

32. Have you received training regarding the following? (Answer all options)

32.1	Menu planning	Y	N
32.2	Food preparation	Y	N
32.3	Prevention of food contamination	Y	N
32.4	Prevention of cross-contamination of food	Y	N
32.5	Illness in the workplace	Y	N
32.6	Injury in the workplace	Y	N
32.7	First aid	Y	N
32.8	Personal hygiene	Y	N
32.9	Hand washing	Y	N
32.10	Other (please specify)	Y	N

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

33.1	Department of Education	Y	N
33.2	Department of Health	Y	N
33.3	Another cook/ handler	Y	N
33.4	Previous employer	Y	N
33.5	Other (please specify)	Y	N

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

34.1	Ongoing	1
34.2	Last week	2
34.3	Last month	3
34.4	Last term	4
34.5	Last year	5
34.6	Never	6

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

Ongoing	1
Weekly	2
Monthly	3
Once a term	4
Once a year	5
Never	6

36. Is there soap available for hand washing?

Yes	Y
No	N

37. Is there running tap water available for hand washing? (Answer all options)

37.1	Hot	Y	N
37.2	Cold	Y	N
37.3	None	Y	N

38. How frequently are utensils washed? (Mark all relevant options)

During preparation	1
After the food is ready	2
After the work is finished	3

39. How frequently is the stove cleaned? (Mark all relevant options)

During preparation	1
After the food is ready	2
After the work is finished	3
No stove	4

40. Are the correct cleaning chemicals available to clean the kitchen?

Yes	Y
No	N

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

Yes	Y
No	N

42. How often is the preparation area cleaned? (Mark all relevant options)

During preparation	1
After the food is ready	2
After the work is finished	3

43. Are the work areas ever sanitised?

Yes	Y
No	N

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

Frequently	1
Daily	2
Weekly	3
Seldom	4

45. How often is frying oil changed from the deep fat fryer?

Frequently during the day	1
Daily	2
Weekly	3
Seldom	4

SECTION 5: FOOD SAFETY & HYGIENE KNOWLEDGE

46.	Do you use separate utensils/containers for raw products and cooked foods?	c) Yes d) No
47.	How are cooking utensils washed?	d) Hot water & detergent e) Cold water & detergent f) Other (specify) ……
48.	When should you wash your hands?	g) After visiting the toilet h) Before preparing food i) Both a & b j) Neither k) Don't know l) Other (specify) ……
49.	Wiping cloths can spread microorganisms	c) Yes d) No

50.	The same cutting board can be used for raw foods and cooked foods provided it looks clean	c) Yes d) No
51.	Raw foods need to be stored separately from cooked food	c) True d) False
52.	Cooked foods do not need to be thoroughly reheated	c) True d) False
53.	Cooked meat can be left out of the fridge to cool overnight before refrigerating	c) True d) False
54.	Cooked foods should be kept very hot before serving	c) True d) False
55.	Wash fruits and vegetables before eating/preparing	c) True d) False
56.	Safe water can be seen by the way it looks	c) True d) False
57.	Frequent hand washing during food preparation is worth the extra time	d) Agree e) Not Sure f) Disagree
58.	Keeping kitchen surfaces clean reduces the risk of illness	d) Agree e) Not Sure f) Disagree
59.	Keeping raw and cooked foods separate helps to prevent illness	d) Agree e) Not Sure f) Disagree
60.	Thawing food can be done on the counter	d) Agree e) Not Sure f) Disagree
61.	I think that it is unsafe to leave cooked food out of the refrigerator for more than two hours	d) Agree e) Not Sure f) Disagree
62.	I separate raw and cooked food during storage	d) Most Times e) Sometimes f) Never
63.	I inspect food for freshness to ensure quality ingredients	d) Agree e) Not Sure f) Disagree
64.	I think it is important to throw away foods that have reached their expiry date	d) Agree e) Not Sure f) Disagree

SECTION 6: STORAGE

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

Kitchen	1
Designated store room	2
Cooler boxes	3
Storage containers	4
Other (please specify)	5

66. Where are the non-perishable food supplies stored? (Mark all relevant options)

Kitchen	1
Designated store room	2
Cooler boxes	3
Storage containers	4
Other (please specify)	5

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

Yes	Y
No	N

68. How often is the storage areas cleaned?

Less than once a week	1
Once a week	2
Twice a week	3
Three times a week	4
Four times a week	5
Every day of the week	6

