Access dimensions to the local urban food environment of adults residing in the Eastern suburbs of Tshwane

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Dissertation

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Supervisor: Dr AT Viljoen

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Dedication

This study is dedicated:

- To my loving husband, for his wonderful support,
- My family, for my upbringing and belief in this endeavour, and last but not the least,
- To my beautiful children, Liese and Cari.

Love you all.

Declaration

I, **Lené Smit**, declare that this dissertation for the Master degree in Consumer Science Food Management as submitted to the University of Pretoria is my own work that has not previously been done and submitted by anyone else; neither at the University of Pretoria, nor at any other tertiary institution.

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Lené Smit

September 2019

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Abstract

Access dimensions to the local urban food environment of adults residing in the Eastern suburbs of Tshwane

by

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Degree: Masters in Consumer Science (Food Management)

The access dimensions to the local, urban food environment of adults in the eastern suburbs of the Tshwane metropolitan are explored and described. The study further determined how the food access dimensions contribute to the food choices and food consumption patterns of the study group.

South Africa has the highest rate of urbanisation in the world. Moving to and living in urban areas usually result in major shifts in people's food consumption patterns and lifestyles which are associated with non-communicable diseases. Intervention strategies aimed at changing consumers' food behaviour often fail to recognise the complexities associated with the local urban food environment and the contribution of the food access dimensions. This study fills the gap on the limited information on the food access dimensions and food choices of white South African urban adults. A mixed methods approach was followed in this cross-sectional study that consisted of two phases.

In the first quantitative phase, an electronic survey questionnaire was used to gather information on respondents' usual food shopping and eating patterns, together with aspects related to the local urban food environment. The questionnaire was completed by a total of 230 white adults residing in regions 3, 4 and 6 of the Tshwane metropolis. The second qualitative data collection

phase used Geographic Information System (GIS) measurement to identify, describe and map all the food retail outlets in the eastern suburbs of Tshwane. From the mapped food stores in regions 3, 4 and 6, stores were purposively selected and in-store observations were conducted to gain information and insight into the variety, quality and price of food products on offer in these food retail stores. A food basket was developed to obtain and compare the price of certain food products. Food prices between food stores were compared, as well as with the Consumer Price Index. Results indicated a minimal difference in price and it is concluded that most of the food products seemed to be affordably-priced to adults in Tshwane.

Results confirm that urban consumers in Tshwane have easy, adequate access to food stores and purchase most of their food at supermarkets at least once or more times a week. The results also prevailed that a variety of good quality, affordable food products are available and accessible at food stores close to them and that they find the stores accommodating and food products acceptable. Although the Dietary Diversity Score (DDS) of 6.20 reflected that the majority of the respondents daily consumed a variety of food, they do not follow all the guidelines of the Food-Based Dietary Guidelines for South Africa, which might have an impact on their future health.

This research contributes to a better understanding of how the access dimensions in the local urban food environment contribute to urban consumers' food choices. By exploring the local urban food environment of urban consumers in Tshwane, this study contributed to fill the knowledge gap on this topic in South Africa.

Key words: urban food environment, access dimensions, availability, affordability, accessibility, acceptability, accommodation, food choice

Abstrak

Toegangsdimensies tot die plaaslike stedelike voedselomgewing van volwassenes in die Oostelike voorstede van Tshwane

deur

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Hierdie studie verken en beskryf die bydrae wat die voedsel toegangsdimensies het op die voedselkeuses van die studiegroep in die plaaslike voedselomgewing van Tshwane.

Suid-Afrika het die hoogste verstedelikingskoers in die wêreld. As gevolg van die verstedeliking verander verbruikers se eetpatrone en lewenswyse wat baie nou geassosieer word met nie-oordraagbare siektes. Intervensiestrategieë wat op die verandering van verbruikersgedrag in terme van voedselkeuses gerig is, is dikwels onsuksesvol as gevolg van die kompleksiteit van die plaaslike voedselomgewing asook omdat die bydrae van die voedsel toegangsdimensies dikwels nie aangespreek word nie. Daar is tans beperkte inligting oor die rol wat die voedsel toegangsdimensies in die voedselkeuses en eetpatrone van blanke Suid-Afrikaanse volwassenes speel, en hierdie studie vul die leemte in die literatuur. Gemengde metodes as navorsingsbenadering is gevolg tydens hierdie deursneestudie, wat in twee fases uitgevoer is.

In die eerste kwantitatiewe fase is ’n vooraf getoetsde, elektroniese vraelys gebruik om inligting in te samel oor die algemene voedselaankoop en -eetpatrone van die respondente, asook aspekte met betrekking tot die plaaslike stedelike voedselomgewing. Die vraelys is deur 230 blanke volwassenes, woonagtig in streke 3, 4 en 6 van die Tshwane metropool voltooi. In die

tweede kwalitatiewe fase is 'n Geografiese inligtingstelsel (GIS) meting gebruik om al die voedselkleinhandelswinkels in die oostelike voorstede van Tshwane te identifiseer, te beskryf en te karteer. Van die voedselkleinhandelswinkels wat op die kaart aangedui is in streke 3, 4 en 6, is doelbewus gekies om bepaalde waarnemings te maak, ten einde insig te verkry oor die verskeidenheid, kwaliteit en prys van voedselprodukte wat aangebied word. 'n Voedselmandjie is ontwikkel om die prys van bepaalde voedselprodukte te bepaal en vergelyk. Die voedselpryse van verskillende winkels is met mekaar en met die Verbruikers Prysindeks vergelyk. Resultate wys dat verskille tussen die voedselpryse wat vergelyk is minimaal was en gevolglik bevestig dit dat die meeste voedselprodukte bekostigbaar is vir die blanke respondente van Tshwane.

Resultate van beide fases bevestig verder dat stedelike verbruikers in Tshwane gerieflike en voldoende toegang het tot die meeste voedselwinkels waar die meerderheid hul voedselprodukte minstens een of twee keer per week aankoop. Die resultate het ook bevestig dat 'n verskeidenheid van goeie kwaliteit, bekostigbare voedselprodukte beskikbaar en toeganklik is in die onmiddellike omgewing waar die verbruikers woonagtig is. Die verbruikers het ook bevestig dat die voedselinstansies akkommoderend en hul voedselprodukte aanvaarbaar is. Alhoewel die dieetverskeidenheidstelling van 6.20 daarop dui dat die meerderheid van die respondente daagliks 'n verskeidenheid voedselsoorte eet, word daar nie altyd gesonde voedselkeuses gemaak nie, en meer spesifiek word nie al die riglyne van die Voedselgebaseerde Dieetriglyne vir Suid-Afrika gevolg nie, wat moontlike toekomstige gesondheidsrisiko's vir die respondente mag inhou.

Die studie dra by tot beter insig van die voedseltoegangsdimensies in die plaaslike stedelike voedselomgewing en hoe hierdie toegangsdimensies bydra tot stedelike verbruikers se voedselkeuses. Deur die plaaslike voedselomgewing van stedelike verbruikers in Tshwane te verken, is 'n bydrae gelewer tot die uitbreiding van kennis oor die voedsel toegangsdimensies in Suid-Afrika.

Sleutelwoorde: stedelike voedselomgewing, toegangsdimensies, beskikbaarheid, bekostigbaarheid, toeganklikheid, aanvaarbaarheid, akkommodasie, voedselkeuse

Table of contents

List of tables

List of figures

List of addenda

Chapter 1
The study in perspective

1.1 INTRODUCTION AND BACKGROUND

For the first time in history in 2008, more than half of the world's population lived in urban areas and by 2050 this percentage is expected to increase to 75 % (Watson, 2009; Silva, 2016). Seventy percent of the world's population currently lives in developing countries and urban growth will continue to rapidly increase as this number is expected to increase to 83 % by the year 2050 (Watson, 2009; Silva, 2016). South Africa, as developing country, has the highest rate of urbanisation in the world and is expected to have two thirds of its population living in urban areas by 2050 (Drimie, Faber, Vearey & Nunez, 2013; Pretorius & Sliwa, 2011; Patel & Burke, 2009; United Nations, Department of Economic and Social Affairs, 2001). Urbanisation is a global reality. Urbanisation refers to the growth in the proportion of a population that lives in urban areas (Frayne, Crush & McLachlan, 2014; Nnyepi, Gwisai, Lekgoa & Seru, 2015; Pretorius & Sliwa, 2011; Chen, 2007:1). In the 2016 South African Demographic and Health Survey, it was reported that the majority of people in South Africa live in urban areas (67 % of women and 69 % of men) and by province, the majority of men and women in South Africa live in Gauteng (SADHS, 2016:10).

This urban environmental change is due to a number of social structural changes such as migration, modernisation, globalisation, economic advancement and acculturation (Kittler & Sucher, 2008:1). This resulted in food environments undergoing major changes due to technological advancements, food policies and lifestyle changes of families (Cannuscio, Tappe, Hillier, Buttenheim, Karpyn & Glanz, 2013; Story, Kaphingst, Robinson-O'Brien & Glanz, 2008:254). Technological advancements include processes used to produce, store and preserve food (Bryant, Dewalt, Courtney & Schwartz, 2003:12). Technological innovations with appliances used for food preparation and storage such as refrigerators and deep freezers greatly influenced food choice as it prolong the shelf life of food products, especially seasonal foods (Brunner, Van der Horst & Siegrist, 2010; Popkin, 2006). Technological advancements have also contributed to the food choices in the changed household, work and activity patterns.

Food choice includes the selection and consumption of food and/or beverages, considering what, how, when, where and with whom people eat, as well as other aspects of their food and eating behaviours (Sobal, Bisogni, Devine & Jastran, 2006). The food choice process incorporates, not only decisions based on conscious reflection, but also those that are automatic, habitual and

subconscious (Furst, Connors, Bisogni, Sobal & Falk, 1996, 251). Females are usually regarded as the household gatekeepers who make most of the decisions regarding food choices in the form of food purchases and preparation (Sishana, Labadarios, Rehle, Simbayi, Zuma, Dhansay, Reddy, Parker, Hoosain, Naidoo & Hongoro, 2014:11; Damman & Smith, 2009:249) and now, being employed outside the home, means that they have to accommodate food provision activities in their busy daily routines. These changing commitments of women in the household have significant effects on what the food industry provides. The increasing number of hours people today spend away from home due to their busy lifestyles and more time constraints due to the fact that both men and women are employed and spending more time in traffic to and from work, have created a demand for and a reliance on convenience foods or even food that can be ordered online that, in turn, influences food choices (Belahsen, 2014; Nnyepi *et al.*, 2015; Steyn & Mchiza, 2014; Lhuissier, Tichit, Caillavet, Cardon, Masullo, Martin-Fernandez, Parizot & Chauvin, 2013; Popkin, Adair & Ng, 2012; Verbeke & Poquiviqui Lopez, 2005).

Technological advancements in the food industry also increased the availability of ready-prepared and convenience foods, and in turn this saves consumer's time on food preparation for they can just grab something to eat while they are on the go. These social structural changes further induce a food culture change that is associated with changes in the lifestyles and food habits of populations undergoing the process of urbanisation. In urban environments the situation is often thought to be even more critical due to nutritional imbalance caused by the easy access to abundant fast-food restaurants and convenience options (Gallagher, 2010; Gallagher, 2012). Evidence of the changes in the food consumption patterns is documented in various studies in South Africa and other countries (Belahsen, 2014; Micklesfield, Lambert, Hume, Chantler, Pienaar, Dickie & Goedecke, 2013:370; Popkin *et al.*, 2012; Abrahams, Mchiza & Steyn 2011:1; Popkin, 2003; Popkin & Gordon-Larsen, 2004). These changes in food patterns refer to the distinctive food consumption and lifestyle changes as well as major shifts in countries experiencing rapid economic and social development (Nnyepi *et al*., 2015; Popkin *et al.*, 2012; Abrahams *et al.*, 2011; Popkin & Gordon-Larsen, 2004; Popkin, 2003) and is also accompanied by reduced physical activity and a more sedentary lifestyle that often leads to a change in body composition and disease patterns (Ronquest-Ross, Vink & Sigge, 2015; Nnyepi *et al*., 2015; Steyn & Mchiza, 2014; Belahsen, 2014; Pretorius & Sliwa, 2011; Kruger, Puoane, Senekal, & van der Merwe, 2005; Vorster, Venter, Kruger, Kruger, Malan, Wissing, De Ridder, Veldman, Steyn, Margetts, & MacIntyre, 2000; Drewnowski & Popkin, 1997).

The urban environment can be seen as a contributing factor to these food consumption patterns and lifestyle changes and is associated with the rising rate of overweight and obesity which are, in turn, linked with non-communicable diseases (NCD's) such as diabetes mellitus type 2, cardiovascular diseases and some cancers (Belahsen, 2014; Steyn & Mchiza, 2014; Popkin *et*

al., 2012; Abrahams *et al.*, 2011; Kearney, 2010; Patel & Burke, 2009; World Health Organisation, 2003; Popkin, 1999). This is supported by recent South African obesity prevalence statistics from the South African Demographic and Health Survey that shows that 68 % of adult women and 31 % of adult men living in urban as well as rural areas are classified as overweight or obese (SADHS, 2016:10; Sishana *et al.*, 2014).

Together with the technological advancements associated with the food choices, urban consumers' food choices are not only driven by their own needs, but also influenced by several access dimensions, including what types of food items are available (availability), at what prices (affordability), and proximity to grocery stores (accessibility) (Martin, Ghosh, Page, Wolff, McMinimee & Zhang, 2014). To fully understand the local urban food environment, it is important to have insight into the access dimensions of food in the urban environment (Charreire, Casey, Salze, Simon, Chaix, Banos & Oppert, 2010). Availability, accessibility, affordability, acceptability and accommodation are the five food access dimensions that have been identified in relation to food acquisition and choice (Caspi, Sorensen, Subramanian & Kawachi, 2012:1172; Antin & Hunt, 2012). *Availability* refers to how obtainable food is in an individual's neighbourhood and household, for example fresh fruit and vegetables (Holsten, Deatrick, Kumanyika, Pinto-Martin & Compher, 2012; Laurie, Faber, Calitz, Moelich, Muller & Labuschagne, 2013; Bryant *et al.*, 2003:14) and also how available it is for consumption (Story *et al.,* 2008). Availability also include the presence of certain types of restaurants near people's homes or the number of places available to buy produce from (Caspi *et al.,* 2012:1173). The availability of healthy foods influences people's food choice (Furst *et al.*, 1996) and directly contributes to their healthier food choice and improved nutritional status. The dimension of *accessibility* is fundamentally more geographic in nature, as it refers to the location of the food supply and the proximity of consumers to reach that location (Caspi *et al.*, 2012:1173). Travel time and distance are key measures of accessibility in an urban environment (Caspi *et al.*, 2012:1173). Food access is to a large extent also determined by food prices (Pieters, Guariso, & Vandeplas, 2013:8). *Affordability* refers to a person's ability to obtain food according to the amount of money that person has available to purchase the food required. It is simultaneously governed by the time, skills and facilities the consumer has for preparation and storage of a particular food (Larson, Story & Nelson, 2009; Bryant *et al.*, 2003:14). *Acceptability* refers to people's attitude about the quality of their local food environment, and whether or not the given supply of food products meet their personal preferences, norms and standards. The last access dimension is *accommodation*, which refers to how well local food suppliers and sources accept and adapt to the needs and desires of the local consumers (Caspi *et al.*, 2012:1173).

A direct relationship between the local urban food environment, food choice and the risks of obesity and non-communicable diseases (NCD's) has been emphasised in recent studies

(Belahsen, 2014; Popkin *et al.*, 2012; Charreire *et al.*, 2010; Lytle, 2009). People eat what is available or offered in the environment where they live (Antin & Hunt, 2012; Caspi *et al.*, 2012:1173). The local urban food environment thus influences people's food choices, which in turn is directly associated with food intake, health and well-being. It has thus become important to pay closer attention to the local urban food environment and to explore and describe the various access dimensions of the local urban food environment and how it contributes to food choices.

1.2 PROBLEM STATEMENT

As indicated above, food consumption patterns have often been negatively influenced by the urban environment. Most urban people are away from home for most of the day, working long hours, which in most instances lead to limited time available to plan, purchase and prepare nutritious meals (Abrahams *et al.*, 2011). This, together with fast foods and other convenient options that are more readily available and affordable, have contributed to changes in the food choices of many urban consumers (Micklesfield *et al.*, 2013; Abrahams *et al.*, 2011; Pretorius & Sliwa, 2011:179). What is available, chosen and consumed, in turn, determines the quality of the diet and ultimately the nutritional status of the individual. Closely associated with this shift in the urban food environment is the increased prevalence of overweight and obesity and the resulting rise in the number of people suffering from non-communicable diseases (NCD's) which include cardiovascular disease, hypertension, diabetes mellitus type 2 and some cancers (Sishana *et al.*, 2014; Popkin *et al.,* 2012; Mayosi, Flisher, Lalloo, Sitas, Tollman & Bradshaw, 2009).

Food consumption patterns and the consequences thereof have thus become important health topics in the context of the urban environment (Drimie *et al.*, 2013; Lucan, 2015). The food access dimensions influences the food choice process. To fully understand the local urban food environment, it is important to have insight into the access dimensions of food in the urban environment (Charreire *et al.*, 2010). *The first access dimension of availability* refers to how obtainable food is in an individual's neighbourhood and household and how available it is for consumption (Holsten, Deatrick, Kumanyika, Pinto-Martin & Compher, 2012; Laurie, Faber, Calitz, Moelich, Muller & Labuschagne, 2013; Bryant *et al.*, 2003:14; Story *et al.,* 2008). The dimension of *accessibility* is more geographic, as it refers to the location of the food supply and the proximity of consumers to reach that location (Caspi *et al.*, 2012:1173). *Affordability* refers to a person's ability to obtain food according to the amount of money that person has available to purchase the food required (Larson, Story & Nelson, 2009; Bryant *et al.*, 2003:14). *Acceptability* refers to people's attitude about the quality of their local food environment, and whether or not the given supply of food products meet their personal preferences, norms and standards. The last

access dimension is *accommodation*, which refers to how well local food suppliers and sources accept and adapt to the needs and desires of the local consumers (Caspi *et al.*, 2012:1173).

Research is thus needed to better understand the local urban food environment and more specifically how the food access dimensions (availability, accessibility, affordability, accommodation and acceptability) influences food choice and food-related behaviour. Food choice remains a topic that is complex and not well understood (Sobal *et al.*, 2006; Furst *et al.,* 1996). Food choice not only includes the selection and consumption of food and beverages, but also requires considering what, how, when, where and with whom people eat, and thus also implies the acquisition of food as well as other aspects of the local urban food environment (Story *et al.,* 2008; Sobal *et al.*, 2006).Therefore, the formulated research question for this explorative and descriptive study, deals with how the various access dimensions to the local urban food environment contribute to the food choice of the study group.

1.3 JUSTIFICATION

The researcher could only find two published South African studies that investigated the food environment by determining and describing the availability of healthy food choices and the associated cost thereof. One of the studies was conducted in rural towns of the Western Cape Province (Temple, Steyn, Fourie & De Villiers, 2011) and the other in a low-income, urban community in Worcester (Roos, Ruthven, Lombard & McLachlan, 2013). No other studies were found in any other provinces.

It is thus clear that a need exists to investigate the food access dimensions as part of the food choice process ofurban consumers in other regions of South Africa. This study will form part of the first phase of a larger research project that investigates the food environments, food practices and dietary intakes of adults in Tshwane. The aim of this master's study focuses on exploring and describing the various access dimensions to the local urban food environment of adults (25 years and older) in the eastern suburbs of Tshwane (National Research Foundation grant no. 93743). This investigation will include the views of and possible barriers to making healthy food choices by the study group. In exploring the urban food environment this study will contribute to the limited body of knowledge available on the food choices and food practices of South Africans and more specifically in Tshwane. The information obtained from the study could be of value to consumer facilitation to enhance healthier food choices.

1.4 RESEARCH AIM AND OBJECTIVES

The aim of this study is to explore and describe the various access dimensions to the local, urban food environment of adults residing in the eastern suburbs of Tshwane metropolitan area in order to describe how it contributes to the food choices of the study group.

Research objectives:

1. To locate, explore and describe the local urban food environment of the study group.
2. To explore and describe the type, quality and price of the food available in the formal and informal food retail sector of the eastern suburbs of Tshwane.
3. To determine and describe the food access dimensions (availability, accessibility, affordability, acceptability and accommodation) of the study group.
4. To determine and describe the food choices of the study group in terms of their food consumption patterns and how the food access dimensions contribute to the food choices of the study group.

1.5 STUDY AREA AND POPULATION

The study was confined to urban adults, age 25 years and older, residing in the eastern suburbs (as represented by regions 3, 4 and 6) of Tshwane, situated in South Africa's most urban province, Gauteng as indicated in Figure 1.1. This study area comprised of regions 3, 4 and 6 of the Tshwane metropolitan area of Gauteng Province.