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

Not checked	1
Once a month	2
Twice a month	3
< Once a week	4
Once a week	5
Twice a week	6
Three times a week	7
Four times a week	8
Every day of the week	9

70. How often is stock – take done? (Select one)

Not done	1
Once a month	2
Twice a month	3
< once a month	4
Once a week	5
Twice a week	6
Three times a week	7
Four times a week	8
Every day of the week	9

71. Is stock rotation in place?

Yes	Y
No	N

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

Delivery dates	1
Expiry dates	2
Correct storage on delivery	3
First In First Out	4
Other (please specify)	5

Thank you for your participation

ANNEXURE G

SECTION 5: PRACTICES – OBSERVATION CHECKLIST

OBSERVATION	YES	NO	N/A	COMMENTS
GENERAL / MANAGEMENT				
1. Is there a menu?	Y	N		
2. Is there evidence of monitoring procedures?	Y	N		
3. Is there evidence of policies and procedures? (ask)	Y	N		
4. Is there service learning agreement between DUT & the vendors?	Y	N		
RECEIVING				
5. Is the delivery date written onto the product?	Y	N		
6. Are the delivery temperatures checked?	Y	N		
7. If yes how?				
STORAGE				
8. Is the perishable food stored in a cold room/fridge/freezer?	Y	N		
9. Is the non-perishable foods stored in a separate room?	Y	N		
10. Are cleaning items stored with food?	Y	N		
11. Are the storage areas kept locked?	Y	N		
12. Is there adequate light in the storage areas?	Y	N		
13. Is there adequate space in the storage areas?	Y	N		
14. Is the food stored in original packaging?	Y	N		
15. Are the products clearly labeled?	Y	N		
16. Are there expiry dates on food items?	Y	N		
17. Have some food passed the expiry dates?	Y	N		
18. If products are transferred to storage containers, is the expiry date recorded?	Y	N		
19. Are any foods that are past their expiry date used?	Y	N		
20. Are all containers covered?	Y	N		
21. Is any of the food old or stale?	Y	N		
22. Is there any evidence of decay in the fresh produce?	Y	N		
23. Are the storage areas clean?	Y	N		
24. Are the storage areas neatly arranged?	Y	N		
25. Is any food stored directly on the floor?	Y	N		
26. Is refrigerated storage available	Y	N		
27. If yes, is the refrigerated storage in working order?	Y	N		
28. Is the stock sheet kept? (ask)	Y	N		
29. Is the old stock of food used before the new stock (FIFO)? (ask)	Y	N		
30. Is there any evidence pest (rodents/insects) infestation?	Y	N		
31. Are there any unpleasant odours in the storage area?	Y	N		
FOOD PREPARATION				
32. Is there adequate space for food preparation?	Y	N		
33. Is there adequate space for serving / portioning?	Y	N		
34. Are recipes available?	Y	N		
35. Are the recipes standardized?	Y	N		
36. Are there adequate food preparation utensils?	Y	N		
37. What fuel source is used for cooking? (e.g. wood, gas, electricity)	Type:			
38. Is the internal temperature of the food checked?	Y	N		
39. Is there easy availability to water for cooking?	Y	N		

HOLDING				
40. Is the food served immediately following cooking?	Y	N		
41. How long is the food held between cooking and serving?	Time:			
42. Is the food kept warm at this time?	Y	N		
43. If yes, how is the food kept warm?				
44. If yes, is the internal temperature checked?	Y	N		
SERVING				
45. Are there adequate food serving utensils?	Y	N		
46. Are there adequate eating utensils?	Y	N		
47. Are the portion sizes standardized?	Y	N		
WASTE				
48. Is all the prepared / cooked food served?	Y	N		
49. If not, is the left-over food stored properly	Y	N		
50. Is the internal temperature of reheated food checked? (ask)	Y	N		
51. Do the students finish their food?	Y	N		
52. Is there any plate waste/ food thrown away?	Y	N		
53. Is there a designated rubbish bin?	Y	N		
54. Are the dust bins covered?	Y	N		
55. Are the dust bins clean?	Y	N		
56. Is there waste lying outside the dustbins?	Y	N		
HYGIENE	Y	N		
57. Are the kitchens utensils clean?	Y	N		
58. Is the kitchen equipment clean?	Y	N		
59. Are there correct cleaning chemicals available?	Y	N		
60 Are there adequate cleaning supplies e.g. cloths, scourers, etc?	Y	N		
61. Are the work areas clean?	Y	N		
62. Is the area cleaned frequently during preparation?	Y	N		
63. Is the area sanitized following food preparation?	Y	N		
64. Is there water available for cleaning?	Y	N		
65. Do the food handlers wash their hands regularly	Y	N		
66. Is there water available for the food handlers to wash their hands?	Y	N		
67. Is there soap available for hand washing?	Y	N		
68. Are the food handler's overalls/ clothes clean?	Y	N		
69. Do the servers wash their hands before serving?	Y	N		
70. Do the students wash their hands before eating?	Y	N		
71. Is cooked food kept separately from raw food items?	Y	N		

Do you have any questions/comments/suggestions?

_____

_____

_____

ANNEXURE H

Menu item recording sheet									ANNEXURE H	
Vendor:_____			Date _____		Researcher: _____					
Meal items	Packaging and weight	Ingredient and preparation method	weight (g)	Ingredient and preparation method	weight (g)	Ingredient and preparation method	weight (g)	Ingredient and preparation method	weight (g)	Cost per meal

ANNEXURE I

Institutional Research Ethics Committee
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17 September 2013

IREC Reference Number: **REC 56/13**

Mrs D S Khuluse
P O Box 211162
Durban
4036

Dear Mrs Khuluse

Food hygiene and safety practices of food vendors at a University of Technology in Durban

I am pleased to inform you that Full Approval has been granted to your proposal REC 56/13.

The Proposal has been allocated the following Ethical Clearance number IREC 078/13. Please use this number in all communication with this office.

Approval has been granted for a period of one year, before the expiry of which you are required to apply for safety monitoring and annual recertification. Please use the Safety Monitoring and Annual Recertification Report form which can be found in the Standard Operating Procedures [SOP's] of the IREC. This form must be submitted to the IREC at least 3 months before the ethics approval for the study expires.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the IREC according to the IREC SOP's. In addition, you will be responsible to ensure gatekeeper permission.
Please note that any deviations from the approved proposal require the approval of the IREC as outlined in the IREC SOP's.

Yours Sincerely

[redacted]

Prof J K Adam
Chairperson: IREC

ANNEXURE J

	Food Item per 100g	Energy (kJ)	Total Protein (g)	Total Fats (g)	Carbohydrates (g) (EAR)	Dietary Fibre (g) (AI)	Calcium (mg) (AI)	Iron (mg) (EAR)	Magnesium (mg) (EAR)	Zinc (mg) (EAR)	Vitamin A (mcg) (EAR)	Vitamin B6 (mg) (EAR)	Vitamin B12 (mcg) (EAR)	Saturated FA (g)
DRIs for age group 19 to 30 years	Male	12881	56		100	38	1000	6.0	330	9.4	625	1.1	2.0	
	Female	10093	46		100	25	1000	8.1	255	6.8	500	1.1	2.0	
Vendor 1	Vetkoek (372g) served with polony (28g) and sliced cheese (14g) **Total = 414g**	6 222.42	33.12	77.418	158.562	5.382	1449.90	4.968	41.40	3.1878	91.08	0.16146	2.07	15.0696
	Fried Fish (69g)	531.3	14.421	7.728	0.00	0.00	23.46	0.276	21.39	0.345	14.49	0.14421	1.104	1.0557
	Russian (160g)	2 729.60	36.64	55.04	4.16	0.00	12.80	2.40	27.20	5.168	0.00	0.80	2.56	19.52
Vendor 2	Beef Burger (95g+90g) with shredded lettuce (23g) served with French Fries (75g) **Total = 283g**	3 053.57	34.243	31.413	71.033	5.66	76.41	3.679	76.41	6.4524	2.83	0.58298	2.264	9.1126
	Boerewors roll (98g+46g) and French Fries (75g) **Total = 219g**	3057.24	20.586	47.523	51.684	3.942	45.99	2.19	54.75	2.6499	0.00	0.34821	0.438	14.3007
	Russian roll (139g + 46g) served with French fries (25g) **Total = 210g**	2893.70	35.91	48.64	26.98	1.52	38.00	1.96	38.00	4.959	0.00	0.7353	2.66	17.157
Vendor 3	Vegetable burger (87g +141g) with sliced tomato (17g), sliced cucumbers (18g), and shredded lettuce (16g) served with French fries (150g) **Total = 429g**	4 851.99	60.06	30.888	144.573	13.299	270.27	10.725	326.04	4.2471	12.87	0.65637	0.00	4.0326