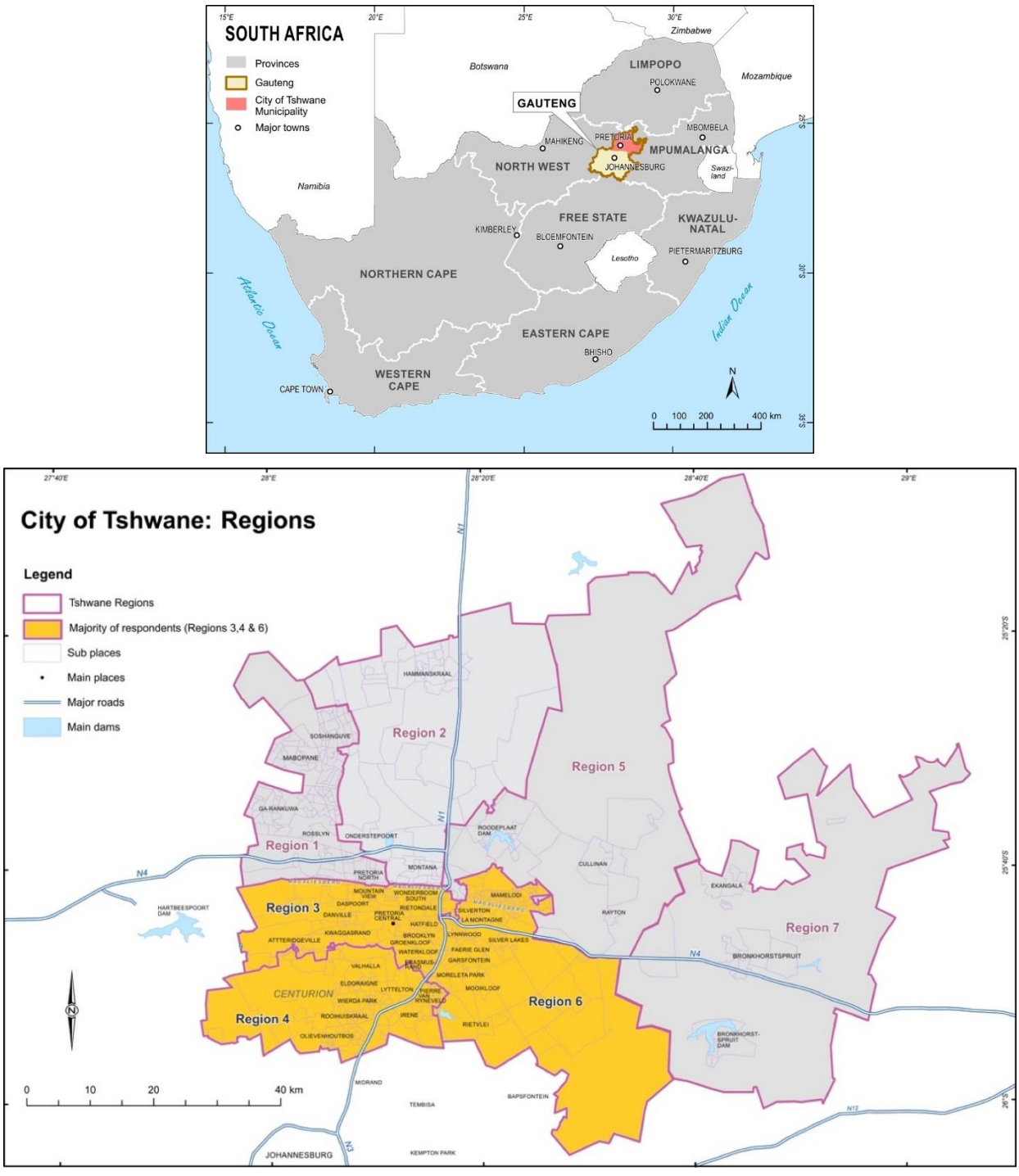

FIGURE 1.1: ORIENTATION MAPS INDICATING THE TSHWANE METROPOLITAN AREA IN GAUTENG, SOUTH AFRICA AND THE EASTERN AND SOUTHERN SUBURBS OF TSHWANE

Centrally located within the Tshwane metropolitan area is Region 3 with approximately 20,03 % of the Tshwane population residing in this region, which is the third highest concentration of residents. It contains the Central Business District (CBD) that can be described as the largest employment opportunity zone in the metropolitan area and it further comprises of two other main suburbs, namely Brooklyn and Hatfield. The demographics and quality of the built environment vary across Region 3 (Ganief & Thorpe, 2013).

Region 4 is situated in the south-westerly portion of the City of Tshwane metropolitan area and includes Centurion, Irene, Olievenhoutbosch and the Rens Nature Reserve. Region 4 falls within the Triangular Economic Core of Gauteng, which has been identified by the South African Government as the economic growth focus (Ganief & Thorpe, 2013).

Approximately 20,73 % of Tshwane's population resides in Region 6, which represents the second highest concentration of residents. This region has the highest income per capita of all seven regions in Tshwane. There is a large number of businesses and retailers in the area and it also covers the second most important industrialised area in Tshwane (Ganief & Thorpe, 2013). This region includes suburbs Menlyn, Lynnwood, Garsfontein, Moreleta Park and Faerie Glen.

1.6 RESEARCH DESIGN

In this exploratory and descriptive study, a sequential, mixed method research approach was followed as the food choice process is complex and multi-dimensional. Mixed method research is an approach that involves collecting both quantitative and qualitative data, integrating the two forms of data. Using the combination of quantitative and qualitative approaches provides a more complete understanding of the research problem (Creswell, 2014:4). This type of design uses quantitative research first to test theories and concepts and then followed with qualitative research to further explore in detail (Creswell, 2009:16). Explorative research can provide insight into a situation, a community or an individual when investigating a relatively unknown area of research. It helps the researcher to gather info that leads to an appreciation of the situation at hand (De Vos, Delport, Fouche & Strydom, 2011:95; Salkind, 2012:193; Blanche, Blanche, Durrheim & Painter, 2008:44). Descriptive research is to describe or indicate characteristics common to the entire sample and trying to understand events occurring at present and their relationship to other factors (De Vos *et al.*, 2011:96; Blanche *et al.*, 2008:44; Salkind, 2012:193).

1.7 DATA COLLECTION

Data collection for this cross-sectional study was done in two phases. Firstly, the quantitative phase proceeded where the data were collected by means of a pretested survey questionnaire. The questionnaire measured the socio-demographic characteristics, usual social shopping patterns and frequencies thereof as well as the usual eating patterns and frequencies thereof. The survey questionnaires were completed by 230 respondents in regions 3,4 and 6 of Tshwane.

The second phase included the qualitative phase where Geographic Information System (GIS) mapping were done to collect information regarding the availability and accessibility of food stores. Data were collected by means of store and open market observations with an observation checklist that focused on the type or variety, price and quality of food products. Lastly, a food basket was also compiled to determine and compare the affordability of food available with the National Consumer Price Index .

1.8 DATA ANALYSIS

The data analysis were also done in two phases. The collected data were checked, cleaned and entered into an Excel spreadsheet. To summarise the data, a descriptive statistical analysis was used to represent the data frequencies and tendencies (Babin & Zikmund, 2015:67). Organisation and summarisation were necessary to put results into a more comprehensive format (Pietersen & Maree, 2007:186). Examples thereof include frequencies, percentages, means and the median as well as standard deviation. Descriptive statistics can be divided into two ways of representing or describing data, either graphical or numerical (Pietersen & Maree, 2007:183). Graphs and tables were used to represent the data in a better understandable way (Zikmund, Babin, Carr & Dan Griffin, 2010). Organisation and summaries were necessary to put results into a more comprehensive format (Pietersen & Maree, 2007:186). Graphs and illustrations accompanied the numerical data analysis of Phase 1.

The GIS mapping provided a visual depiction of the location of food stores in the study area. Results were presented and analysed according to standard GIS methodology (Charreire *et al.*, 2010) to provide a geospatial representation of the formal and informal food outlets in the eastern suburbs of Tshwane. Data from the store observations as well as the food basket were captured in Microsoft Excel to summarise and analyse the data in order to gain an insight into the variety, quality and price of food products available in the study area.

1.9 DELIMITATIONS OF THE STUDY

The study was confined to urban adults, aged 25 years and older, residing in regions 3, 4 and 6 in the eastern and southern suburbs of the Tshwane metropolis.

1.10 OUTLINE OF THE REPORT

Chapter 1: The study in perspective

This introductory chapter provides background information on the study, stated the research problem and justified the study. The formulated objectives that helped to guide the study as well as the research design and methodology were also highlighted.

The outline of the rest of the research report is as follows:

Chapter 2: Literature review

The second chapter provides an overview of the literature as background to the study and justifies the theoretical perspective of the study. The assumptions of the human ecological perspective that helped to guide an understanding of the dynamic relationship between individuals and their environments are stated. This chapter also reviews the literature and recent research in order to conceptualise and contextualise the research pertaining to food choices for this study. The external as well as the internal environmental factors that influence the food choice process are discussed, as well as food choice as a concept. An overview of the local urban food environment of South Africa, the access dimensions, as well as the limited information on the current food consumption and food choices of urban South Africans are also given.

Chapter 3: Research methodology

The research methodology is presented and described in this chapter, which includes information on the research design, the research aim and objectives. The conceptual framework, main concepts of the study, the operationalisation and development of the measuring instrument are explained. The study area and population are described, including the sample and sampling method. The data collection, data analysis and measures to ensure data quality as means of combating possible errors in the research process are also dealt with in this chapter. Lastly, the ethical aspects that were considered were given.

Chapter 4: Results and discussion

This chapter presents the results of the study and their discussion. The demographic profile of the sample is presented first, followed by accounts of the study group's current food shopping patterns, the study group's current food consumption patterns, the frequency of consumption, the various influences from the external and internal environment on the food choices and the access dimensions to the local urban food environment.

Chapter 5: Conclusions, evaluation and recommendations of the study

This final chapter of the dissertation offers the conclusions drawn from the major findings of the study on the access dimensions to the local urban food environment of adults. The research is evaluated, recommendations are made and suggestions for future research are given.

1.11 CHAPTER CONCLUSION

This introductory chapter presented the background to the study, the problem statement and justification for conducting the study. It spelled out the research objectives, research methodology, delimitations of the study and the outline of the structure of the study report. The next chapter deals with the theoretical perspective of the study and literature review on the different environmental factors which influence the food choice process.

Chapter 2
Literature review

2.1 INTRODUCTION

This chapter presents the theoretical perspective and an overview of the literature used for the study. The justification and explanation of the theoretical perspective for the study are given, together with a brief overview of the factors that influence and guide the food choice process and the food access dimensions that contribute to this process. In order to understand the local food environment, the food access dimensions of food in the urban environment need to be understood. The five food access dimensions identified in relation to food acquisition and choice, namely availability, accessibility, affordability, acceptability and accommodation, will be addressed. The chapter then also sets out to conceptualise these main concepts of the study, namely the food access dimensions and their meaning. Lastly, the local urban food environment and the South African urban consumer are also described.

2.2 THEORETICAL PERSPECTIVE

Food choice is a complex process and influenced by numerous interrelated and interdependent factors from various environmental levels (Antin & Hunt, 2012; Sobal & Bisogni, 2009:s43; Story *et al.*, 2008:253; Bryant e*t al.*, 2003:2). As both external and internal environmental factors influence this multi-dimensional process (Story *et al.*, 2008; Bryant *et al.*, 2003:2), the human ecological perspective, which offers a holistic approach, is chosen as theoretical perspective for this study (Story e*t al.*, 2008). A holistic view considers the individual in the entirety of his environments and is therefore helpful to understand this complex process. This perspective has been used in similar studies on the food choice process and food environments by other scholars (Cannuscio *et al.*, 2013; Story *et al.*, 2008).

The following assumptions of the human ecological perspective by Bubolz & Sontag (1993:425-426) will guide this study:

- ***All parts of the environments are interrelated and influence each other***

No environment functions in isolation. The state of one environment can affect all the other environments and a single factor that is changed can alter the totality of the food supply system. For example, extreme weather conditions (drought or a hailstorm) could cause major damage to crop (i.e. tomato fields) in the natural environment. This will decrease the availability of tomatoes, which could cause an increase in the price of tomatoes (economic environment). This in turn can affect the individual and economic environments as the demand for the food (tomatoes) can decrease due to the high price of tomatoes and thereby possibly change the consumption pattern of tomatoes to be less frequently as opposed to what was previously regularly consumed.

- ***Humans interact with multiple environments***

An individual constantly interacts with various environments simultaneously. For example, in a household, the members interact with the various environments that surround them. The food purchaser for example interacts with the local urban food environment that consists of various food retail outlets where food is available to purchase. The economic environment influences the price of food and the food purchaser could be restricted by the household's food budget. This could result that the food purchaser has to buy food that might not satisfy the preference or liking of the other family members, because the purchaser is restricted to choose food that is within the household's food budget.

- ***Environments are dynamic and ever changing; humans adapt and modify environments***

The human ecological perspective offers a holistic approach when considering the changes that affect humans and does not focus on one specific point in time. More people are moving to urban areas (physical environment), which could mean better employment opportunities and an increased income, but also increased living costs (economic and political environment). Additionally, the change in physical, economic and political environments will influence their socio-cultural environment in terms of what they eat and where, when and with whom they eat. Humans not only adapt to changes in the environment, but also act on or modify the environment in order to obtain the desired outcomes. An example of how humans adapt to these changing environments and circumstances is the increased consumption of convenience and fast foods. This is due to many consumers that have busy schedules and lifestyles, who work full-time, leading to not having time to prepare the meals themselves. The food industry then modifies and develops new food products like convenience and fast foods that are easily available and accessible to accommodate the consumers' present busy schedules and lifestyles and save time on food preparation.

- ***Environments do not determine human behaviour, but pose limitations and constraints as well as opportunities and barriers for humans***

For example, the food choice of an individual with a food allergy (individual environment) will be restricted to make specific food choices in order to prevent the allergic reaction. The individual environment of this person can thus pose certain barriers when selecting foods. Firstly, the choice of food may not be typical of the food eaten by the rest of the family and friends, making it difficult for this individual to function within his/her socio-cultural environment, as family members and friends may choose to continue with their habitual food choices. Having to follow a specific diet may thus influence the whole family. An example of this would be when an individual is allergic to shellfish or nuts and cannot even touch these products, the whole family will be influenced and advised not to purchase or consume these products. Secondly, different food choices could mean increased costs (economic and political environment). For example, the individual would only be able to eat food products that are more expensive than what the family would want to purchase and consume, such as organic food. Thirdly, the food that can be eaten is possibly only available in specific stores to which the individual has limited access to (physical environment). For example, the individual would need to buy food from a speciality shop that might be more expensive than the products at a supermarket. This illustrates how each environment can pose certain barriers or opportunities in the food choice process.

The next section describes and illustrates the various environmental levels contributing to the food choice process.

2.3 CONTRIBUTION OF THE VARIOUS ENVIRONMENTAL LEVELS TO FOOD CHOICE

Food choice is multidimensional and has been recognised as a process that is influenced by numerous environmental factors, for example geographical, psychological, social, cultural, economic and biological factors (Fieldhouse, 2013:27, Story *et al.*, 2008). These factors could be grouped into two groups of environments, namely the external and internal environments. Within each of these two groups of environments there are thus various embedded environments which contribute to the food choice process that will be discussed.

These environmental levels are presented in Figure 2.1 showing where and how they each operate in the food choice process.

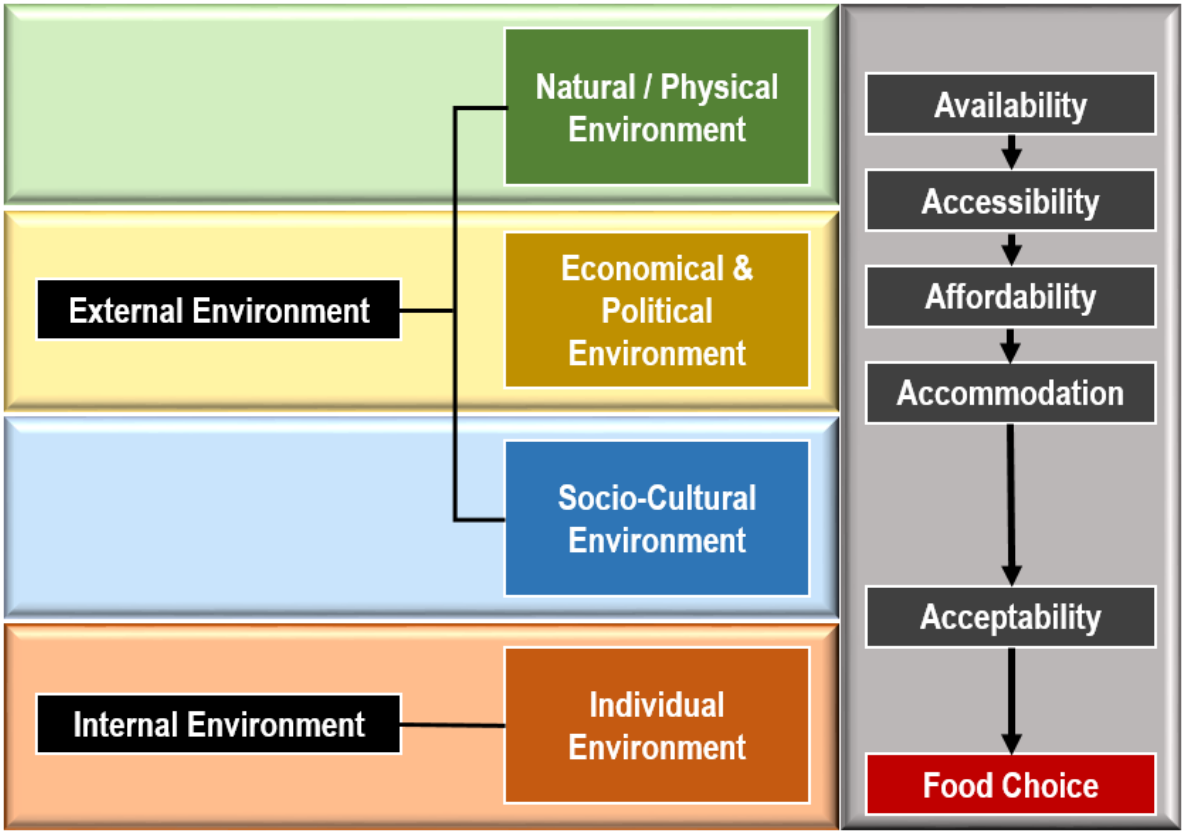

FIGURE 2.1: ENVIRONMENTAL LEVELS CONTRIBUTING TO THE FOOD CHOICE PROCESS (adapted from Viljoen, 2010:23)

2.3.1 External environment

The external environment represents the physical, economic and political, as well as the socio-cultural environments. Each of these environments is interconnected and interrelated, one affecting the other (Bryant *et al.*, 2003:11). Each is briefly discussed:

2.3.1.1 Natural / physical environment

The natural / physical environment represents the two components, namely the natural environment that includes the land, soil and climate, as well as the physical or human-built environment that includes all man-made structures such as roads and urban infrastructure (Story *et al.*, 2008; Bryant *et al.*, 2003:11; Story, Neumark-Sztainer & French, 2002). This means that the natural / physical environment fundamentally provides the settings where food is produced, procured or consumed, (Larson & Story, 2009). This includes the formal food retail stores (restaurants, supermarkets, convenience stores) as well as the informal (open markets and street vendors) food sectors. The physical environment thus contributes to what food is available and accessible for consumption (Story *et al.*, 2008; Story *et al.*, 2002). The physical environment could therefore either hinder or promote healthy food choices, considering that consumers can only

procure what is available and accessible (Story *et al.*, 2008). Recently, fast food and other convenient options are more readily available and accessible in the urban food environment, which contribute to the unhealthy food choices of many consumers as it is often high in kilojoules and fat (Pretorius & Sliwa, 2011).

2.3.1.2 Economic and political environment

The next environmental level relates to the economic and political environment that also affects human food choices and food patterns (Bryant *et al.*, 2003:13). The economic environment includes aspects such as income of the consumer, the price of food, marketing strategies and consumer demand (Fieldhouse, 2013:26). The political environment includes aspects such as governmental legislation, policies and controls like sugar tax which has an impact on production, processing and the distribution of food (Fieldhouse, 2013:26). These aspects influence accessibility and affordability of food which ultimately influence food choice. Food access is to a large extent determined by food prices (Pieters *et al.*, 2013:8). Economic studies on food choice have shown that household income and food costs directly influence food selection and often override considerations such as healthfulness, social desirability or even the taste of food (Sobal & Bisogni, 2009:s39; Messer, 2007). Hence, individuals not only choose food based on availability, but their choice is also influenced by whether or not it is available at a price they can afford. This implies that the higher the disposable income, the wider the choice and the variety of food consumed (Hunt, Fazio, Mackenzie & Maloney, 2011: Sobal & Bisogni, 2009:s39; Messer, 2007). However, high income does not automatically mean a quality diet; instead the range of food to choose from increases. For example, the number and type of meals an individual eats per day would be highly dependent on the money available. The economic environment influences people's access to food and other resources, and affords them the capacity to exploit those resources (Bryant *et al.*, 2003:13). Therefore, the economic and political environment indirectly influences people's access to food which ultimately influences the food choice process (Bryant *et al.*, 2003:13). Certain food policies and legislations are also part of this environment in order to protect the consumer, for example, alcohol purchasing is influenced by governmental regulations and prohibits drinking and driving for the people's own safety (Deliens, Clarys, De Bourdeaudhuij & Deforche, 2014:11). In South Africa alcohol is not allowed to be sold to persons under the age of 18 years old. There is also legislation that requires places and restaurants that sell alcohol to have a liquor license which allows them to sell alcoholic products by law.