Vendor 4	Giant Toasted Bacon (82g) and egg (94g) sandwich (149g) served with French fries (100g) **Total = 425g**	5 554.75	53.125	71.40	109.65	8.075	140.25	5.525	110.50	5.6525	59.50	0.714	2.975	20.0175
	Russian (167g) foot long (101g) served with French fries (100g) **Total = 368g**	5 240.32	51.152	73.968	89.06	6.624	84.64	4.416	95.68	6.8816	0.00	1.26	3.312	22.6688
	Rib burgher (95g+138g) with sliced tomato (21g), fried onions (65g) and sliced cheese (17g), served with French fries (100g) **Total = 436g**	4 403.60	48.832	40.548		9.592	244.16	3.924	113.36	4.8396	56.58	0.97228	0.436	9.6356
Vendor 5	Boerewors roll (165 +100g) with grated carrots (20g)and shredded lettuce (20g) served with French fries (217g) **Total = 522g**	6 598.08	40.716	93.96	131.544	11.484	109.62	5.22	135.72	5.22	652.5	0.94482	0.522	25.8912
	Mutton burger (83g+123g) with grated carrots (20g) and shredded lettuce (20g) served with French fries (217g) **Total = 463g**	5 130.04	40.744	47.96	138.437	12.038	125.01	5.093	143.53	6.2505	652.83	0.99545	2.315	11.3435
	Chicken burger (126g + 123g) with grated carrots (20g) and shredded lettuce (20g) served with French fries (217g) **Total = 506g**	4 958.80	57.178	38.456	138.644	12.144	111.32	4.048	156.86	3.542	662.86	1.3156	0.506	5.6672
Vendor 6	Chicken wrap (163g + 131g) with grated carrots (21g), shredded lettuce (21g), and sliced cheese (28g) served with French fries (187g) **Total = 551g**	6 876.48	66.671	94.772	122.322	9.367	225.91	3.857	137.75	3.8019	1 217.71	1.28934	0.551	21.489
	Mutton burger (96g + 88g) with grated carrots (21g) and shredded lettuce (21g) served with French fries (187g) **Total = 413g**	4 505.83	39.235	48.321	110.684	9.912	94.99	4.956	119.77	7.0623	685.58	0.99946	2.478	11.2749
	Chicken Tikka (158g) with grated carrots (21g) shredded lettuce (21g) served with French fries (187g) **Total = 520g**	4 934.80	62.92	46.28	1159.60	10.92	109.2	3.64	150.8	3.536	696.8	1.3676	0.52	6.708
Vendor 7	Boerewors roll (80g+78g) with sliced cheese (30g) and French fries (180g) **Total = 368g**	3 223.68	27.60	40.48	69.184	5.152	298.08	2.944	62.56	3.9376	117.76	0.45632	0.736	16.2656

	Russian roll (73g + 78g) with sliced cheese (30g) served with French fries (180g) **Total = 361g**	4 898.77	38.627	62.814	103.968	8.664	310.46	3.61	115.52	5.1623	115.52	1.083	1.805	18.1222
	French fries (342g)	4 367.34	14.706	50.616	120.042	11.97	47.88	2.736	133.38	1.6074	0.00	1.22436	0.00	6.4296
Vendor 8	Stiff pap (350g) with grilled meat (180g) and Boerewors (180g) Combo **Total = 710g**	6 908.30	71.71	118.57	73.13	2.84	42.6	5.68	120.7	11.005	0.00	0.7739	4.26	47.783
	Boerewors Roll (160g+45g) served with French fries (193g) **Total = 398g**	5 560.06	34.228	87.56	94.326	7.96	67.66	3.98	107.46	4.3382	0.00	0.79998	0.796	24.5566
	Chicken burgher (200g + 77g) served with French fries (193g) **Total = 470g**	4 559.00	73.79	36.66	105.75	8.93	79.9	3.29	155.1	3.525	0.00	1.4429	0.47	5.64
Vendor 9	Beef Curry (304g) served with Maize Meal (268g) Butternut (62g), Beetroot (50g), mixed fresh vegetables (45g) and potato (68g)Salads **Total = 797g**	5 594.94	51.805	61.369	130.708	13.549	151.43	8.767	207.22	8.5279	701.36	1.09189	3.188	23.5912
	Chicken Curry (352g) served with rice (263g), butternut (62g), coleslaw (44g), potato (68g) and mixed fresh vegetable (45g) Salads **Total = 834g**	5 037.36	60.048	54.21	110.922	8.34	125.10	5.004	125.10	6.0048	734	0.98412	0.834	10.2582
	Vetkoek (248g) served with sliced polony (23g) and sliced cheese (14g) **Total = 285g**	4 269.30	23.37	54.15	106.02	3.705	125.40	3.42	31.35	2.3655	74.1	0.1197	1.425	11.286
Vendor 10	Roasted Chicken (225g) served with French fries roll (280g + 60g) **Total = 565g**	6 299.75	74.58	71.755	127.69	11.865	113.00	5.65	180.80	5.537	28.25	1.5142	1.13	12.995
Vendor 11	Vetkoek (426g)	6 492.24	30.672	75.402	180.624	6.39	68.16	5.112	42.60	2.5134	59.64	0.11502	1.704	11.076
Vendor 12	Beef curry (332g) served with maize meal (289g) and butternut (50g) **Total = 671g**	5 703.50	57.706	71.126	114.07	8.052	80.52	6.039	161.04	9.4611	932.69	1.0065	4.026	29.0543
	Chicken curry (409g) served with rice (344g) and beetroot (50g) salad **Total = 803g**	5 050.87	68.255	46.574	120.45	2.409	120.45	4.818	136	6.7452	64.24	0.93951	0.803	9.7966

	Beef curry (332g) served with Maize meal/ Samp / Rice, (370g) and salad (grated carrots (12.5g), pineapple (12.5g), raisins and orange squash (12.5g+12.5g)) (**Total = 752g**	5 391.84	54.896	69.184	103.776	7.52	82.72	6.016	97.76	8.7984	1 173.12	0.95504	4.512	28.7264
Vendor 13	Beef burger (102g+66g) served with French fries (355g) **Total = 523g**	6 427.67	46.024	73.743	156.9	14.644	99.37	5.753	177.82	7.845	0.00	1.57946	2.615	14.8009
	Boerewors roll (89g + 60g) served with French fries (355g) **Total = 504g**	6 637.68	32.76	85.68	156.744	14.112	90.72	4.536	166.32	3.9312	0.00	1.35576	0.504	18.4464
	Roasted chicken (230g) served with French fries (355g) and lettuce (12g) and tomato (11g) side salad **Total = 608g**	6 657.60	74.176	82.688	125.248	12.768	91.20	5.472	194.56	5.4112	36.48	1.76928	1.216	14.288
Vendor 14	French fries (306g)	3 907.62	13.158	45.288	107.406	10.71	42.84	2.448	119.34	1.4382	0.00	1. 09548	0.00	5.7528
	Beef Burgher (91g + 75g) with sliced cheese (13g), fried onions (31g), shredded lettuce (37g), Grated carrots (37g), Sliced tomato (17g), served with French fries (128g) **Total = 429g**	4 062.63	38.181	46.761	89.661	9.009	175.89	4.719	107.25	7.0785	1 252.68	0.858	2.574	12.6126
	Chicken Curry (280g) served with rice (222g), Butternut (118g) and coleslaw with raisins (90g + 8g) **Total = 718g**	4 214.66	48.824	42.362	99.802	7.898	122.06	4.308	114.88	4.8824	452.34	0.81852	0.00	7.9698
Vendor 15	Vetkoek (286g)	4 358.64	20.592	50.622	121.264	4.29	45.76	3.432	28.6	1.6874	40.04	0.07722	1.144	7.436
	Beef Burgher (92g + 154g) with shredded lettuce (37g) and sliced tomato (15g) served with French fries (151g) **Total = 449g**	4 718.99	42.655	43.104	130.21	10.776	125.72	5.388	125.72	7.3636	13.47	0.90698	2.245	10.5964
	Deep fried Mutton Samoosas (28g)	699.72	1.428	15.708	5.012	0.532	9.52	0.224	3.08	0.196	7.84	0.0196	0.00	3.5532