2.3.1.3 Socio-cultural environment

The socio-cultural environment is characterised by the complex interrelationships that exist among individuals, their culture and society. This provides a framework for the behaviour of a

society, including their food-related behaviour (Viljoen, 2010:24). The socio-cultural environment comprises of the twin concepts, social and cultural (Booth, Mayer, Sallis & Rittenbaugh, 2001:24). These twin concepts are interdependent and inseparable (Fieldhouse, 2013: 27, Ferraro, 2006:22). There can be no culture without society, and culture prescribes the patterns of behaviour in a society (Bryant *et al*., 2003:190).

Society can be described as a group of people that interact and have shared characteristics within a common culture (Heron, Penny, Paine, Sheath, Pederson & Botha, 2001). The social environment thus includes interactions with family, friends, peers and others in the community through role modelling, social support and social norms (Larson *et al.*, 2009). It thus refers to the external environment in which the individual or groups (such as the families, friends, church groups and work groups) function and interact with other groups, societies and communities through the process of enculturation[1] and socialisation[2] (Larson & Story, 2009; Fieldhouse, 1996:4). Food behaviours are learned through enculturation, which is described as the process through which culture is transmitted from one generation to the next. People consume food based on what they have learned as being acceptable (Falk, Bisogni, & Sobal, 1996). The social environment influences food choice as access to acceptable food and the necessary resources (i.e. money) to obtain and use food products to determine what is chosen to be consumed. The social environment also influences food choice and relates to activities such as how the food is acquired, preserved or stored, prepared, presented and served. This includes not only how the food is served, but also to whom it is served and how frequently, as reflected in identified meal patterns, and how it is consumed (Kittler & Sucher, 2008:2; Fieldhouse, 1996:1). What is implied here is that food preparation and consumption involve social interaction between members of a household or a specific society. The classic definition by Margaret Mead (1945) on food habits strongly resembles this first aspect of the concept: " ... *the way in which individuals or groups of individuals, in response to social and cultural pressures, select, consume, and utilise portions of the available food supply.*" (National Research Council, 1945:13) Food choices are part of culture, implying that they are learned and then also influenced by society. Therefore, food choice is dependent on what is socially as well as culturally *acceptable* (Larson e*t al.*, 2009; Sobal & Bisogni, 2009:s40; Furst *et al.*, 1996).

[1]"*Enculturation refers to the entire incidental learning that occurs through imitation of elders and others* ..." Segall (1979:187).

[2]Socialisation, according to Segall (1979:187), "*includes all the more or less direct teaching to which the individual is exposed*." This teaching involves the inculcation of norms and customs by various socialisation agents (parents, teachers, elders and others) who are consciously shaping the individual according to the cultural model of a "proper" member of society. Fieldhouse (1996:3) gives a similar description and views socialisation as "a process by which culturally valued norms of behaviour are passed on from generation to generation".

Culture includes patterns of behaviour and a system of shared understandings and interactions that shapes, and in turn is shaped by experience (Caprio, Daniels, Drewnowski, Kaufman, Palinkas, Rosenbloom, Schwimmer, 2008). Culture is everything that people have, think and do as part of a group and is shared by at least two or more people. What people have or own refers to the material or tangible objects of a culture such as food products. What people think is represented by the intangible part of culture, namely ideas, values, attitudes and beliefs. What people do when they behave in certain socially prescribed ways relates to cultural behaviour (Ferraro, 2006:22). Culture is the foundation of food choices and people use the rules of their cultural group to choose the food products they consider to be acceptable or preferable for consumption and thus also shapes food choices. For example, social gatherings in some cultures encourage overeating, as there is usually an abundance of food (Kruger *et al.*, 2005; Bryant *et al.*, 2003:222; Nestle, Wing, Birch, Disogra, Drewnowski, Middleton & Economos, 1998:51). The culture in which individuals live and are raised in has a major and powerful influence on the food choices individuals make and what is eaten (Bryant *et al.*, 2003:190; Shepherd, 1999:807). Culture as a construct is, however, not a single entity, but consists of three components, namely technology, social organisation and ideology (Bryant *et al.*, 2003:12). Each of these components will be discussed.

(i) Technology

Technology refers to the tools, practices and knowledge a group uses to cope with the physical environment and meet the basic needs of life as well as to produce, process and prepare food. (Kittler, Sucher & Nelms, 2011:12; Bryant *et al.*, 2003:12). Popkin (2006) similarly regards technology as the tools and techniques a society uses in the processing, preparation, preservation and storage of food. Technological innovations with appliances used for food preparation and storage such as refrigerators and deep freezers greatly influence food choice as it prolongs the shelf life of food products, especially seasonal foods (Brunner *et al.*, 2010; Popkin, 2006). Advances in food science and technology play a role in producing palatable foods such as frozen foods and canned products (Rozin, 2007:8).

Another example of technological advancement is transportation. Modern means of transportation have played a role in the demand for, and access to supermarkets (Popkin, 2006). Consumers today have fresh farm produce available and can purchase food that originates in different parts of the world because of preservation technologies and improvement in transportation (Rozin, 2007:8; Bryant *et al.*, 2003:87). For example, people that have big freezers can buy food in bulk that is not locally available to reduce the cost of transport and the need to buy it on a daily basis.

Technological advancements have also contributed to the food choices in the changed household, work and activity patterns. More females are being employed outside the home, which means that they must accommodate food provision activities in their busy daily routines. These changing commitments of women in the household have significant effects on what the food industry provides. The increasing number of hours people today spend away from home with their busy lifestyles and more time constraints due to the fact that both men and women are employed and spending more time in traffic to and from work, have created a demand for and a reliance on convenience food, or even food that can be ordered online which, in turn, influences food choices (Lhuissier *et al.*, 2013; Verbeke & Poquiviqui Lopez, 2005).

(ii) Social organisation

Social organisation is the way a group organises its members into families, social strata and communities. This includes how relationships work and are structured (Viljoen, 2010; Bryant *et al.*, 2003:12). People act in certain socially prescribed ways as characterised in what they do (Ferraro, 2006:19). Food choices are tied to social organisation in a way that food brings people together thus building and maintaining human relationships. Parents influence their children's food choices by making certain food readily accessible in the home, selecting the places to eat outside the home, transmitting beliefs, norms and values that guide food selection and also rewarding desired behaviours and punishing others (Rozin, 2007:12; Bryant *et al.*, 2003:194).

(iii) Ideology

Ideology is everything that people think and relate to the intangible part of culture (Ferraro, 2006:23). Ideology as integral part of culture also influences the food choice process (Sobal & Bisogni, 2009:s41-s42; Bryant *et al.*, 2003:221; Furst *et al.*, 1996). With respect to food, all values, attitudes and beliefs shared by a group of people are part of ideology and includes the symbolic meanings and associated values placed on specific food (Sobal & Bisogni, 2009:s42; Bryant *et al.*, 2003:13; Furst *et al.*, 1996). Food values are learned through the process of socialisation and are slowly internalised by an individual. *Values* determine what is socially desirable or undesirable and which food are regarded as acceptable or not (Sobal & Bisogni, 2009:s42; Fieldhouse, 2013:28). Values are also defined as enduring beliefs which guide and motivate behaviour and are important in self-definition and in food choices and provide cognitive scripts for food behaviour (Hauser, Jonas, & Riemann, 2011; Botonaki & Mattas, 2010; Connors, Bisogni, Sobal & Devine, 2001). *Beliefs* are accepted or considered to be true or held as an opinion (Bryant *et al.*, 2003:93). Beliefs are also conceptions of reality and propositions about how the universe works (Bryant *et al.*, 2003:93). These beliefs are then used to make food choices (Sobal *et al.*, 2006:5). *Attitude* is a person's behaviour; a person's attitude towards a specific food will influence the food choices

made (Shepherd & Raats, 2006). A person's attitudes toward the attributes of a specific food determines the acceptability of the food (Caspi *et al.*, 2012:1179).

The external environment is not the only environment that influences the individual. There are certain influences in the internal environment that will be discussed in the next section.

2.3.2 Internal environment

The next group of factors relates to the internal environment, also referred to as the individual or personal environment. This environment represents the unique characteristics of an individual that influences personal food choices that are closely related to acceptability and preferences (Falk *et al.*, 1996). This environment consists of two major components applicable to this study, namely influences and personal food systems that are shown in Figure 2.2 and will be discussed below.

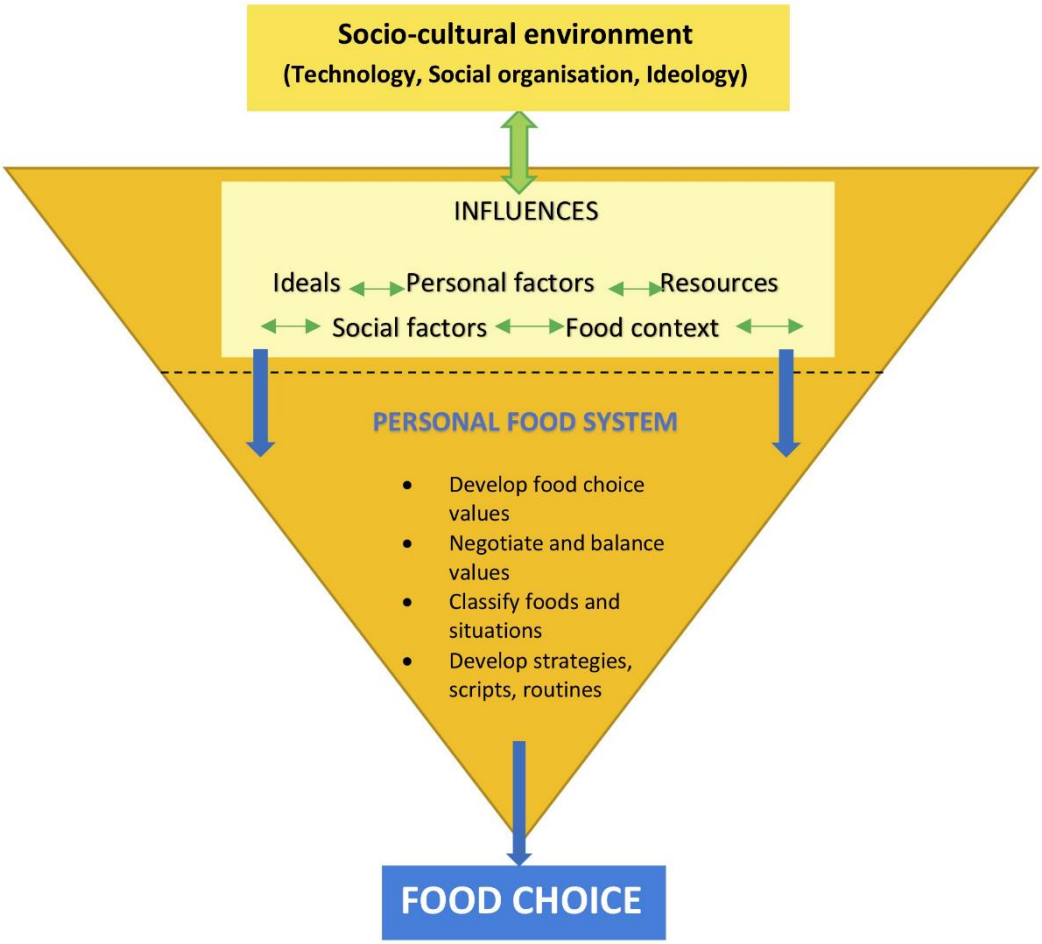

FIGURE 2.2: FOOD CHOICE PROCESS MODEL (adapted from Sobal & Bisogni, 2009:s41)

2.3.2.1 Influences

A number of individual or personal influences operate and shape food choices. In the food choice model of Sobal *et al.* (2006:42) these influences are grouped into five groups, namely ideals, personal factors, resources, social factors and contexts (Sobal *et al.*, 2006:5; Furst *et al.*, 1996). Each of these groups of influences are interrelated, influenced by the socio-cultural environment that includes the components of culture (technology, social organisation and ideology) and are further all embedded in the personal food system of the individual when engaging in food choice decisions (Sobal & Nelson, 2003:5). In the following section each of these five major groups of influences and how they influence food choices will be discussed.

2.3.2.1.1 Ideals

Ideals can be described as the points of reference or standards used to evaluate what is acceptable behaviour in daily life experiences such as food choices (Sobal & Bisogni, 2009:s41). Cultural ideals include the learned systems of values and rules (guidelines or directions), social norms and standards or criteria that a person uses to guide behaviour. These are also used to assess and judge food-related behaviours as appropriate or inappropriate in a certain situation or context (Sobal & Bisogni, 2009:s41; Furst *et al.*, 1996). Ideals, expectations, hopes or beliefs are culturally learned through families and other institutions (Sobal *et al.*, 2006:5). In food choice, ideals could include symbolic meanings such as social status or to express friendship. A food item could be chosen if its meaning suggests positive significance as this would imply that it is acceptable to the eater and, conversely, it will be refused if it is seen as unacceptable to the eater (Parraga, 1990).

2.3.2.1.2 Personal factors

Personal factors are characteristics of individuals that influence their food choice decisions (Sobal & Bisogni, 2009:s42; Sobal *et al.*, 2006:6; Furst *et al.*, 1996:254). Personal factors comprise of physiological factors (sensory, sensitivity to food tastes, genetic predisposition to diseases), psychological factors (food preferences, personality, mood, phobias) and social factors (gender roles, parent responsibilities). Physiological factors would be an allergic response to a certain food product or hunger that affects the food choice process (Furst *et* al., 1996). Psychological or emotional factors are about what, how and why food should be eaten in terms of one's mood, feelings and emotional state. Personal factors develop and change over time and permit individuals to be unique in their food decisions (Sobal & Bisogni, 2009:s42; Sobal *et al.*, 2006:6; Furst *et al.*, 1996:254). This leads to dietary individualism in which one person would eat certain

types of food that are different from the rest of the family. In making food choices, food cravings, preferences or addictions to certain foods are regarded as personal factors (Sobal *et al.*, 2006:6).

2.3.2.1.3 Resources

Resources are the assets considered by people when making food choice decisions (Sobal & Bisogni, 2009:s42). These resources are either tangible or intangible. Tangible resources include money, equipment and space, and the intangible resources include skills, knowledge and time. Resources are perceived as available or unavailable, depending on the situation, and that may facilitate or inhibit food choices (Sobal & Bisogni, 2009:s42; Furst *et al.*, 1996:254). The first tangible resource (money) is affected by the availability thereof as the availability of this resource provides accessibility to a variety of foods, whereas if it is not available it can restrict or limit food choice (Sobal & Bisogni, 2009:s42; Furst *et al.*, 1996:254). The other tangible resource affecting food choice is equipment such as a big oven or an ice-cream maker. If certain food preparation equipment is not available, then certain food products cannot be prepared and consumed. The last tangible resource, namely space, affects food choice as the availability of space, for example storing space, is important and considered when consumers buy food products (Furst *et al.*, 1996:254).

Intangible resources also affect food choice, and the first intangible resource that comes into play is food preparation skills. If a consumer does not have these skills to prepare a food product, certain ingredients won't be bought due to the lack of skills and how they use them. Food preparation skills similarly play an important role in food choice decisions as people mainly depend on food that requires limited preparation time and skills (Van der Horst, Brunner & Siegrist, 2011). Knowledge is another intangible resource when making food choice decisions (Sobal & Bisogni, 2009:s42). Knowledge refers to simply being informed on something or how a person comprehends information and facts through learning, or experience about something (Lally, Bartle & Wardle, 2011). Knowledge is required for the selection of appropriate food for a specific situation (Lally *et al.*, 2011). Time is the last intangible resource affecting food choice. If a consumer does not have time to prepare a meal, take-away or convenience food might be an option. Individuals make their food choices based on the resources available to them (Furst *et al.*, 1996:254-255). Most people's food choices are however determined by the amount of money they have and the time available for preparation, since they often have an eventful and busy lifestyle (Van der Horst *et al.*, 2011).

2.3.2.1.4 Social factors

As most eating occurs in the presence of other people (Cruwys, Bevelander & Hermans, 2015; Nestle *et al.*, 1998:51), social factors relate to the relationships people are engaged in which influence food choice (Sobal *et al.*, 2006:6). With whom one eats determines what, where, when and how food will be chosen (Sobal, 1999). Some relationships provide opportunities for making unrestricted food choices and other relationships might constrain certain food choices (Sobal & Bisogni, 2009:s43). For example, one would prepare a different type of meal if someone important, such as your boss, is invited for dinner as opposed to preparing a family meal.

Both social and individual factors are involved in food choice (Furst *et al.*, 1996:257). Eating is regarded as a social behaviour. People's choice of what to eat is strongly embedded in their own individual culture, however, at the same time they also have to consider what is socially acceptable for consumption when in the company of other social groups (Sobal & Bisogni, 2009:s43). Compared to eating alone, people tend to eat more when in the company of others. This might be an example of a social factor, which is defined as the enhancement of a certain behaviour inspired by the presence of others. People might have a feeling of hunger due to the relaxed sociable atmosphere and there is relatively more food available during these gatherings (Johnson, Sharkey, Dean, Mcintosh & Kubena, 2011; Sobal & Bisogni, 2009:s43).

2.3.2.1.5 Food context

The last group of individual influences is the food context, which refers to the specific situation or event in which the food choice decisions take place. It includes both the social and physical environments (Sobal & Bisogni, 2009:s42; Sobal *et al.*, 2006:6). The presence of other people, the physical setting and time of consumption are all situational factors that might influence food choice decisions (Stroebele & de Castro, 2004). Situational factors will thus determine where, when and with whom food consumption takes place, and will thus guide certain food choices. The home and work environments are two key contexts where people make their food choices. These social environments shape food choice decisions and the social meanings attached to food (Johnson *et al.*, 2011; Sobal & Bisogni, 2009:s44).

Apart from the influences discussed above, each person's food choices are further guided by his or her own personal food system where the individual's own food values and attitudes are negotiated or traded off against each other in the food choice process. The repeated experience of making food choices leads to individuals developing their own personal food systems to guide their food choice.

2.3.2.2 Personal food system

The personal food system refers to the cognitive processes that people develop to guide them in their food choice decisions in a specific situation. A person first constructs the values to consider in the food choice process and secondly negotiates and balances these values by consciously weighing and considering the values that are important at the specific time and for the situation. Thirdly, to simplify food choice decisions people classify food and situations according to groups / categories they develop based on the food characteristics, the context and their personal experience. In the fourth place strategies, scripts and routines are formed (Sobal & Bisogni, 2009:s41; Sobal *et al.*, 2006:7; Furst *et al.*, 1996:257). The personal food system represents a dynamic set of trade-offs made by an individual that ultimately leads to making food choice decisions (Sobal & Bisogni, 2009:s41).

The personal food system includes the development of food choice values, negotiations and balancing of these food choice values, the classification of food and situations and the development of strategies and routines for frequent food decisions (Sobal & Bisogni, 2009:s42).

2.3.2.2.1 Development of food choice values

The development of food choice values is the way in which individuals construct their own food choices while considering values and employing other cognitive processes for selecting food (Sobal *et al.,* 2006:14). These considerations could for example include the sensory attributes (taste, texture and flavour), cost, health, convenience and managing social relationships (i.e. considering the preference importance and feelings other people attach to food) (Sobal & Bisogni, 2009:s42; Shepherd & Raats, 2006). The food choice values thus represent the way in which people use options, trade-offs and boundaries when they make food choices (Sobal *et al.,* 2006:7).

2.3.2.2.2 Value negotiations and balancing

Value negotiations is a dynamic process and is of importance in making food choice decisions. Different values are negotiated in different situations during the food choice process. It represents the consideration of values by prioritising them in order to simplify and construct food choice decisions (Sobal & Bisogni, 2009:s43; Connors *et al.*, 2001; Falk *et al.*, 1996; Furst *et al.*, 1996). The priority of food choice values varies according to individual traits, personal states and situational contexts (Sobal *et al.,* 2006:11). Food choice values include: taste, convenience, cost, health and managing relationships (Sobal & Bisogni, 2009:s43) and will be discussed next.

Taste is one of the sensory characteristics of food that influence enjoyment or aversion to food. Taste is often used as a minimum criterion for whether or not a food or beverage will be consumed and taste preferences may change over time (Sobal *et al.*, 2006:6). *Taste* represents the consideration that individuals take into account that relate to their sensory perceptions of food (Sobal *et al.*, 2006:7). Most consumers' food choices are largely determined by taste, as opposed to any other consideration (Nestle *et al.*, 1998; Sobal & Bisogni, 2009:s43).

Convenience is another food choice value that is considered in food choice (Sobal *et al.*, 2006:8; Marquis, 2005:55). Time and energy are the two main dimensions of the construct of convenience. Convenience relates to the actual time, physical ability and the mental involvement it takes for a person to acquire, prepare and consume food (Marquis, 2005:58). Due to the time pressure that people experience because of professional or personal activities, an increase in the consumption of convenience foods is noted (Brunner *et al.*, 2010). As lifestyles change, more people begin to rely on foods prepared away from home, and consequently they resort to snack foods, fast foods or convenience foods which are often energy dense and less nutritious, which could result in overweight and obesity (Popkin & Gordon-Larsen, 2004; Vorster, 2002).

Cost is a food choice value signifying the monetary considerations that people contemplate when making food choices and it often dominates food choice (Furst *et al.*, 1996:255). Cost also includes the concept of "worth" or value for money (Sobal *et al.*, 2006:9). People with unlimited disposable income may still be sensitive to price increases, as they might not feel that the product is worth the cost (Sobal *et al.*, 2006:9).

Health is a food choice value that is considered to create physical well-being. Health includes immediate and long-term consequences of eating certain foods. Long-term consequences involve growth, weight control or chronic disease prevention, whereas considerations about immediate responses include aspects such as digestive discomfort, energy levels and allergic reactions (Story *et al.*, 2008; Sobal *et al.*, 2006:9).

How someone considers the interests and well-being of other people involved in a person's social world refers to the food choice value of *managing relationships* (Sobal & Bisogni, 2009:s43; Sobal *et al.*, 2006:9). This food choice value relates to food choice decisions when taking other people's preferences and needs into consideration. Managing relationships confirm that an individual does not live in isolation but as a social being that interacts with other people (Furst *et al.*, 1996:256). This food choice value is considered when building and maintaining relationships in households by accommodating and anticipating conflicts over issues of food choice.

Other food choice values that are considered in food choice decisions include *quality, variety, symbolism, ethics, safety* and *waste* (Furst *et al*., 1996:255; Connors *et al*., 2001). Considerations associated with these values are for some people highly significant, whereas for other people they are considered only in certain circumstances. For example, religious beliefs, ethnic identity and environmental concerns are to some people primary considerations in food choice decisions, whereas other people will be more focused on their personal expectations for "quality" related to the way food is grown, stored, prepared or presented (Sobal *et al.*, 2006:9).

2.3.2.2.3 Classifying foods and situations

Classifying food into groups based on the characteristics of the food, the contexts in which food are used or personal experiences, help people construct food choice decisions and evaluate different options according to their choice values (Sobal & Bisogni, 2009:s43; Sobal *et al.*, 2006:11). Consumers might make use of routinised strategies to standardise or ritualise certain food choice decisions in order to make it easier for themselves when making a food choice (Sobal & Bisogni, 2009:s43). An example is to classify certain foods (such as yogurt, eggs, cereals) as a breakfast option or meat and salad or vegetables as lunch or dinner. Classifying these foods makes the food choice much easier for that specific situation.

2.3.2.2.4 Food choice scripts, strategies and routines

Food choice scripts, strategies and routines relate to the cognitive aspects of food choice. Food choice *scripts* are procedural knowledge that people hold for food behaviours in specific situations that are familiar to them. Food choice *scripts* refer to the behavioural plan and knowledge that guide the way people act in a specific situation. *Scripts* include expectations about the situation as well as plans for acting in that situation and the specific sequences of behaviour (Blake, Bisogni, Sobal, Jastran & Devine, 2008). People form specific scripts for events like birthdays, Christmas, evening meals, snack times and situations in which people eat: either alone or with others, and the scripts formed will be revised and made flexible or appropriate for each event (Nyberg, Olsson, Örtman, Pajalic, Andersson, Blücher, Lindborg, Wendin & Westergren, 2016:86; Sobal & Bisogni, 2009:s43). For example, for a birthday celebration a cake may be an appropriate dessert as opposed to a fruit salad.

Food choice *strategies* are rules that people develop and implement to guide them in their frequent food choice situations (Jastran, Bisogni, Sobal, Blake & Devine, 2009; Furst *et al.*, 1996:255; Falk *et al.*, 1996). An example of this might be to rather choose brown bread instead of white bread, or only drink two cups of coffee a day because it might be the healthier option. *Strategies* simplify food choice decisions by eliminating cognitive effort and time for contemplating

every food choice (Sobal *et al.*, 2006:9; Connors *et al.*, 2001; Falk *et al.*, 1996). *Strategies* facilitate food choice decisions by making them more automatic or habitual, thus value negotiations are not required in every food choice situation (Sobal & Bisogni, 2009:s43). *Strategies* and scripts that work well become habits for food choice decisions as they provide comfort and predictability (Jastran *et al.*, 2009).

Routines are usually carefully constructed over time as people seek to achieve their food choice values while adapting to the other demands in their lives (Connors *et al.*, 2001; Falk *et al.*, 1996). Routinised food choices are usually standard and systematic and an example might be to eat cereal or drink coffee every morning for breakfast (Sobal *et al.*, 2006:12).

Closely associated with the various environmental factors that influence the food choice process are the food access dimensions that are regarded as an integral part of the food environment that has recently received much attention in literature (Caspi *et al.*, 2012:1172; Sobal & Bisogni, 2009:s43; Popkin, Duffy & Gordon-Larsen, 2005; Bryant *et al.,* 2003:12).

2.4 FOOD ACCESS DIMENSIONS

There are five food access dimensions that guide the food choice process (Caspi *et al.*, 2012:1172; Sobal & Bisogni, 2009:s43; Popkin *et al*., 2005; Bryant *et al.,* 2003:11). These dimensions are availability, accessibility, affordability, accommodation and acceptability, as illustrated on the right in Figure 2.1 will be discussed.

2.4.1 Availability

Availability is an important factor in the food choice process as it determines the type of food that is likely to be selected or chosen since it is obtainable (Holsten *et al.,* 2012). Availability also refers to how obtainable food is in an individual's neighbourhood, for example, fresh fruit and vegetables in supermarkets and fruit and vegetable markets (Holsten *et al.*, 2012; Laurie *et al.*, 2013; Bryant *et al.*, 2003:14). Availability of food is food that is present in the household and available for consumption (Story *et al.,* 2008). Availability also refers to the adequacy of the supply of healthy food and might include the presence of certain types of restaurants near people's homes or the number of places to buy produce from (Caspi *et al.,* 2012:1175). Food choice implies the process in which the individual makes decisions about what food could be consumed out of the **available** and **accessible** foods. **Food availability** and **accessibility** are either enhanced or restricted by components or food systems emanating from the physical, political and economic environments (Story *et al*., 2008:253; Popkin *et al.*, 2005; Bryant *et al.,* 2003:11; Pelto, Goodman & Dufour,

2000:2). From the food that is **available** or potentially available for human consumption, the final food consumption choice is guided by certain underlying criteria. These criteria might include dimensions such as accessibility and affordability, together with cultural, socio-psychological and religious orientation. All have an influence in determining what is available and acceptable to the consumer (Conner & Armitage, 2006:41; Bryant *et al.,* 2003:10; Conner & Armitage & Connor, 2002:1-3; Furst *et al.,* 1996; Fieldhouse, 1996:27). **Availability** refers to the adequacy of the food supply, or if there is a sufficient supply of food stores, as well as healthy foods available (Caspi *et al.*, 2012:1173) and if foods of interest and meaning are available in store and at home (Holsten *et al.*, 2012; Jaeger, Bava, Worch, Dawson & Marshall, 2011; Story *et al.*, 2008:255; Bryant *et al.*, 2003:10; Cullen, Baranowski, Owens, Marsh, Rittenberry, de Moor, 2003:616).

2.4.2 Accessibility

Making the available food obtainable to consumers relates to the **accessibility** of food. The dimension of **accessibility** is more geographic, as it refers to the location of the food supply and the ease of getting to the location (Caspi *et al.*, 2012:1175). **Accessibility** also concerns whether quality and quantity of food are available for consumption in a specific location according to the consumers' needs (Cullen *et al.*, 2003:616). **Food accessibility** therefore plays a crucial role in the food choice process (Caspi *et al.*, 2012:1175). In South Africa an example hereof is the supply of citrus fruit in abundance during winter compared to the opposite during summer months. Citrus fruit will thus also be more accessible in the geographic areas close to citrus farms. Citrus fruit are mostly produced in the northern parts of South Africa, specifically the Limpopo Province, and therefore needs to be transported to other areas of the country, such as Gauteng, to be accessible to consumers in other geographical locations. For an individual to access or choose any food, it must not only be available and accessible, but also **affordable** (Sobal & Bisogni, 2009:s42; Bryant *et al.*, 2003:13-14; Pelto *et al.*, 2000:2).

2.4.3 Affordability

Affordability refers to the ability to obtain food governed by the availability of money to purchase the required food (Larson *et al.*, 2009:74; Bryant *et al.*, 2003:14). **Affordability** refers to food prices and people's perceptions of the value or concept of "worth" relative to the cost (Caspi *et al.*, 2012:1178). People will always consider whether certain products are worth the cost. The cost of food is the second most important factor, after taste, influencing food choices (Story *et al.*, 2008:263). The individual's choice of food and the availability of food to the consumer can be hampered by the lack of money (Vorster, 2002:240). The affordability of food is not only a major consideration for consumers, but also an important marketing tool for retailers (Furey, Farley & Strugnell, 2002:313). If a specific food product is too expensive for a certain consumer, it might

not be bought. Retailers should also price food products in such a way that it is perceived to be affordable for the consumer to purchase. However, from the available, accessible and affordable food, not everything is selected for consumption, as human food choice is equally significantly guided by what food is regarded as **acceptable** (Fieldhouse, 2013:28; Rozin, 2006:29-30; Bryant *et al.,* 2003:86; Parraga, 1990:661).

2.4.4 Acceptability

Cardello (1996:2) views food **acceptability** as "a perceptual / evaluative construct" and further expands by explaining that food acceptability is "a phenomenological" experience, best categorised as a feeling, emotion or mood with a defining pleasant or unpleasant character. Only after the other access dimensions of availability, accessibility and affordability have been considered, the consumer will finally decide if the food product is acceptable for purchase and consumption. Food **acceptability** further deals with the emotional state that depicts a person's like or dislike for a particular food (Cohuet, Marquer, Shephered, Captier, Langendorf, Phelan, Manzo & Grais, 2012:698). In turn, this is influenced by the sensory attributes of the food (appearance, texture, taste and flavour) and relates to the behavioural aspects of food choice (Cohuet *et al.*, 2012:698). Food **acceptability** can also be guided by culture and specifically relates to the cultural values, beliefs and attitudes about food that primarily serves as guidance to what food is regarded as acceptable or not (Rozin, 2006:23). How one was raised in terms of your culture has an influence on the food choices you make. If you were raised to eat mopani worms as a child, because of your culture, you will most probably purchase and consume them in your adulthood.

2.4.5 Accommodation

Accommodation is the last access dimension that guides the food choice process. This includes how well food retailers and suppliers accept, adapt and accommodate the needs and desires of their consumers (Caspi *et al.*, 2012:1179). The retail environment needs to make provision for different consumer groups that reside in an area. For example, a food store in an urban area usually has credit card facilities and longer retail hours. Food stores also accommodate consumers living in a specific area. A food store in an area where many families reside will cater for them by supplying family meals and family size packaging, whereas a food store close to a university will provide single serving packaging, smaller portions that would serve a single person and more discounted prices in order to accommodate the needs of students.

As this study concerns the food access dimensions to the local urban food environment, it is important to understand the local urban food environment as it is a major influence on the food access dimensions.

2.5 THE LOCAL URBAN FOOD ENVIRONMENT

The term “urban” is recognised as referring to any location that has the features of a town or city regarding its size and population numbers and density (Statistics South Africa, 2015). The urban food environment consists of the human-built environment which represents the infrastructure and physical structures such as homes, work sites, schools, neighbourhoods, communities, restaurants, fast food outlets, supermarkets, hypermarkets as well as convenience stores (Lucan, 2015:206; McKinnon, Reedy, Morrisette, Lytle & Yaroch, 2009:124; Story *et al.,* 2008:256; Nielsen, Siega-Riz & Popkin, 2002:109). An urban area, especially one like the Tshwane metropolitan area, has a high population density, public roads, water and electricity distribution systems, schools, hospitals and commercial buildings which all form part of the sustainability, liveability and efficiency of the city. In these urban areas, people are provided with endless choices of retail stores (Aoun, 2013; UNEP, 2007:1).

The Tshwane metropolitan area is the second largest municipality in Gauteng and is among the six biggest metropolitan municipalities in South Africa. Tshwane forms part of the government of the northern Gauteng Province, South Africa. It is one of the country's three capital cities and is the administrative capital of South Africa that houses the Union Buildings with government also playing an important role in Tshwane's economy. In fact, the city has adapted to globalisation remarkably well and has all the elements of a smart city, although public transport in South Africa are not on the same level as for example the European public transport. Tshwane is also known for being the diplomatic core with most embassies situated in Tshwane. Top universities and schools are also situated in Tshwane. The main languages spoken in Tshwane are Sepedi, Sesotho, Setswana, Xitsonga, isiZulu, Afrikaans and English. Tshwane has the largest white population in Sub-Saharan Africa and since its founding it has been a major Afrikaner population centre; currently there are roughly 1 million Afrikaners living in or around this city (Aoun, 2013; UNEP, 2007:1).

2.5.1 The South African food retail environment

The food retail sector in South Africa consists of the formal and informal sector and is set apart from other African countries, mainly because of the highly developed and competitive formal retail sector. The formal food retail sector in urban South Africa includes a wide range of neighbourhood

convenience stores, speciality stores, boutique stores, chain supermarkets, department stores and large wholesale and retail outlets (Claasen, van der Hoeven & Covic, 2016). The food retail sector is dominated by four major supermarket chains, namely Pick n Pay, Shoprite-Checkers, Spar and Woolworths (Stroebel & Van Schalkwyk, 2012; Mathu & Phetla, 2018.). This formal food retail sector makes up 70 % of total food sales and smaller local supermarkets and convenience stores make up 30 % of the rest of the food retail sales (Trade Intelligence, 2016). The informal food retail sector includes small food trade enterprises and small service providers (legal and illegal) that produce and sell a variety of products, for example spaza shops, street vendors and open markets. (Food and Agriculture Organisation of the United Nations, 2008:1). The value of the South African food retail market is estimated at R460 to R470 billion and includes, amongst others, groceries, perishables, baked goods, meat and fruit and vegetables, but excludes food services (Trade Intelligence, 2016).

It is reported that most South African and international consumers do their primary food shopping at local supermarkets (Claasen *et al.,* 2016; Cannuscio, Hillier, Karpyn & Glanz, 2014:15; Cannuscio *et al.*, 2013:607; Freedman & Bell 2009:828; D'Haese & Van Huylenbroeck, 2005:97). Local supermarkets are also regarded most popular as they provide the most diverse and healthful food options to consumers in comparison to convenience and smaller food stores, who offer a limited variety of energy-dense food products (Cannuscio *et al.*, 2014:15; D'Haese & Van Huylenbroeck, 2005:97). Supermarkets are large stores with the lowest prices in comparison to other food stores, and offer a full line of different high-quality products including the services of a deli, bakery and butchery (Larson & Story, 2009:66). On the other hand, convenience stores usually offer a limited selection of basic groceries (bread and milk), ready-to-eat foods and non-food items such as cigarettes and magazines, due to limited shelf space (Cannuscio *et al.*, 2014:16; Larson & Story, 2009:66; D'Haese & Van Huylenbroeck, 2005:97). Examples of convenience stores in South Africa are small express shops as well as tuck shops at petrol stations. The products in convenience stores have higher prices with a smaller selection of healthful food offered in comparison to supermarkets (Cannuscio *et al.*, 2014:16; D'Haese & Van Huylenbroeck, 2005:98). Consumers who have access to supermarkets near their homes are more likely to follow a healthy eating pattern and the presence of a supermarket offering fresh produce near the consumer's home can be used as indicator of availability of healthy food in the local food environment (Larson & Story, 2009:66; Moore, Diez Roux, Nettleton & Jacobs, 2008:921).

2.5.2 Accessibility to the local urban food environment

There is no question that many factors influence what people eat; individual, social and cultural factors are important, but what is also important is the physical environment, in particular the local

food environments in which individuals live and obtain food (Lucan, Barg, Karasz, Palmer & Long, 2012:754; Caspi *et al.*, 2012:1175). The local urban food environment consists of the number, type, location and accessibility of food outlets in the urban area as well as availability, accessibility, quality and the price of food in stores (Caspi *et al.*, 2012:1175; Van Ansem, Schrijvers, Rodenburg & van de Mheen, 2012:1207). Ample food stores include supermarkets, convenient stores, fast food stores, and restaurants that are available and accessible in the urban areas and also show significant growth (Ronquest-Ross *et al.*, 2015:02). Urban consumers of the local urban food environment of Tshwane have multiple food stores available and accessible to them as there are many small centres and malls available in a short radius of most of the neighbourhoods with ample choices of food stores. The local urban food environment essentially contributes to what, where, when and how people procure food. The combined process of urbanisation and globalisation of food trade have resulted in rapid changes in the South African food environment (Ronquest-Ross *et al*., 2015:02; Igumbor, Sanders, Puoane, Tsdekile, Schwarz, Purdy, Swart, Durao & Hawkes, 2012:2). According to a recent South African study on "Big food" and "The Consumer Food Environment", there has been a large increase in "ready-to-eat" packaged foods, soft drinks, fast food outlets, retailers and food imports. There has also been significant growth of supermarkets and convenient stores (Osman, Osman, Mokhtar, Setapa, Shukor & Temyati, 2014:225; Ronquest-Ross *et al.*, 2015:03). Therefore, a variety of food retail stores are more accessible to the consumers in the local urban food environment.

South African food stores and restaurants are usually located in places to which one travels relative short distances to purchase food and are often close to where the worksites and schools are. In South Africa many restaurants that represent food from around the world are situated in the local urban areas such as Tshwane. Fast food chains such as Kentucky Fried Chicken, Nando's, Steers, Debonairs and McDonald's are popular in the local South African urban food environment. Most fast food franchises in urban cities have home delivery services available and this has increased the access to fast food for the urban community even more (Osman *et al.*, 2014:225). Food away from home, in environments around the home and school / workplace, usually offer less-nutritious options such as fast food and convenience items which are energy-dense, with limited healthy alternatives (Hilmers, Hilmers & Dave, 2012:1644; Lucan *et al.*, 2010:396; Larson *et al.*, 2009:79). These food environments are related to diverse nutritional issues and health disparities (Lucan, 2015:210; Cannuscio *et al.*, 2013:607; Cannuscio, Weiss & Asch, 2010:387; Larson *et al.*, 2009:79; Glanz, Hewitt & Rudd, 1992:271).

2.6 THE SOUTH AFRICAN URBAN CONSUMER

Lifestyle changes that are most frequently observed with urban living are a change in food

patterns and a less active lifestyle (Pretorius & Silwa, 2011:179). The lifestyle of the urban consumer has undergone changes as both men and women are employed and due to the high costs of living in the urban areas. Urban employed consumers therefore also spend a lot of time on the roads and in traffic. The number of women in formal employment is increasing due to more people having a good level of education; food safety concerns are growing due to better the education and access to valuable information regarding food (Claasen *et al.,* 2016). The diverse pressure experienced by females from both work and home environments has for example reduced the time that female consumers have for household chores and as a result created a market for convenience food products and fast food restaurants (Schiffman & Kanuk, 2010:328; Story *et al.,* 2002:S43). The modern female consumer is overwhelmed by balancing work and family demands together with providing healthy meals to their families (Johnson *et al.,* 2011:227). Therefore, they will most likely resort to coping strategies and convenience and fast food options and in the process make trade-offs between their own and their children's nutrition in order to save time and energy (Johnson *et al.,* 2011:227).

The hectic lifestyle of most urban consumers due to living a fast-paced life with both men and women being employed and spending a large part of their day away from home resulted in the habit of frequent snacking as well as opting for convenient and fast foods (Abdullah, Mokhtar, Bakar & Al-Kubaisy 2015:505; Bilman, Van Trijp & Renes, 2010; Macintyre, Venter, Kruger & Serfontein, 2012; Dunn, Mohr, Wilson & Wittert, 2011; Van Zyl, Steyn & Marais, 2010:124; Popkin, 2006:291). Their food intake nowadays includes excessive consumption of processed, mass-produced foods and beverages that are high in fat and sugar, packaged snacks, cookies, artificially sweetened drinks and a relatively low intake of fruit and vegetables (Ronquest-Ross *et al*., 2015:07; Macintyre *et al*., 2012; Popkin, 2006:291).

Fast-food outlets account for the highest spending on these convenience foods, with urban consumers looking for a quick bite. Most fast food franchises in urban cities have home delivery services available and this has increased the access to fast food for the urban community even more (Osman *et al.*, 2014:311; Steyn, Labadarios & Nel, 2011; Igumbor *et al.*, 2012). Snack foods are described as a major part of the consumers' food habits, which also form part of the habit that motivates more frequent planned as well as unplanned shopping trips (Cannuscio, *et al*., 2014:16). There is also a tendency for consumers to aim for the consumption of lower-priced food because of the high costs associated with living in urban areas (Osman *et al.*, 2014:312; Igumbor *et al.*, 2012).

Urban consumers actively engage with their local urban food environments by choosing to shop at stores that meet a wide range of social needs (Cannuscio *et al*., 2014:16). These social needs are met through food retailers that offer opportunities for social connection and positive social

encounters (Cannuscio *et al*., 2014:16). For example, individuals often go to food stores, not only to buy food, but also to socially interact with other human beings.

Due to urbanisation being a fast expanding phenomenon in most developing countries, urban consumers have access to a wider range of food products, many of which are high in fat and sugar (Abrahams *et al.*, 2011; Popkin, 2006:292). Processed and preserved foods have become cheaper and are more readily available than fresh produce. There is a major concern about this shift in diet and low activity patterns, which are associated with a change in body composition and disease patterns that are bound to result in increased obesity and non-communicable diseases as leading causes of death globally (MacIntyre *et al*., 2012:70; World Health Organisation, 2003; Feeley, Kahn, Twine & Norris, 2011; Popkin, 2006:291; Vorster, 2002:239).

2.7 CHAPTER CONCLUSION

In this chapter the human ecological perspective as theoretical perspective was presented together with the assumptions that guide this perspective. This was followed by an overview of the factors that influence food choice. The food access dimensions and how they guide the food choice process was discussed and presented. Information on the local urban food environment and the South African urban consumer concluded the literature review. The next chapter addresses the research methodology followed in the study.

Chapter 3
Research methodology

3.1 INTRODUCTION

This chapter provides a detailed description of the research methodology followed for this study. The research design and techniques that were used to achieve the research aim and objectives are discussed. The research objectives, conceptual framework, conceptualisation and operationalisation are presented. The measuring instruments that were used in this study are also explained. The sampling procedures, data collection techniques and data analysis are discussed. Measures taken to ensure the data quality and trustworthiness of the study as well as the ethics of the study are also given in the final section of this chapter.

3.2 RESEARCH DESIGN

The research design highlights how the research process was conducted. The aim of this explorative and descriptive cross-sectional study was to explore and describe the food access dimensions of the local urban food environment of white adults residing in the eastern suburbs of Tshwane.

Cross-sectional studies are typically descriptive and explorative, such as this study. Individuals were not studied over time, but rather at a single time interval (Babbie & Mouton, 2001:92). The research is exploratory because insight into the phenomenon of the food access dimensions to the local urban food environment and the food choice behaviour of adults in the eastern suburbs of the Tshwane metropole were investigated. The study was also descriptive because it presents a picture of a well-defined situation, social setting and relationship by focusing on the 'how' and 'why' questions (De Vos *et al.*, 2011:95). In this study the researcher wanted to describe the food access dimensions and focused on the urban food environment and the contribution of the various food environments to the process.

In order to gain a holistic view of the contribution of the local urban food environment to the food choices of the study group, a mixed method approach was the most appropriate approach for this study as the food choice process is complex and multi-dimensional. Mixed methods involve that both quantitative and qualitative measurements, which complement each other, be used to allow for a more complete understanding of the research problem (Creswell, 2014:4). An explanatory

sequential mix method design was followed. This type of design uses quantitative research, first to test theories and concepts, and then it is followed with qualitative research techniques to further explore in detail (Creswell, 2009:16). Triangulation is common to mixed methods as it involves the use of multiple sources to address one problem (Leedy & Ormrod, 2005). The mixed methods allow for a more complete analysis of the study topic which then lead to an in-depth understanding of the situation. In this study the qualitative techniques were used after the quantitative techniques, in order to explain and elaborate on the results that were obtained in the quantitative phase.

The study was conducted in two phases;

Phase 1: Quantitative phase

In the quantitative phase an electronic survey questionnaire (Addendum B) was used to collect data on the study group's socio-demographic profile, usual food shopping patterns, usual food consumption patterns, frequency of food consumption and food choices.

Phase 2: Qualitative phase

To gain more insight to be able to explain the results in more detail, a qualitative phase was conducted after the first frequency analysis of the data was completed on where most of the respondents resided. The next step was to determine how close the residential areas of the respondents were to food outlets. This was done by means of Geographic Information System (GIS) mapping to identify and map all the food outlets close to where the respondents lived. Then, from the identified and mapped stores, 20 stores were purposively selected to be observed by means of an observation checklist, to gain information on the range, quality and price of the food items (Addendum D). The prices of food products were also compared to the Consumer Price Index applicable in November 2017 by means of a food basket (Addendum E).

The following aim and objectives guided this study:

3.3 RESEARCH AIM AND OBJECTIVES

The aim of this study was to explore and describe the food access dimensions of the local, urban food environment of adults residing in the eastern suburbs of the Tshwane metropolitan area in order to describe how it contributes to the food choices of the study group.

Research objectives:

1. To locate, explore and describe the local urban food environment of the study group.
   1.1. To locate, explore and describe the formal food retail sector (supermarkets, hypermarkets, stand-alone food stores, fast food outlets, convenient stores and restaurants).
   1.2. To explore, locate and describe the informal food retail sector (spaza shops, street vendors and open markets).
2. To explore and describe the type, quality and price of the food available in the formal and informal food retail sector of the eastern suburbs of Tshwane.
   2.1. To explore and describe the type, quality and price of the food available in the formal food retail sector of the eastern suburbs of Tshwane.
   2.2. To explore and describe the type, quality and price of the food available in the informal food retail sector of the eastern suburbs of Tshwane.
3. To determine and describe the food access dimensions (availability, accessibility, affordability, acceptability and accommodation) of the study group.
4. To determine and describe the food choices of the study group in terms of their food consumption patterns and how the food access dimensions contribute to the food choices of the study group.

3.4 CONCEPTUAL FRAMEWORK

The conceptual framework given in Figure 3.1 is based on the human ecological perspective, as well as the food choice process. It assisted in the research process to obtain a holistic understanding of the various food environments and how the food access dimensions are linked and contributed to the food choices of the study group.

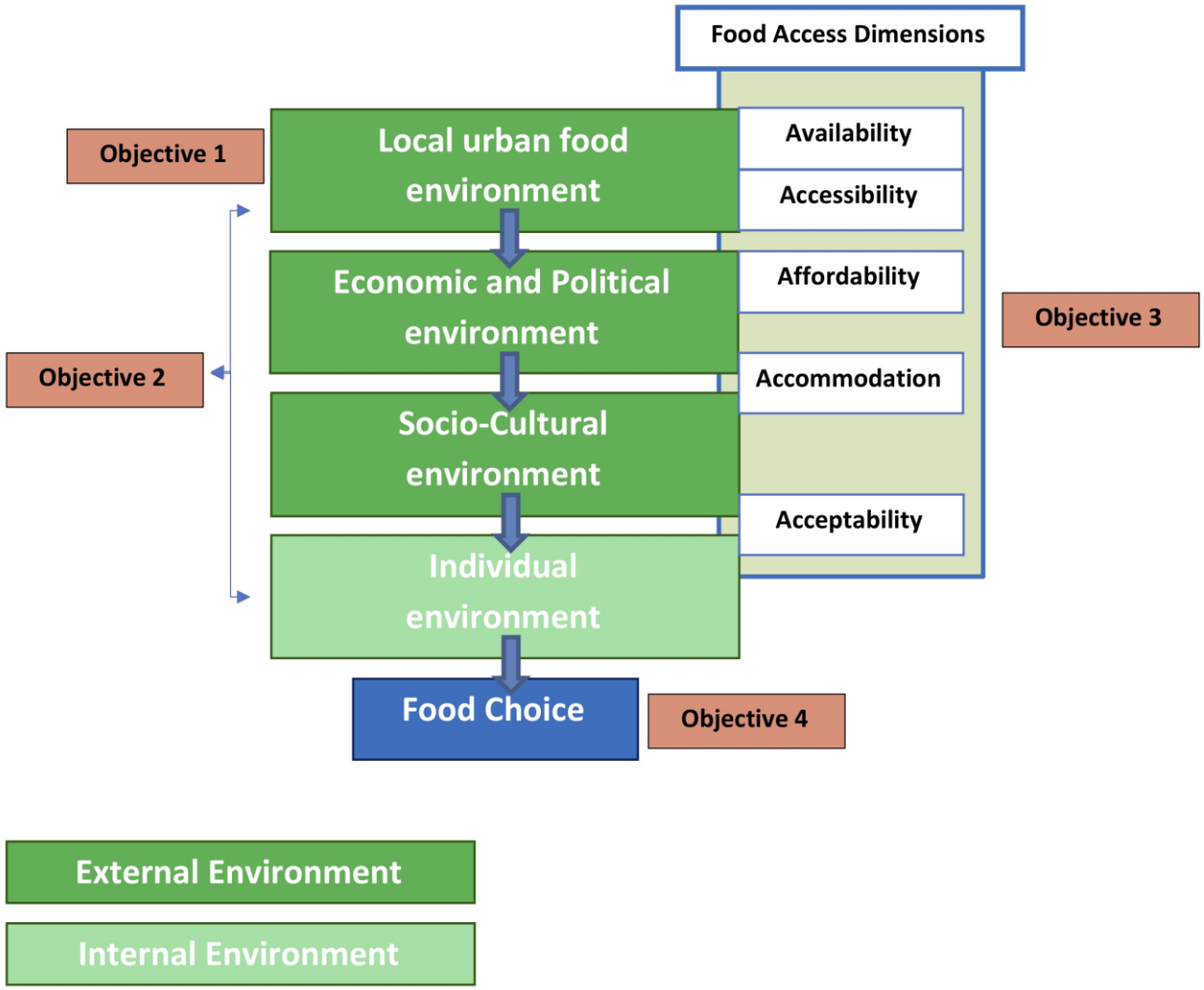

FIGURE 3.1: CONCEPTUAL FRAMEWORK (adapted from Viljoen, 2010:23)

The external environment, as described in Chapter 2 (see 2.3.1), consists of the local urban food environment, economic and political environment and the socio-cultural environment. The internal environment, also described in Chapter 2 (see 2.3.2), consists of the individual environment. Both the external and internal environments contribute to the food choice process as illustrated. The interrelated and interdependent food access dimensions that determine and guide the food choice process are portrayed on the right-hand side of the model. These food access dimensions are linked to the environment where they are most applicable. The local urban food environment (physical environment) influences the availability and accessibility of food, which addresses the first objective of this study. The economic and political environment influences the affordability of food, whereas accommodation and acceptability are influenced by the socio-cultural as well as individual environments that form part of Objective 2. The five food access dimensions (availability, accessibility, affordability, accommodation and acceptability) relates to Objective 3. The last objective (Objective 4) deals with how the food access dimensions converge and contribute to the food choices of the study group.

The conceptualisation of the main concepts as applied to the study are given in the next section.

3.5 CONCEPTUALISATION OF MAIN CONCEPTS

Local urban food environment describes the type, location and number of food outlets in a specific urban area and what consumers encounter in and around these outlets (Caspi *et al*., 2012:1172). The local urban food environment essentially contributes to what, where, when and how people can procure food.

Formal food retail sector is a multifaceted, global group of diverse food retailers that supply most of the food consumed by the world population. The formal food sector includes supermarkets, hypermarkets, stand-alone food stores, fast-food outlets, convenient stores and restaurants (Food and Agriculture Organisation of the United Nations, 2008:1).

Informal food retail sector includes small food trade enterprises and small service providers (legal and illegal) that produce a variety of products, for example spaza shops[3], street vendors and open markets. The informal food sector is characterised by very low capital investment, the absence of accounts and the non-payment of all or some taxation (Food and Agriculture Organisation of the United Nations, 2008:1).

Availability refers to how obtainable food is in an individual's neighbourhood, for example, fresh fruit and vegetables (Holsten *et al.*, 2012; Drimie *et al*., 2013; Bryant *et al.*, 2003:14). Availability of food is food that is present in the household and available for consumption (Story *et al.,* 2008:254). Availability also refers to the adequacy of the supply of healthy food and might include the presence of certain types of restaurants near people's homes or the number of places to buy produce (Caspi *et al.,* 2012:1172).

Accessibility could inherently be more geographic, as it refers to the location of the food supply and ease of reaching the location. Travel time and distance are key measures of accessibility in an urban environment (Caspi *et al.*, 2012:1173). Food access is also to a large extent determined by food prices (Pieters *et al.*, 2013:8).

Affordability refers to a person's ability to obtain food according to the amount of money that person has available to purchase the food required. It is simultaneously governed by the time, skills and facilities the consumer has for preparation and storage of a particular food (Larson *et al*., 2009:75; Bryant *et al.*, 2003:14).

[3]*Spaza shops refer to an informal convenience kiosk usually run from a person's home (Maundeni, 2005:13).*

Acceptability refers to people's attitudes about the quality of their local food environment, and whether the given supply of products meets their personal standards, preferences and norms or not. It also includes whether the quality of the food products are acceptable to the consumer (Caspi *et al.*, 2012:1178).

Accommodation means how well the local food sources accept and adapt to local consumers' needs (Caspi *et al.*, 2012:1179). Food stores that offer credit facilities or extended operating hours are examples of how they adapt to accommodate the needs of consumers.

Food choice involves the selection and consumption of food and/or beverages, considering what, how, when, where and with whom people eat, as well as other aspects of their food and eating behaviours (Sobal *et al*., 2006:1). Food choice simultaneously refers to a set of conscious and unconscious decisions made by a person at the point of purchase, the point of consumption or any point in-between (Sobal & Bisogni, 2009:s38; Hamilton, Mcllveen & Strugnell, 2000). The food choice process incorporates, not only decisions based on conscious reflection, but also those that are automatic, habitual and subconscious (Furst *et al.*, 1996:251). Food choices play an important role in symbolic, economic and social aspects of life by expressing preferences, identities and cultural meanings (Sobal *et al.*, 2006:1).

Food consumption patterns refer to the continuing pattern when an individual chooses, prepares and consumes food from the available and acceptable food for a specific meal or snack (Viljoen & Gericke, 2001). Food consumption patterns include the temporal distribution of food intake over a twenty-four hour period. It thus refers to the meal pattern and meal composition which includes the timing and number of eating events (Raulio, 2011; Makela, 2000).

Meal pattern refers to the number, composition and distribution of meals, snacks and in-between meals through the course of a day (Viljoen, Botha & Boonzaaier, 2005; Fjellström, 2004; Mäkelä, 2000).

Meal composition refers to the food components or food items served or consumed at an eating occasion or event (Kgaphola & Viljoen, 2004).

3.6 OPERATIONALISATION

Operationalisation deals with how the researcher measured the concepts or variables used in the study (Babbie & Mouton, 2001:98). Table 3.1 explains how the concepts derived from the set objectives for this study were measured and also indicates how each objective was achieved through

the measuring instrument (i.e. survey questionnaire and store observations) by indicating the relevant sections and question numbers that were applicable from each measuring instrument.

TABLE 3.1: OPERATIONALISATION

Objectives & sub-objectives	Concepts	Dimensions	Indicators	Measurement	Measuring instrument
1. To locate, explore and describe the local urban food environment					
1.1 To locate, explore and describe the formal food retail sector	Formal food retail sector	Supermarkets, butchers, green grocers, convenient stores, fast food outlets, restaurants	Number and types or range of food retail stores Store density	Survey question A3	GIS mapping Spatial analysis Questionnaire
1.2 To locate, explore, and describe the informal food retail sector	Informal food retail sector	Open food markets	Number and types or range of open food markets Market density	Observation checklist	Open market observation
2. To explore and describe the type, quality and price of the food available in the formal and informal food retail sectors of the eastern suburbs of Tshwane.					
2.1. To explore and describe the type, quality and price of the food available in the formal food retail sector of the eastern suburbs of Tshwane.	Type of food Quality of food Price of food	Food available and variety of food products Quality of the food products Unit cost	Availability Variety Quality norms and standard Price per kg or unit	Observation checklist (adapted from Freedman & Bell, 2009) Observation checklist Interview schedule Observation checklist Observation checklist	Store observation (Freedman & Bell, 2009) Store observation and personal communication Store observation
2.2. To explore and describe the type, quality and price of the food available in the informal food retail sector of the eastern suburbs of Tshwane.	Type of food Quality of food Price of food	Food available and variety of food products Quality of the food products Unit cost	Availability Variety Quality norms and standards Price per kg or unit	Observation checklist Observation checklist Observation checklist	Open market observation Open market observation Open market observation
3. To determine and describe the food access dimensions (availability, accessibility, affordability, acceptability and accommodation) of the study group.	Access dimensions	Availability	Availability of food retail outlets	Survey questions B1, B2, B3.1 B4 and B5 Observation checklist Observation checklist	GIS mapping and Spatial analysis Questionnaire Store observation Open market observation
			Food availability	Survey questions B3.2 and B3.3 Observation checklist	Questionnaire Store observation
		Accessibility	Accessibility of food retail outlets Store density Access to food products Variety of food products	Survey question B3.1, B3.4, B3.5, B3.8 Survey questions B5 Observation checklist	Questionnaire Questionnaire Store observation
		Acceptability	Quality of food products Price of food products Variety of food products	Survey questions B3.1, B3.2, B3.5, B3.6 Observation checklist	Questionnaire Store observation
		Affordability	Price of food products	Survey questions A5, A6, B3.7	Questionnaire

Objectives & sub-objectives	Concepts	Dimensions	Indicators	Measurement	Measuring instrument
				Observation checklist Food basket	Store observation Market basket
		Accommodation	Variety of food products Payment options Operating hours	Survey questions B3.5, B3.9 Observation checklist	Questionnaire Store observation
4. To determine and describe the food choices of the study group in terms of their food consumption patterns and how the access dimensions contribute to the food choices of the study group.	Food choices	Food consumption patterns	Meal pattern	Survey questions C1-C8	Questionnaire
			Meal composition	Survey questions C16, C18	Questionnaire
		Food access dimensions	Availability	Survey questions B1, B2, B3.1-B3.3, B4, B5, C15	Questionnaire
			Accessibility	Survey question B3.1, B3.4, B3.5, B3.8, B5	Questionnaire
			Acceptability	Survey question B3.1, B3.2, B3.5, B3.6	Questionnaire
			Affordability	Survey question A5, A6, B3.7	Questionnaire
			Accommodation	Survey question B3.5, B3.9	Questionnaire
		Healthy food choices	Attitude towards healthy eating	Survey question C12-C14	Questionnaire
			Adequacy of food consumed	Survey question C16, C18	Questionnaire

3.7 MEASURING TECHNIQUES

This section discusses the measuring techniques that were used to achieve the aim and objectives of the study. These included an electronic survey questionnaire, Geographic Information System (GIS) mapping, store observations and a food basket.

3.7.1 Phase 1: Quantitative phase

An electronic survey questionnaire (see Addendum B) was compiled and used as data collection technique for the quantitative data.

3.7.1.1 Survey questionnaire

The survey questionnaire consisted of three sections and the outline and discussion thereof is given. Apart from questions regarding the socio-demographics of the respondents, two other sections on their food shopping patterns and usual eating patterns were included. Questions used in other studies to identify aspects of the food environment were included and adapted to the South African circumstances (Caspi *et al.,* 2012:1185; Kennedy, Ballard & Dop, 2011; Freedman & Bell, 2009; McKinnon *et al.,* 2009). Both open- and closed-ended questions were used in the questionnaire.

Section A: Socio-demographic information

Information on the demographic profile of the respondents were collected through closed- and open-ended questions and included information such as age, gender, area of residence within the Tshwane metropolitan area, educational level, home language and population group. Optional questions that were also included were the monthly household income and monthly food budget. Respondents were also asked to provide their household structure, household size and indicate who is mainly responsible for food purchasing and preparation in their household. These questions were adapted to the South African circumstances.

Section B: Usual food shopping patterns

In this section, the accessibility to food in the local urban environment was measured in terms of the access dimensions of availability, accessibility, affordability, acceptability and accommodation. The questions included how frequently food items were purchased from specific food stores/outlets listed. Another set of questions included was where certain food items were purchased from the stores/outlets listed. A 5-point Likert-type scale was also used to determine

the level of agreement on statements regarding specific aspects relating to the access dimensions of the food stores/outlets they purchased from. Respondents were also asked if they made use of online or internet shopping for food and how they transported purchased food home.

Section C: Usual eating patterns

In order to gain insight into the food consumption patterns as part of the food choice of the respondents, questions on the number of meals eaten per day− including which meals (breakfast, lunch, dinner and snacks) were consumed were asked . Questions regarding where most meals were eaten (at home or away from home) and if they, their friends and the people they live with cared about healthy eating were included. Another question on whether food were included as part of their meals or snacks the day before were also asked. The respondents were then asked questions regarding the availability and frequency of consumption of certain food groups and meals (Nuvoli,, 2015; Neumark-Sztainer, Larson, Fulkerson, Eisenberg & Story, 2010; Boutelle, Fulkerson, Neumark-Sztainer, Story & French, 2007) .

3.7.2 Phase 2: Qualitative phase

In the second phase the measuring techniques that were used to gather the qualitative data were the Geographic Information System mapping, store observations and a food basket.

3.7.2.1 Geographic Information System mapping

Geographic Information System (GIS) measurement was used to identify, describe and map all the food retail outlets in the eastern suburbs of Tshwane. GIS mapping provides a quick and cost-effective way to examine neighbourhood differences without surveying the area (Ghirardelli, Quinn & Foerster, 2010).

3.7.2.2 Store observations and food basket

Store observations were conducted based on Freedman and Bell's (2009) observation checklist (see Addendum F and G) adapted to the South African circumstances. Trained fieldworkers conducted the in-store observations of food retail stores and open markets. Store observations were done in order to gain insight into the variety of food products that food retail stores offered. The following store sections were observed: fresh produce, dairy, meat, bread and alcoholic beverages and other beverages. The floor space and layout of the stores were also observed. Questions regarding the variety, quality and price of certain food products (including fresh fruits, vegetables, dairy products, meat, bread, soft drinks, beverages and juices and other products

such as tobacco and alcoholic beverages) were recorded. These observation questions included whether these stores offered certain fresh produce, tinned products, frozen products and what the prices of certain products were.

Regarding the price of certain food products, a food basket was developed to investigate the affordability of chosen food items and compare the prices throughout the stores observed with one another as well as with the Customer Price Index. The food basket was developed from the National Agricultural Marketing Council's (NAMC) 28-item urban food basket, together with the Victoria Health Food Basket (Palmero & Wilson, 2007) and based on a previous study done in Worcester in the Western Cape. The food items that were included were items that the respondents of this study indicated as items frequently purchased.

3.8 PRE-TESTING OF THE SURVEY QUESTIONNAIRE

The survey questionnaire was pre-tested before the actual data collection commenced. This was done to assess the questionnaire for readability and comprehension (Creswell, 2014; Neuman, 2000; Delport & Roestenburg, 2011:195; De Vos et al., 2011). This is a necessary step in the research process to ensure validity and reliability of the questionnaire (Salkind, 2012:269). The survey questionnaire was pre-tested on a group of 10 adults who had the same characteristics as the study group, although they did not partake in the study. It is essential that respondents participating in the pre-test of the study comprise of people who have characteristics similar to those of the respondents to ensure content validity of the questionnaire (Babbie & Mouton, 2001:244-245). Questions that proved not to be clear were rephrased according to the recommendations made by the pre-test respondents.

3.9 UNIT OF ANALYSIS

This study forms part of a larger research project that investigated the food practices of adults 25 years and older in the Tshwane metropolitan area. This study reports on the urban adults in the eastern suburbs of the Tshwane metropolitan area. The unit of analysis for this study was urban adults, aged 25 years and older from both genders.

3.10 THE SAMPLE AND SAMPLING TECHNIQUE

The larger project of which this study forms part included respondents residing in the Tshwane metropolitan area, however this study reports on a sample of 230 urban respondents aged 25 and older, of both genders, residing in the eastern suburbs of Tshwane.

3.10.1 Phase 1: Quantitative phase

Convenience sampling was used as non-probability sampling technique. This method is used in situations where the population elements are conveniently available and is useful in exploratory research due to time and financial limitations (Maree & Pietersen, 2007:147). A self-administered electronic survey questionnaire was distributed to consumers on the database ofConsulta Research Pty Ltd a consumer-related research company who has access to a large data base of South African consumers (REF) This assisted to obtain the required number of questionnaires to reach the goals of this study (Maree & Pietersen, 2007:148). The requirements set by the study were that respondents aged 25 years and older, were computer literate and have access to an electronic device were eligible to participate in the study.

3.10.2 Phase 2: Qualitative phase

Two main notions can be used to assess the food environment, namely density and proximity (Charreire *et al.*, 2010). In this study, only density was measured. Density relates to the number of food outlets in an administratively defined area or specific zone (Charreire *et al.*, 2010). Geographic Information System (GIS) mapping was used to indicate the density of food outlets and to identify and map the food outlets in the eastern suburbs of Tshwane that represent the suburbs where the majority of the respondents reside. Some of these mapped food stores were included in the in-store observations. A total of 20 stores were then purposefully selected from the areas where most of the respondents reside (see Figure 3.2) and observed. Similar stores were purposefully selected to collect the food basket information.

3.11 DATA COLLECTION

Data collection was conducted in two phases. The first phase comprised of survey questionnaires and the second phase comprised of GIS mapping and store observations.

3.11.1 Phase 1: Quantitative phase

For the larger project of which this study forms part of, Consulta Research Pty Ltd. (a research company that specialises in consumer-related research) was contracted to assist with the data collection (Consulta, 2018). Consulta invited the consumers on their data base who met the criteria for inclusion (were 25 years of age or older and who lived in the urban areas of Tshwane) to participate in the study. Consulta then distributed a self-administered electronic survey questionnaire (see Addendum B) on 26 May 2016, via email to those consumers on their data base who showed interest to participate in the study and who gave their informed consent after reading the cover letter that explained the purpose of the study (see Addendum A). The data collection continued up to the end of June 2016 when an adequate number of fully completed and usable questionnaire were received by Consulta.

3.11.2 Phase 2: Qualitative phase

Density of food outlets were determined through the GIS mapping of food outlets in the residential areas of the eastern suburbs of Tshwane, where most of the respondents reside. This was to get an indication of where food retailers and other food outlets were distributed in the area. This approach was helpful to determine the availability and accessibility of food retail outlets in the study area.

A total of 20 stores were purposively selected and visited from suburbs where most of the respondents reside to conduct the food store observations. The observation checklist (see Addendum D) was used to determine the types or variety, quality and price of food available in food stores. Trained fieldworkers assisted in the observations by means of an observation checklist. The three fieldworkers who conducted the store observations, were trained how to observe and record the layout of the food stores as well as how to judge the quality of the food commodities in the different areas of the store. They were also given instructions on how to record the observations by means of the checklist. A cover letter and consent form (see Addendum C) that provided the information on the purpose of the study and to obtain consent and permission from the store manager were presented to the store management upon arrival at the selected stores. Observations commenced only after informed consent was obtained from the store management and these observations conducted over a period of three months during October to December 2016. During these store observations the trained fieldworkers also collected data on the price of certain food items by means of a food basket. Similar procedures were followed to gain access to food retailer outlets when information on the price of food basket items were collected.

3.12 DATA ANALYSIS

Data analysis proceeded after the completion of each phase.

3.12.1 Phase 1: Quantitative phase

The collected data was checked, cleaned and entered into an Excel spreadsheet. To summarise the data, the statistical software IBM© SPSS© version 23 was used to analyse the data. Descriptive statistical analysis was used to represent the data frequencies and tendencies (Babin & Zikmund, 2015:67). Organisation and summarisation were necessary to put results in a more comprehensive format (Pietersen & Maree, 2007:186). Examples thereof include frequencies, percentages, means and the median, as well as standard deviation. Descriptive statistics can be divided into two ways of representing or describing data, either graphical or numerical (Pietersen & Maree, 2007:183). Graphs and tables were used to represent the data in a better understandable way (Zikmund & Babin, 2010). Organisation and summaries were necessary to put results in a more comprehensive format (Pietersen & Maree, 2007:186). Graphs and illustrations accompanied the numerical data analysis of Phase 1.

3.12.2 Phase 2: Qualitative phase

The GIS mapping provided a visual depiction of the location of food stores in the study area. Results were presented and analysed (Charreire *et al.*, 2010) to provide a geospatial representation of the formal and informal food outlets in the eastern suburbs of Tshwane as described above (see 3.7.2.1). Data collected from the store observations as well as the food basket were captured in Microsoft Excel to assist to summarise and analyse the data in order to gain an insight into the variety, quality and price of food products available in the study area.

3.13 ENSURING DATA QUALITY AND COMBATTING ERROR

To add credibility to the study certain measures were taken to minimise and prevent errors. This is important as reliability and validity are essential as they determine the quality of the study (De Vos *et al.*, 2011:160). Triangulation was achieved through the employment of different data collection techniques by using quantitative as well as qualitative research techniques through the mixed methodological approach of an explanatory sequential mixed methodology. The data collection techniques complemented each other, and not only enhanced triangulation, but contributed to the collection of extensive data of the food environment in a holistic manner.

3.13.1 Validity

Validity is reached when a measuring instrument effectively and accurately measures or describes what it is supposed to measure or describe (Leedy & Ormond, 2005:81). Three types of validity are applicable to this study, namely construct, content and face validity.

Construct validity is concerned with the constructs used in the development of the measuring instruments to show a logical relationship between variables (De Vos *et al.*, 2011:160; Babbie & Mouton, 2001:122). This was achieved through a thorough and extensive literature review to support findings and assist with the interpretation of the findings by means of a wide range of up-to-date literature sources that were consulted and extensively reviewed.

Content validity deals with the content that can either be the topics or items of a measuring technique and whether if it measures the concepts it intends to measure. Content validity also ensures that all the concepts are measured to achieve the aim and objectives of the study. Subject experts in consumer sciences from the Department of Consumer and Food Sciences assessed the questionnaires to ensure that the questions were phrased correctly and unambiguously and that it measures what it intends to measure (Neuman, 2000:212; Salkind, 2012:118, De Vos, 2011:161).

Face validity is a judgement by the scientific community that the indicators sufficiently measure the constructs (Neuman, 2000:192). It concerns the superficial appearance or the face value of a measurement instrument (De Vos *et al.*, 2011:161). Extra care was taken during the data collection process and more specifically the design of the questionnaire to avoid errors (Pietersen & Maree, 2007:158). The appearance of the questionnaire, format of the questions, question sequence and wording of the questions were important factors that were taken into consideration when the questionnaire was compiled (Delport & Roestenburg, 2011:192-193).

3.13.2 Reliability

Reliability describes the consistency, accuracy and precision of the measuring instruments (De Vos *et al.*, 2011:161). It is important to obtain similar results if the study is to be repeated (Leedy & Ormond, 2005:82). Data collection reliability is the key criteria for reliability (Mouton, 1996:144). To ensure reliability, constructs used in this study were identified and clearly conceptualised and defined, according to relevant theories. Aspects identified were measured using multiple indicators (see Table 3.6). Lastly, the questionnaire was pre-tested to eliminate all possible problems with the posed questions. To further accommodate reliability, measuring techniques were adapted to be suitable for the South African situation.

3.14 ETHICS

The research proposal of the larger project was submitted to the ethics committee of the Faculty of Natural and Agricultural Sciences of the University of Pretoria for ethical clearance before data collection commenced. The ethics clearance number is EC160318-009. The study adhered to the guidelines for ethical conduct as it engaged with human subjects as a source of data. The respondents were given the freedom of choice to participate in the study and participants gave informed written consent (see Addendum F). Informed consent refers to the accurate communication of all possible information that relates to the research project (De Vos *et al.*, 2011:59). A consent form detailing the purpose of the study as well as important and necessary information about the participants' rights, anonymity and confidentiality was attached to the survey questionnaire. Anonymity and confidentiality were ensured for participants and names remained anonymous in the final research project. They also had the option to withdraw from the study at any stage should they wish to do so. For the store observations permission was obtained from the branch managers or shop owners and operators through an information form and consent letter describing the process and information needed.

3.15 CHAPTER CONCLUSION

This chapter explained the research design and methodology followed to achieve the aims and objectives of this research. A conceptual framework to guide the study together with all the main concepts of the study were explained. The operationalisation of the main concepts was summarised in a table and the measuring techniques used to measure each concept were indicated. The sampling procedures for selecting the respondents, and the applicable data collection techniques and data analyses were explained. Measures to ensure data quality as well as the ethical conduct were addressed. The following chapter will focus on the results and discussion of the results.

Chapter 4
Results and discussion

4.1 INTRODUCTION

In this chapter the results of the study are presented, interpreted and discussed. The discussion of the results will follow and will be according to the objectives of the study to achieve the research aim presented in the previous chapter. Firstly, information on the sample and demographic profile of the respondents is given. The local food environment regarding the type, quality and price of food available together with the food access dimensions are discussed. Lastly, the food choices of the study group and how the access dimensions contribute to their food choices are also given.

4.2 SAMPLE AND DEMOGRAPHIC PROFILE

Information on the study group is given in terms of the description of the sample and their demographic profiles which include a description of their socio-demographics and household structure.

4.2.1 Sample

The results of the study are based on the responses of a sample of 230 urban adults aged 25 years and older, residing in regions 3, 4 and 6 of the Tshwane metropolitan area.

4.2.2 Socio-demographic profile of the respondents

The demographic information of the respondents was obtained from both closed- and open-ended questions (see section A of the survey questionnaire, Addendum B). This information is presented in two different tables. Table 4.1 presents the demographic profile of the respondents in terms of age, gender, level of education and home language. Table 4.2 presents the household structure of the respondents.

TABLE 4.1: SOCIO-DEMOGRAPHIC INFORMATION (n=230)

Characteristics		Frequency (n)	%	Mean
Age	Generation Y (21 – 39yrs)	41	17.9	53.05
	Generation X (40 - 51yrs)	56	24.5	
	Baby Boomers (52 – 70yrs)	108	47.2	
	Matures (71 yrs and older)	24	10.5	
Gender	Female	89	38.7	
	Male	141	61.3	
Level of education	Completed secondary school	30	13.0	
	Undergraduate student	7	3.0	
	Graduate	97	42.2	
	Honours graduate	46	20.0	
	Masters graduate	33	14.3	
	Doctors graduate	16	7.0	
Home language	Afrikaans	174	75.7	
	English	50	21.7	
	Other	5	2.2	

Age

The age of the respondents ranged between 25 and 83 years of age with the mean age being 53,05 years old. Respondents were grouped according to the generation group classification as described by Schiffman & Kanuk (2010:410). The first group is Generation Y, which are the group of respondents born between 1977 and 1995 and were between the ages of 21 and 39 years old at the time of the study. The second group, Generation X, are the group of respondents who were born between 1965 and 1976 and were between the ages of 40 and 51 years old. The third group are the Baby Boomers which were the group of respondents who were born between 1946 and 1964 and were between the ages 52 and 70. The last group, the Matures, was the people born in 1945 and earlier and were 71 years and older (Bakewell & Mitchel, 2003; Schiffman & Kanuk, 2010:410).

Most of the respondents (47,2 %, n=108) fell within the Baby Boomer group, which was indicated by those who were between the ages of 52 and 70. Nearly a quarter of the respondents (24,5 %, n=56) indicated that they were aged between 40 and 51, which falls in the Generation X group. Some respondents (17,9 %, n=41) indicated that they were aged between 21 and 39 years and fall under the group of Generation Y. Only 10,5 % (n=24) of the respondents indicated that they were aged 71 years and older which represent the Mature group.

Gender

Both genders participated in the study and were represented by 61,3 % (n=141) males and 38,7 % (n=89) females. The reason for this might be that most of the respondents were from the older aged groups (between ages 52 and 70) that could indicate that they are retired men and have more time to answer questionnaires. More men (61,3 %, n=141) completed the questionnaire, which is interesting as usually women are more willing to participate in answering questionnaires (De Ruijter & Van der Lippe, 2009:8, Keusch, 2015). Females are usually regarded as the

household gatekeepers who make most of the decisions regarding food purchases and preparation (Sishana *et al.,* 2014:11; Damman & Smith, 2009:249).

Area of residence

Respondents were asked in an open-ended question to name the area within the Tshwane metropolitan area they lived in. The residential areas marked by most of the respondents included Centurion, Lyttleton, Eldoraigne, Waterkloof, Garsfontein and Lynnwood. These residential areas fall within regions 3, 4 and 6 of the Tshwane metropolitan area.

Educational level

The respondents can be described as highly educated as the majority respondents indicated that they completed a tertiary education, as 42,2 % (n=97) had a first degree, 20 % (n=46) an honours degree, 14,3 % (n=33) a master's degree and 7 % (n= 16) a doctoral degree.

Home language

The majority of the respondents (75,7 %, n=174) indicated Afrikaans as their home language, followed by those who spoke English (21,7 %, n=50). Only 5 respondents indicated that they have other home languages and indicated Dutch, French and German (2,2 %, n=5) as home languages.

The household structure as part of the socio-demographic information is presented in Table 4.2.

TABLE 4.2: HOUSEHOLD DEMOGRAPHICS (n=230)

Household structure:		Frequency (n)	%
Number of people in the household	1	20	8.7
	2	80	34.8
	3	50	21.7
	4	50	21.7
	5+	30	13
Household structure	Single (living on own)	23	10.0
	Married (without children)	72	31.3
	Nuclear family (both parents and children)	77	33.5
	Extended family (parents, children and other)	32	13.9
	Single parent family (father/mother with children)	10	4.3
	Living with other family members	1	0.4
	Living with parents/ friends or others	15	6.5
Number of dependent children under 18 years old:	None	161	70.0
	1	33	14.3
	2	31	13.5
	3	3	1.3
	4	2	0.9
Number of children: Infants (0-2 years)	None	220	95.7
	1	10	4.3
Toddlers and pre-schoolers (3-6 years)	None	207	90.0
	1	20	8.7
	2	3	1.3
Primary schoolers (7-12 years)	None	197	85.7

Household structure:		Frequency (n)	%
	1	22	9.6
	2	10	4.3
	3	1	0.4
Secondary schoolers (13-18 years)	None	200	87.0
	1	21	9.1
	2	8	3.5
	3	1	0.4
Number of adult children (older than 18 years)	None	11	4.8
	1	33	14.3
	2	107	46.5
	3	45	19.6
	4	20	8.7
	5	9	3.9
	6	3	1.3
	7	1	0.4
	8	1	0.4

Number of people in household

Most of the respondents were part of a two-person households (34,8 %, n=80). This group was followed by the household size of three people (21,7 %, n=50) as well as the household size of four people (21,7 %, n=50). Only some of the respondents (13 %, n=30) indicated that they were part of a household consisting of between 5 and 9 people.

Household structure

A third of the respondents (33,5 %, n=77) indicated that they were part of a nuclear family. The term “nuclear family” is used to define a family group consisting of a pair of adults and their children (Bryant *et al*., 2003:191). Nuclear families are typically married couples in contrast to single parents and extended families (Utter, Denny, Robinson, Fleming, Ameratunga & Grant, 2013:3). Nearly another third, 31,3 % (n=72) of the respondents indicated that they were married couples without any children. Some respondents (13,9 %, n=32) also indicated that they were an extended family consisting of parents, children and other family members, followed by 6,5 % (n=15) and 4,3 % (n=10) who were living with their parents / friends or others and being single parents respectively. These groups were classified according to Schiffman and Kanuk (2010:332).

Number of dependent children under 18 years old

The majority of the respondents (70,0 %, n=161) indicated that they did not have any dependent children under the age of 18 years living in their households. Respondents with only one dependent child represented 14,3 % (n=33) and those with two dependent children under the age of 18 living in the household were 13,5% (n=31) of the study group. The reason for this might be because the majority of the respondents (57.7%, n=132) were aged above 52 years and most of their children might be living on their own and not at home anymore.

Number of children

Almost 90 % of the respondents had no children in their households followed by 9,6 % (n=22) that had only one primary schooler (7-12 years). This was followed by one secondary schooler (13-18 years) (9,1 %, n=21) which was followed by respondents with one toddler / pre-schooler (8,7 %, n=20). Only 10 respondents indicated that they had one infant in the household (4,3 %, n=10).

Number of adult children

Most of the respondents (46,5 %, n=107) indicated that they are two adults in the household, followed by 19,6 % (n=45) who had three adults over 18 years old living in their household.

In the next sections the results of the study will be presented according to the objectives set.

4.3 LOCAL URBAN FOOD ENVIRONMENT

The first objective deals with the location, exploration and description of the local urban food environment.

Food retail in South Africa is largely dominated by five major players (Shoprite-Checkers, Woolworths, Spar , Pick n Pay and Walmart's Cambridge foods) whose growth over the past ten years have been driven by an accelerated increase in new store openings across the country. The new player, Walmart's Cambridge Foods with Food Lovers Market, is also becoming an increasingly important player (Trade Intelligence, 2016).

In South Africa, the food retail sector consists of the formal and informal sector. The majority of the respondents reside in regions 3, 4 and 6 of Tshwane, Gauteng Province (see 4.2.2 − demographic profile). These regions include the following suburbs: Brooklyn, Hatfield, Centurion, Lyttleton, Eldoraigne, Waterkloof, Garsfontein and Lynnwood. A typical suburb like this consists of a variety of formal (supermarkets, convenience stores, fast food outlets and restaurants) as well as informal food shops (open markets and street vendors) within close proximity of where the respondents reside.

4.3.1 Formal food retail sector

The formal food retail sector includes supermarkets, butchers, green grocers, convenient stores, fast food outlets and restaurants. The highly developed and competitive formal food retail sector is represented by the five major chains, namely Shoprite-Checkers, Woolworths, Pick n Pay, Spar

as well as Walmart's Cambridge foods. This formal food retail sector makes up 70 % of total food sales and smaller local supermarkets and convenience stores make up 30 % of food retail sales (Trade Intelligence, 2016).

Through GIS mapping and spatial analysis, a map was compiled to indicate the distribution of the respondents per sub-place and the number, range or types and density of the formal food retail stores situated in regions 3, 4 and 6 of Tshwane. Typically, a sub-place in one of these areas would include a number of shopping malls or centres (big and small) with formal as well as informal food retail stores available (Ronquest-Ross *et al.*, 2015). A shopping mall is usually a large building with multiple shops inside and typically have two or three floors with several large stores on the ends. These shopping malls include Brooklyn Mall, Menlyn Mall, Centurion Mall and The Grove, to name just a few, that would comprise of multiple food stores that include some of the major chains, a variety of restaurants and take-away food stores as well as smaller speciality food stores such as biltong, fruit and nuts, ice-cream and candy shops. Smaller retail centres are usually open-air and include Hillcrest centre and Groenkloof Plaza. These smaller retail centres also include a variety of food stores but less than the big shopping malls and usually smaller stores.

Figure 4.1 illustrates that numerous retail centres are available, within a radius of a kilometre, from where most respondents reside.

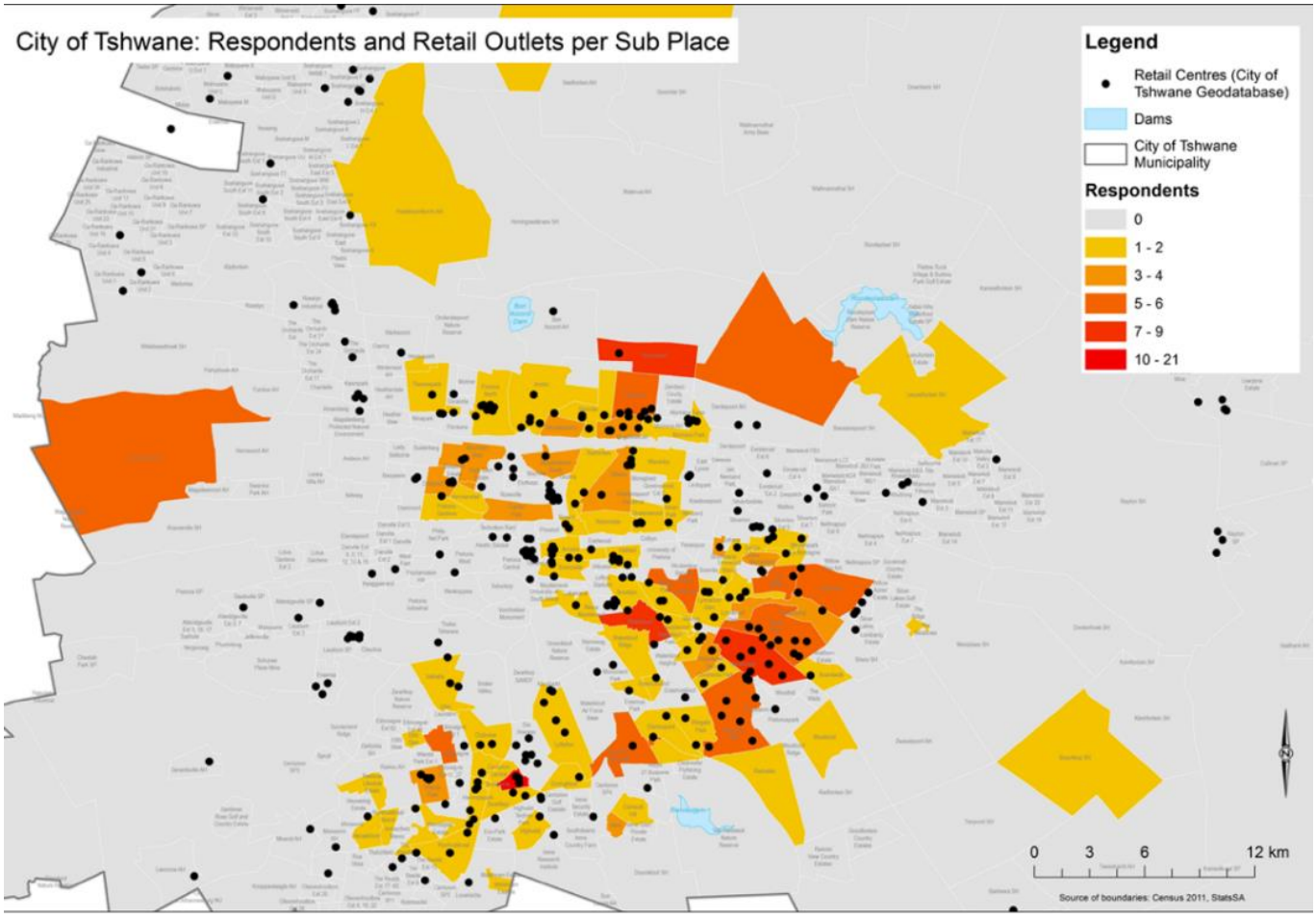

FIGURE 4.1: MAP OF CITY OF TSHWANE − RESPONDENTS AND RETAIL OUTLETS PER SUB-PLACE

In Region 3 the larger shopping malls and centres include Queens Corner Shopping Centre, Queens Quarter, Sunnypark Shopping Centre, Loftus Park, Brooklyn Mall, Hillcrest Boulevard, Wonderboom Junction Shopping Centre, Doornpark Shopping Centre, Rietfontein Pavilion Centre, North Park Mall, Wonderpark Shopping Centre, Kolonnade Shopping Mall and Atlyn Shopping Centre. Food retail stores range from big to small and include Woolworths, Shoprite Checkers, Pick n Pay, Spar, Food Lovers Market and many more. Some of these food retail stores such as Woolworths can be found as stand-alone food stores or as department stores. Some of these food retail chains also have a range of stores. The Spar group for example includes of the following types of stores: Superspar, Spar and Kwikspar. Superspar usually have the full range of groceries and general merchandise which are aggressively priced with extensive service departments such as fresh produce, in-store bakery, butchery, deli and meal solutions. Spar stores focus on neighbourhoods or more rural areas. Spar stores items which competitively priced with a comprehensive range of groceries ranging from fresh produce, in-store bakery, butchery, deli and home-meal replacement sections. Kwikspar stores carry products with a range of prices offering good value for money and focus on convenience with an emphasis on speed.

Departments within Kwikspar range from fresh produce, baked goods, meat and take-out foods (Spar, 2017)

In Region 4 the malls include Lyttleton Shopping Centre, Eldoraigne Shopping Centre, Jean Crossing, Wierda Mall, Doringkloof Mall, Mall@Reds Shopping Centre, Eco Park Mall, Highveld Centre, Southdowns Shopping Centre and Irene Village Mall. Food retail stores range from small to big and include Woolworths, Shoprite Checkers, Pick n Pay, Spar, Food Lovers Market and many other stores.

In Region 6 the malls include Menlyn Shopping Centre, Atterbury Value Mart, The Grove Mall, Karoo Lifestyle Centre, Waterkloof Corner, Lynnwood Bridge and Parkview Shopping Centre. Food retail stores range from big to small that include Woolworths, Shoprite Checkers, Pick n Pay, Spar, Food Lovers Market and many more other stores.

All the malls and shopping centres in these regions included supermarkets, convenience stores, butchers, specialty stores, fast food outlets and restaurants. Supermarkets, fast food outlets and restaurants are more frequently available and accessible as there are more of these stores available with less convenience stores, butchers and speciality stores.

This indicates that the respondents have access to a variety of food retail stores in close proximity, meaning that they don't have to travel a long distance to them and therefore food retail stores are readily available and accessible in all of these regions (Osman *et al.*, 2014; Ronquest-Ross *et al*., 2015:10). This is supported by the fact that there is a variety of shopping malls and centres in each region with a variety of different food retail options to choose from. Also of importance in the food retail sector, apart from the formal food retail sector, is the informal food retail sector, which will be discussed next.

4.3.2 Informal food retail sector

The informal food retail sector includes open food markets and street vendors. Open food markets usually have a variety of stalls selling different food products and operates only once or twice a week for a specific time frame. Street vendors, on the other hand, engage in informal trade, offering a wide range of products, anything from electrical appliances to jewellery, sweets, potato crisps, fruit, vegetables or meat (Viljoen, 2010:83). Open food markets in Region 3 of Tshwane include Market@theSheds (an African urban market that include art, food, music and design), The Brooklyn Design Fair (which is all about pop-up shops presenting culinary art, fashion, crafted beer and home design), Deep Roots Market (known for its gourmet street food, craft beer and other drinks) and The Greenlyn Goods Market (which focuses on hand-crafted products and

imported goods including art, clothing, household items and food). Some other open-food markets include the Centurion Farm Stall Market, situated in Region 4 which focuses on products of the recent past and the Capital Urban Market which is situated in Region 6 in Menlyn and include food and design artisans, live music and a cocktail bar. Markets that were observed to obtain data on the number and types or range of open-food markets were collected through observation. These markets included the Hazelwood Food Market which is situated in Region 3 in Menlo Park and is open every Saturday from 08:00 to 14:00 which also hosts a night market as a mid-week feast on Wednesdays from 17:00 to 21:00. Hazelwood Food Market provides delectable food products. The Irene Village Market, an arts and craft market with a variety of food products and some fresh produce, is situated in Region 4 in Irene, Centurion and is open every first and last Saturday of the month from 09:00 to 14:00 with the occasional night market. Pretoria Boeremark, which is situated in Silverton, Region 6, wedged between the slopes of the Magaliesberg mountains and is open every Saturday from 05:30 to 09:00. It is a farmers market that provides a lot of fresh produce and some household items. Typically these markets offer fresh produce and ready-to-eat meals which will be discussed in more detail under the second objective.

Figure 4.2 presents the open markets situated in the different regions being investigated.

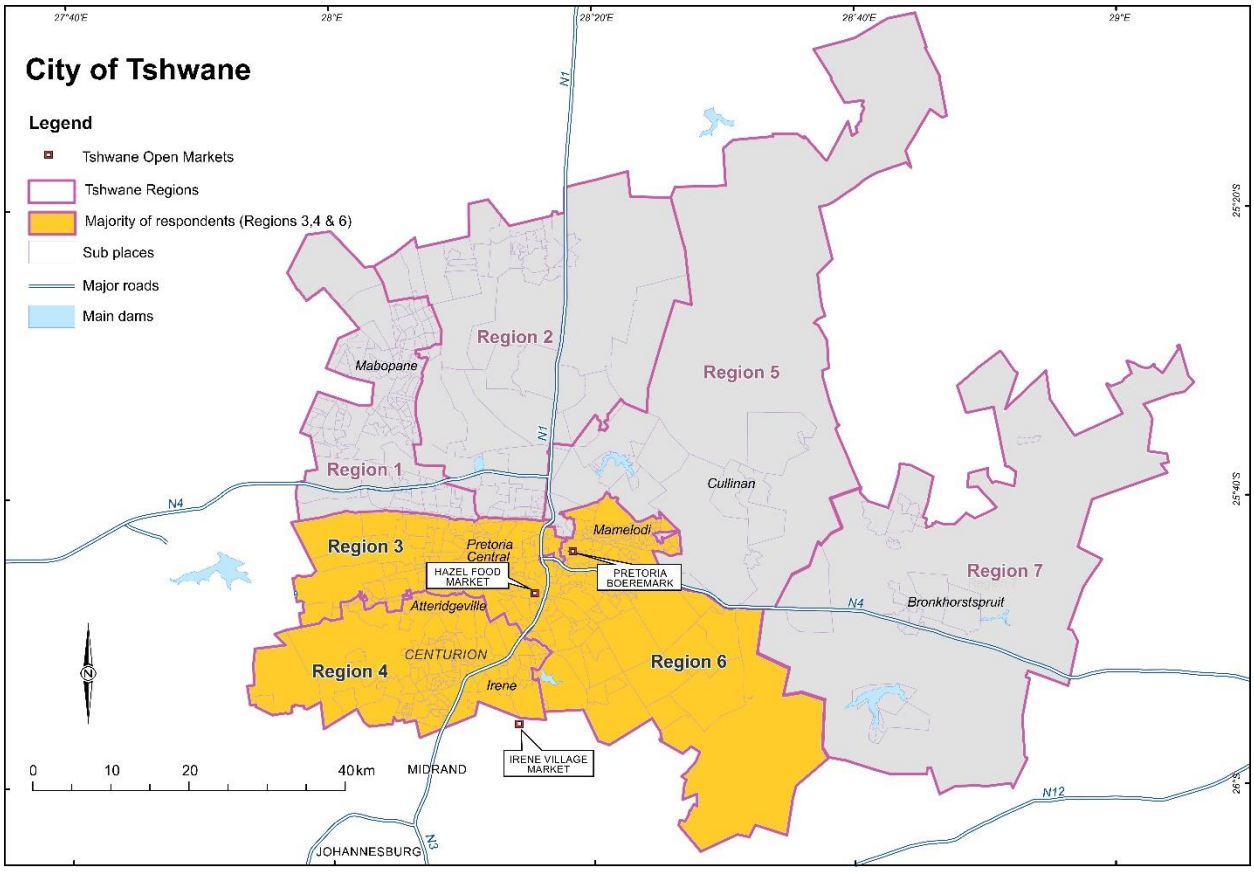

FIGURE 4.2: MAP OF CITY OF TSHWANE – OPEN MARKETS

It can be concluded that there are multiple informal food retail options available and accessible in regions 3, 4 and 6 of Tshwane and that they do offer a variety of food options at these open-food markets.

In the next section the type, quality and price of food available in the formal and informal food retail sectors will be discussed.

4.4 TYPE, QUALITY AND PRICE OF FOOD AVAILABLE IN THE FORMAL AND INFORMAL FOOD RETAIL SECTOR

The second objective was to explore and describe the type, quality and price of food available in the formal and informal food retail sectors. In the formal food retail sector data were collected by means of in-store observations (see observation checklist, Addendum D) whereas for the informal food retail sector data were collected by means of an open-market observation. The observation checklist entailed questions on the floor layout of the store, product observations and recording of the unit price of selected items.

4.4.1 Formal food retail sector

The stores observed were from the regions and suburbs where most of the respondents reside. Then a total of 20 stores were purposefully picked and visited. Stores were visited to conduct an in-store observation to determine the type of food products available, observe the quality of the food products and record the price of selected food products in these food stores. This was obtained through an observation checklist (see Addendum D). These observations were conducted during November 2017 and the price of certain food products were recorded at the time of the data collection. These food stores included Woolworths, Pick n Pay, Shoprite Checkers and Spar stores as well as the speciality shop, Food Lovers Market. The observation checklist included aspects on the type or variety and price of food products together with the store layout in terms of the different sections and space allocated to the different sections and number of checkout / tills available. The sections included fresh fruit and vegetables, dairy products, meat, bread, soft drinks, beverages and juices and other products such as tobacco, alcoholic beverages, chocolates and sweets, biscuits and cookies.

4.4.1.1 Type of food products

To determine the type or variety of food products available in the different stores, the observation included whether the store offered fresh products, whether the store offer a variety of products

and the fieldworkers also had to list some products available in the different sections in the store. The store layout was also observed and recorded.

Fruit section

The observations regarding fresh fruit entailed the recording if the store offered fresh fruit, if there was a variety / different types of fresh fruit such as citrus fruits (oranges, lemons and naartjies), orange-coloured fruits (yellow peaches, mangoes, pawpaw, spanspek and plums) and other fruits (apples, bananas, grapes and pears), and whether the store offered tinned / canned fruits; these products had to be listed. All the stores visited offered fresh fruits, all the different types of fruit such as citrus fruits (oranges, lemons and naartjies), orange-coloured fruits (yellow peaches, mangoes, pawpaw, spanspek and plums), other fruits (apples, bananas, grapes and pears) as well as a variety of tinned fruit products. Some fruit differ from store to store as they accommodate the needs of the consumers. At Hillcrest Woolworths many of the fruits are packaged in smaller portions to accommodate students that might live alone. At some other stores they accommodated for families as the packaging was larger.

Vegetable section

Likewise in the vegetable section the observation entailed the recording whether fresh vegetables were offered, and if there was a variety. The different types of fresh vegetable products included white roots and tubers (potatoes and white sweet potatoes), orange-fleshed vegetables (pumpkin, carrots, butternut and orange-fleshed sweet potatoes), dark green leafy vegetables (spinach and indigenous green leafy vegetables) and other vegetables (tomatoes, onions, green beans, cabbage, gem squash, peas, beetroot and baby marrow). If the store offered frozen vegetable products it was also noted. Frozen vegetables included white roots and tubers, orange-fleshed vegetables, dark green leafy vegetables and other frozen vegetables. The tinned or boxed vegetable products offered were listed. All the stores visited offered fresh vegetables and stocked different types of vegetable products as listed above, including a variety of frozen and tinned / boxed vegetables.

Dairy section

For the dairy section the observation entailed to see whether there was a dairy section, and to record if dairy products such as full-cream milk, 2 % fat milk, fat-free milk and skim milk were available. Low-fat dairy products (such as cottage cheese, yogurt and cream cheese), butter as well as margarine (tubs and bricks) were also recorded and all the other dairy products listed. Most of the stores stocked full-cream milk, low-fat dairy products, butter and margarine (tubs and bricks). Eight of the stores did not offer 2 % fat milk (situated in Parkview, Woodlands, Lynnwood and Glenfair) and three stores did not offer fat-free milk (situated in Lynnwood and Eldo-Square).

Meat section

If the store sold meat, it was recorded whether they offered beef, lean ground mince, and also if mutton / lamb, pork, chicken portions, skinless chicken and fresh fish were available. All 20 stores offered meat, mutton / lamb, pork, chicken portions and skinless chicken. However, two stores offered fresh fish. Three stores did not offer lean ground mince and were situated in the Centurion area. It was observed that most of these stores have an in-store butchery where fresh meat can be cut to the customers' preference and specifications. The majority of the stores offer meat in bulk as well as small packages to accommodate the specific needs of different consumers. Some consumers buy bulk as it might be more economically for a larger family as opposed to others who live alone and might need the smaller packaging sizes.

Bread section

It was observed whether a store offered bread and specifically wholegrain bread. All 20 stores offered bread, and specifically wholegrain bread. Most of the stores also had a commercial bread section as well as a freshly baked bread section (or bakery). At the freshly baked bread section (or bakery) consumers can buy freshly baked goods. Most of the bakery sections offered freshly baked goods that included bread and bread rolls, cakes and confectionary.

Soft drinks, beverages and juices section

Regarding soft drinks, beverages and juices, it was recorded if a store offered fruit juice and other soft drinks such as sugar-sweetened beverages, cordials and concentrates. All the stores offered a wide range of these beverages.

Other products section

The other products section included if a store offered tobacco products, alcoholic beverages, chocolates and sweets, biscuits and cookies. Pick n Pay, one of the Checkers stores and Spar offered tobacco products. Woolworths and Food Lovers Market did not offer tobacco products. All the stores offered alcoholic beverages such as wine (no hard liquor, beers or ciders), chocolates and sweets, and biscuits and cookies.

4.4.1.1.1 Store layout

All the stores observed had allocated space for each product section. The different groups of stores observed (Shoprite, Checkers, Woolworths, Pick n Pay and Spar) each differed in their store layout and allocation of each section as each store had different ways in which they store products for optimal quality and usability as well as the target market and their needs that need to be accommodated. Most Shoprite and Checkers stores' fresh fruit section was at the entrance, followed by the vegetable section. The bread and bakery section then followed with the meat and

butchery next, along the side of the store. The dairy section was at the first aisle in the middle of the store followed with all the rest of the groceries such as canned goods, biscuits and cookies, cleaning products and toiletries. Most of the Woolworths stores' fresh fruit section was at the entrance of the store, followed by the vegetables and then the bread. Some of the dairy sections were divided into two different sections. The milk products situated in-between the fruit and vegetable sections, as well as the cheese and other dairy products were at the first aisle. Followed along the side of the stores was the meat section, situated at the very end of the store before you reach the tills. All the other groceries such as biscuits and cookies, tinned goods, cleaning products, pet food, sweets and chips were in the aisles throughout the store. For most of the Pick n Pay stores the fresh fruit section was at the entrance of the store, followed by the vegetables. The bread and bakery section followed with the meat and butchery next. The dairy section was mostly at the first aisle, also situated near the entrance of the store. The rest of the groceries such as tinned goods, cereal, frozen goods and toiletries followed throughout the store in the aisles. Most of the Spar stores' fresh fruit sections were situated at the entrance of the store, followed by the vegetable section with the bread and bakery next to it. Some Spar stores' meat and butchery sections were situated next to the bread and bakery along the side of the store, and some meat and butchery sections at the other side of the store closer to the tills. Most Spar stores' dairy sections were divided into two different sections with the cheese and other dairy products in the first aisle close to the entrance and the milk and milk juices at the end of the store close to the tills. An example of what the store layouts look like can be seen in Addendum H.

Observations were also made to explore and determine the quality of the food products in these stores.

4.4.1.2 Quality of food products

The quality of the food products available in the food stores were observed through sensory attributes (texture, colour and aroma), the expiry dates and labels on the products as well as delivery procedures followed, as all of these factors influence quality of food products.

The quality of most food products was acceptable in terms of freshness and the sensory attributes. All the products observed (fresh and processed) had expiry dates (sell-by and use-by dates) indicated on the package, which gives an indication of the product's freshness and quality. Sell-by date indicates the last day a product can be sold to the customer. Use-by date indicates the last date a customer can use the product. These expiry dates guide the customer and give an indication of the quality of the product (Caswell & Mojduszka, 1996). No products in the stores were observed to be past their expiry dates and from the observation were of good quality. In most of the stores there were employees allocated to check the quality and expiry dates of

perishable products every day and discard those that are past the date or not of good quality in terms of appearance and freshness.

Questions were asked regarding the delivery procedures followed and most of the stores received deliveries of fresh products such as fruits and vegetables, bread products and meat products on a daily basis. Some stores have deliveries twice a week for some products such as dairy products. At Woolworths stores deliveries were received from midnight every day, whereas the other supermarket groups' deliveries were throughout the day. It can be concluded that overall the quality of these products were good and excellent, because most products were delivered fresh every day.

4.4.1.3 Price of food products

In order to determine whether the prices of food products were comparable across the varied supermarket chains to see how the prices vary in the three regions, it was recorded as part of the in-store observation. Five different Woolworths stores, six different Pick n Pay stores, two different Checkers stores, six different Spar stores and a Food Lovers Market store were observed and the average prices on these food products were calculated. The prices were of selected food products in each of the different food categories which included bananas, carrots, brick margarine and lean ground mince.

Table 4.3 presents the average prices of chosen food products at retail stores.

TABLE 4.3: AVERAGE PRICES OF CHOSEN FOOD PRODUCTS AT RETAIL STORES

Name of Store:	Woolworths	Pick n Pay	Checkers	Spar	Food Lovers Market
A. FRESH FRUIT SECTION					
What is the price of 1 kg bananas?	**R16,96**	**R18,43**	**R14,99**	**R17,19**	**R12,99**
B. VEGETABLE SECTION					
What is the price of 1 kg carrots?	**R12,99**	**R6,99**	**R7,49**	**R9,19**	**R6,99**
C. DAIRY SECTION					
What is the price of a 500 g brick margarine?	**R27,66**	**R13,99**	**R16,49**	**R20,99**	**R16,74**
D. MEAT SECTION					
What is the price of 1 kg lean ground mince?	**R80,99**	**R57,66**	**R69,49**	**R80,66**	**R78,99**

Fresh fruit section

The lowest price per kg for bananas was at Food Lovers Market at R12,99 per kg. Checkers' price per kg for bananas was R14,99. Woolworths' average price for bananas was R16,96 per kg. Spar's price was R17,19 for 1 kg bananas and the highest price for 1 kg bananas was at Pick n Pay for R18,43. These prices show a difference of R5,44 per kg bananas if compared throughout the stores.

Vegetable section

The lowest price per kg for carrots was at Food Lovers Market at R6,99 per kg. Pick n Pay's price per kg for carrots was also R6,99. Checkers' average price for carrots was R7,49 per kg. Spar's price was R9,19 for 1 kg carrots and the highest price for 1 kg carrots was at Woolworths at R12,99. These prices show a difference of R6 per kg of carrots if compared throughout the stores.

Dairy section

The lowest price for a 500 g brick margarine was at Food Lovers Market at R13,99. Pick n Pay's average price was R16,49. Spar's average price was R16,74. Checkers' price was R20,99 for a 500 g brick margarine and the highest price for a 500 g brick margarine was at Woolworths at R27,66. These prices show a difference of R13,67 per 500 g brick margarine if compared throughout the stores.

Meat section

The lowest price for 1 kg lean ground mince was at Pick n Pay at an average price of R57,66. Checkers' average price was R69.49. Food Lovers Market's price for 1 kg lean ground mince was R78,99. Spar's price was R80,66 and the highest price for 1 kg lean ground mince was at Woolworths at R80,99. These prices show a difference of R23,33 per kg of lean ground mince if compared throughout the stores.

From the store observations, it can be concluded that most of the stores offer a variety of good quality and relatively comparable prices of food products that include fruits and vegetables. The prices of dairy and meat products differed even more. These results show that the prices for fruits and vegetables do not differ as much, but that the dairy and meat prices differ considerably if compared throughout the different stores throughout different regions.

4.4.1.4 Informal food retail sector

Similar to the in-store observations of the formal food retail sector, open-market observations were conducted with the use of observation in order to explore and describe the informal food retail sector. The open-market observation was conducted to determine the type of food products available, observe the quality of food products sold there and compile a price comparison between the markets of some of the food products. These observations were conducted in November 2017 and the prices of the food products given represent those at that specific time. The three open markets observed included the Pretoria Boeremark in Region 6, Hazelwood Food Market in Region 3 and the Irene Village Market in Region 4. These markets were purposively chosen to represent one of the largest and most popular markets in each of the regions of this

study. The observation checklist included recordings on the type or variety, quality and price of food products on offer.

Together with the open markets as part of the informal food retail sector are the street vendors. Street vendors were chosen not to be observed as the majority of respondents (85,7 %, n=197) indicated that they never make use of street vendors to purchase their food (see 4.5.1.2 − frequency of food purchasing).

4.4.1.5 Type of food products

The Pretoria Boeremark offered more traditional food products. “Pap en kaiings”, pancakes, “vetkoek” and “melkkos” were the popular ready-to-eat options, which are prepared on site. Other products such as fresh bread, cakes, rusks, chicken and chicken products, meat and meat products and dairy products such as fresh milk and yogurt were also sold here. At Hazelwood Food Market there were artisan breads, burgers, organic vegetables, cheeses and pesto, tarts, sweets, ready-to-eat meals, coffee, milkshakes, home-grown herbs and deli-style products. These products are more up-market, value-added products. At the Irene Village Market, they sold products like corn dogs, burgers, waffles, pancakes, omelettes and cakes, to name but a few. The Irene Village Market also have arts and crafts.

Most of the products at these markets were all ready-to-eat food items that are prepared on site. Very little fresh produce such as raw vegetables, salads or raw meats, that need to be prepared at home, were sold at these markets. Most of the products at these markets were also speciality foods such as waffles, corn dogs and deli-style foods. There were not such a big variety of food products in comparison to what is sold in food retail stores.

4.4.1.6 Quality of food products

The quality of the food products was observed to be good in terms of freshness, colour, texture and aroma. Most of the products were ready-to-eat food items and therefore prepared on site. Some of the fresh produce was from local farmers and observed to be of good quality.

4.4.1.7 Price of food products

The informal food retail sector differs from the formal food retail sector in terms of the type and range of food products, prices as well as the target consumer. Most of the open markets’ food products are ready-to-eat, speciality food items that are unique in a way that it’s not products that one will find in the supermarket or make at home frequently. Examples of these products are corn

dogs and waffles. This might be a reason why these food products are higher in price compared to similar products found in supermarkets. Another reason is that these products are labour intensive to produce. Customers therefore not only pay for the food item, but also for its uniqueness and whole social experience associated with it. The open markets are also a big tourist attraction and thus might be a reason why most of the respondents in this study indicated that they do not make use of open markets or any other informal food retail option that often.

In conclusion, the type of products sold at the informal food retail sector, such as the open food markets, are mostly ready-to-eat, good quality, speciality food options that are unique and priced higher because it is labour intensive to produce. The open markets might be the place to go and have an interesting, unique, good-quality meal together with the social aspect that comes with it, rather than the place to purchase monthly groceries at.

The next section deals with how the urban food environment contributes to the access dimensions (availability, affordability, accessibility, acceptability and accommodation) of food to the study group.

4.5 FOOD ACCESS DIMENSIONS OF THE STUDY GROUP

Objective 3 describes the food access dimensions (availability, accessibility, acceptability, affordability and accommodation) of the study group. The first access dimension addresses the availability of food stores as well as the availability of food products.

Data on this access dimension were collected by means of different measuring techniques to firstly determine the availability of food stores to the study group. GIS mapping and spatial analysis were used to determine the density and location of the food stores. Thereafter the information from the GIS mapping and spatial analysis was used to purposively select the stores in each region to conduct in store, as well as open-market observations, together with information on the prices of selected food items of a food basket. To further determine the availability of food outlets and food products respondents had to indicate, on the survey questionnaire, their level of agreement to statements on the food outlets they purchased from. A 5-point Likert-type scale was used to measure this access dimensions of availability of food stores. In addition respondents were asked to indicate how frequently they purchased from certain food stores or food outlets listed and lastly respondents were asked to indicate what foods they purchased from which of the listed food stores or outlets during the previous week (seven days).

4.5.1 Availability

Availability refers to a sufficient location of food stores in a region and also in the various neighbourhoods in a region as well as food products (Caspi *et al.*, 2012:1173) and also if foods of meaning and interest are available in stores and at home (Holsten *et al.*, 2012; Jaeger *et al.*, 2011; Story *et al.*, 2008:255; Bryant *et al.*, 2003:210; Cullen *et al.*, 2003:616).

As described above (see 4.3.1 and 4.3.2), a variety of food stores are available in close proximity to where the respondents reside.

This is confirmed in Table 4.4 that presents the results regarding the level of satisfaction regarding food store availability. Respondents had to indicate their level of agreement to a statement about the food outlets they purchase from. A 5-point Likert-type scale was used to measure this.

TABLE 4.4: LEVEL OF AGREEMENT REGARDING THE AVAILABILITY OF FOOD STORES (n=230)

	Strongly agree		Agree		Undecided		Disagree		Strongly disagree	
n=230	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**N**	**%**
I am satisfied with the range of food outlets I have access to in my neighbourhood	109	**47,4**	106	46,1	4	1,7	6	2,6	5	2,2

Just over 90 % of the respondents were satisfied as 47,4 % (n=109) strongly agreed and 46,1 %, (n=106) agreed that they are satisfied with the range of food outlets they have access to in their neighbourhood. Only a small number of respondents (2,2 %, n=5) strongly disagreed with this statement. Therefore, the majority of the respondents indicated that they are satisfied with the range of food outlets they have access to and can therefore be assumed that it is also available close to them (in their neighbourhood). The availability of food refers to the sufficient supply of food stores as well as healthy foods available (Caspi *et al.*, 2012:1173).

To further support this data, respondents were asked in the survey questionnaires whether they made use of online or internet shopping to purchase their food and how they transported their purchased food home.

4.5.1.1 How food is purchased

Respondents had to indicate whether they make use of online or internet shopping to purchase food from. The majority of the respondents (95,7 %, n=220) indicated that they do not make use of online or internet shopping to purchase food from. Only 4,3 % (n=10) of the respondents

indicated that they purchased food online. The possible reason for this could be that brick and mortar food stores are readily available and convenient to reach for respondents to purchase food products as South African consumers are also largely in the habit of purchasing their food products at supermarkets (Ronquest-Ross *et al*., 2015).

The respondents also had to indicate what method of transportation (I walk and carry it myself; somebody helps me carry my food home; I take a taxi/bus; I use my car) they use to transport their purchased food home. The majority of the respondents (95,2 %, n=219) indicated that they use their own vehicle to transport their purchased food home.

4.5.1.2 Frequency of food purchasing

Respondents were asked to indicate how frequently they purchased from selected food stores or food outlets listed in the questionnaire. The listed food outlets were those commonly found in an urban residential area and included supermarkets, a fruit and vegetable market, butcher, convenience store, a fast-food outlet, street vendor, spaza shop and open or community market. The results are given in Figure 4.3.

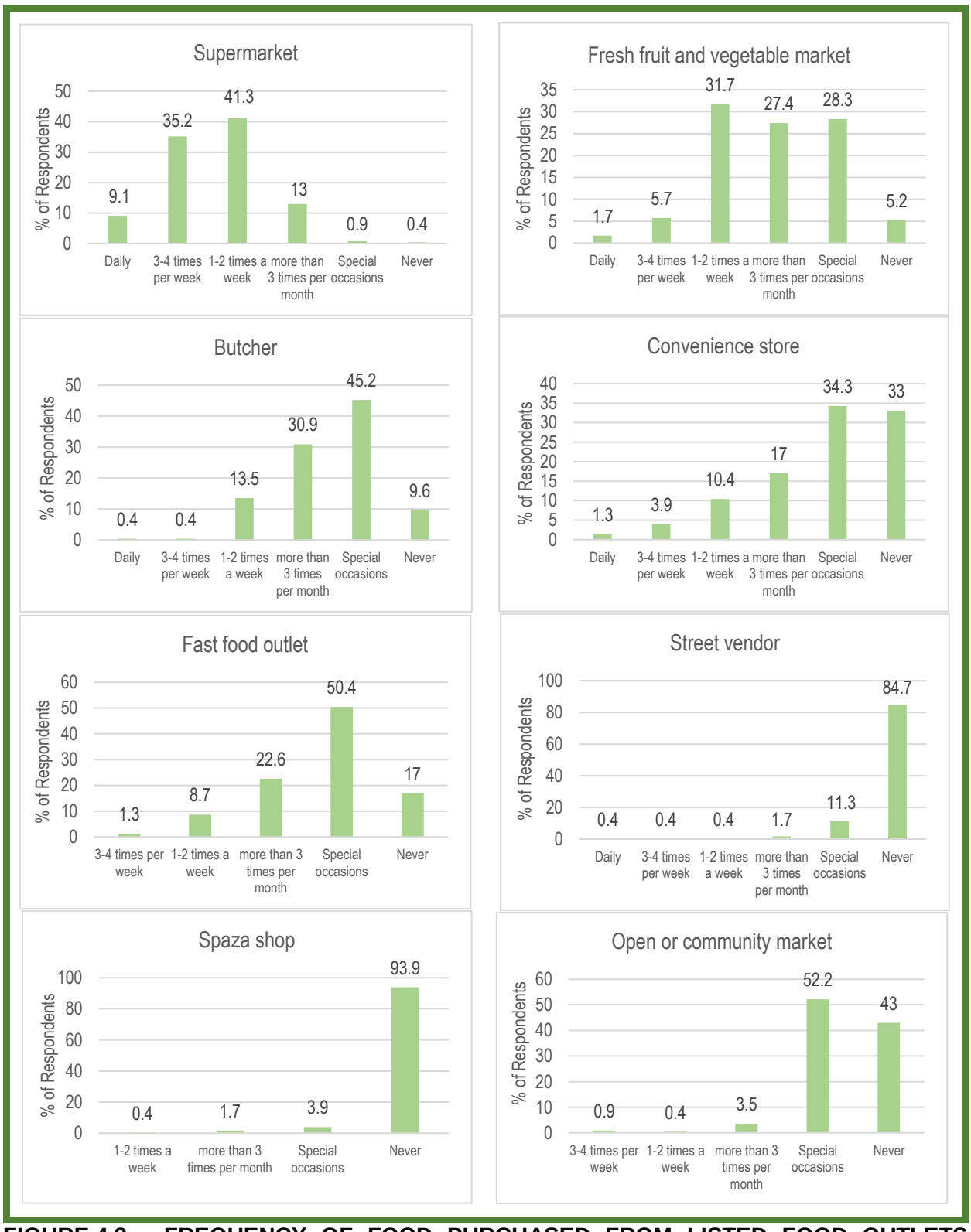

FIGURE 4.3: FREQUENCY OF FOOD PURCHASED FROM LISTED FOOD OUTLETS (n=230)

Supermarket: Over 80 % of the respondents indicated that they purchase their food at least once or more times a week at supermarkets, where 41,3 % (n=95) of the respondents purchase 1 to 2 times a week. This was followed by 35,2 % (n=81) of the respondents who purchase 3 to 4 times

a week and 9,1 % (n=21) of the respondents who daily purchase from a supermarket. Only one respondent indicated that he/she never purchases food at a supermarket (0,4 %, n=1).

Fresh fruit and vegetable market: Almost 40 % of the respondents indicated that they purchase food more than once a week at a fresh fruit and vegetable market, followed by another 27,4 % (n=63) who purchase more than 3 times a month. Just over 30 % of the respondents never or only on special occasions purchase food at the fresh fruit and vegetable market.

Butcher: Over 85 % of the respondents purchase food three times a month or less from a butcher. Only a small percentage of almost 15 % purchase food more than two times a week from a butcher. 9,6 % (n=22) of the respondents never buy from a butcher.

Convenience store: Over a third (34,3 %, n=78) of the respondents only purchase food from a convenience store on special occasions, followed by another third (33 %, n=76) that never purchase food at a convenience store. Some indicated that they purchase food more that three times a month (17,0 %, n=39) at a convenience store. Only three respondents (1.3 %, n=3) indicated that they purchase food at a convenience store daily.

Fast food outlet: Only 17 % (n=39) of the respondents indicated that they never purchase food at a fast food outlet, thus over 80 % of the respondents purchase food at a fast food outlet. The majority of these respondents (50,4 %, n=116) indicated that they purchase food on special occasions at a fast food outlet, followed by 22,6 % (n=52) who indicated that they purchase food more than three times a month and 8,7 % (n=20) who do so 1 to 2 times a week.

Street vendor: The majority of the respondents (85,7 %, n=197) indicated that they never purchase food from a street vendor, although 11,3 % (n=26) of the respondents indicated that they purchase food from a street vendor on special occasions. These results are expected as street vendors are only operating in certain areas of Tshwane and are very inactive in the eastern and southern suburbs of Tshwane. This explains the high percentage who never purchased from street vendors.

Spaza shop: As could be expected, the majority of the respondents (93,9 %, n=216) indicated that they never purchase food at a spaza shop. There was only one person who indicated that he/she purchases food 1 to 2 times a week at a spaza shop. Similar to the street vendors, spaza shops only operate in certain areas, which do not include the eastern and southern suburbs of Tshwane and explains the high percentage of respondents who never purchase there.

Open or community market: The majority of the respondents (52,2 %, n=120) indicated that they purchase food at an open or community market only on special occasions and 43,0 % (n=99) indicated that they never purchase food at an open or community market. A small percentage (3,5 %, n=8) indicated that they purchase food more that three times a month at an open or community market.

The results on the frequency of food purchases from the stores listed confirm that a variety of food stores are available and accessible to the respondents as it indicates that food stores, including supermarkets, fresh fruit and vegetable markets, butchers, convenience stores and fast-food outlets, are all visited to some extent to purchase food products from. If foods of interest are present and obtainable to consumers in an environment, it becomes available and accessible (Cullen *et al.*, 2003; Story *et al.*, 2008:255). It seems as if the majority of the respondents purchase most of their food products at a supermarket. Fruits and vegetables are to some extent purchased at fruit and vegetable markets, and some respondents buy meat products from butchers. Only a few respondents make use of convenience stores. It is however noted that there are respondents who do make use of fast-food outlets only on special occasions and some do so even more than three times a month (22,6 %). Noticeable changes characterised by a rise in fast-food restaurants, convenience stores and street food options have been reported to all contribute to changes in the food consumption patterns of some urban consumers (Steyn & Labadarios, 2011; Van Zyl *et al*., 2010; Story *et al*., 2008:256).

4.5.1.3 Retail outlets where food is purchased

As part of the access dimension of availability, respondents were asked to indicate what food they purchase from which of the listed food stores or outlets during the previous week (seven days). The food stores included supermarkets, fast-food outlets, fruit and vegetable markets, street vendors, spaza shops and convenience stores. Respondents had the option to mark more than one store. If some items were not purchased during the previous seven days respondents had to indicate it like that. Figure 4.4 portrays the results on where various fruit groups are purchased.

The following fruit groups were included, namely citrus fruits (oranges, lemons and naartjies), orange-coloured fruits (yellow peaches, mangoes, pawpaw, spanspek and plums) and other fruits (apples, bananas, grapes, pears and litchis).

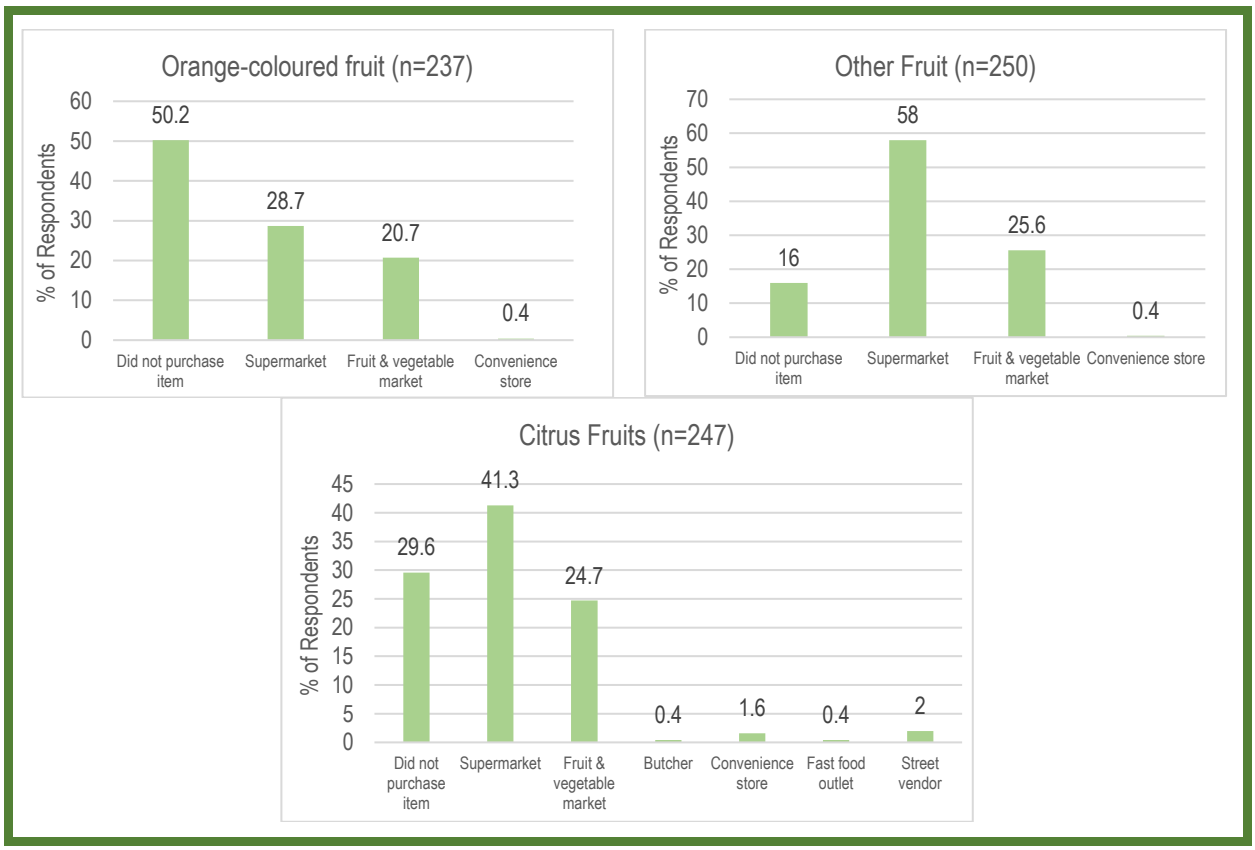

FIGURE 4.4: FOOD STORES WHERE FRUIT ARE PURCHASED

Most respondents (41,3 %, n=102) purchase citrus fruits at supermarkets and at fruit and vegetable markets (24,7 %, n=61). Nearly 30 % of the respondents (29,6 %, n=73) have not purchased any citrus fruit during the previous seven days. Only a small number of the respondents (1,6 %, n=4) have purchased citrus fruit from a convenience store. Half of the respondents (50,2 %, n=119) indicated that they have not purchased orange-coloured fruit during the previous week. Supermarkets (28,7 %, n=68) and fruit and vegetable markets (20,7 %, n=49) were mainly used to purchase orange-coloured fruit from. Only one respondent (0,4 %, n=1) have purchased orange-coloured fruit from a convenience store. The majority of respondents (58 %, n=145) purchase other fruit at supermarkets, while just over a quarter of the respondents (25,6 %, n=64) purchase it at fruit and vegetable markets. A small percentage of the respondents (16 %, n=40) indicated that they have not purchased other fruit at all during the previous seven days.

Figure 4.5 presents the results of where respondents purchased vegetables and are discussed in order of their appearance in the questionnaire. Vegetables were grouped to include white roots and tubers (potatoes, white sweet potatoes), orange-fleshed vegetables (pumpkin, carrot, butternut, orange-fleshed sweet potatoes), dark green leafy vegetables (spinach, kale, indigenous green leafy vegetables) and other vegetables (tomatoes, onion, green beans, cabbage, gem squash, peas, beetroot).

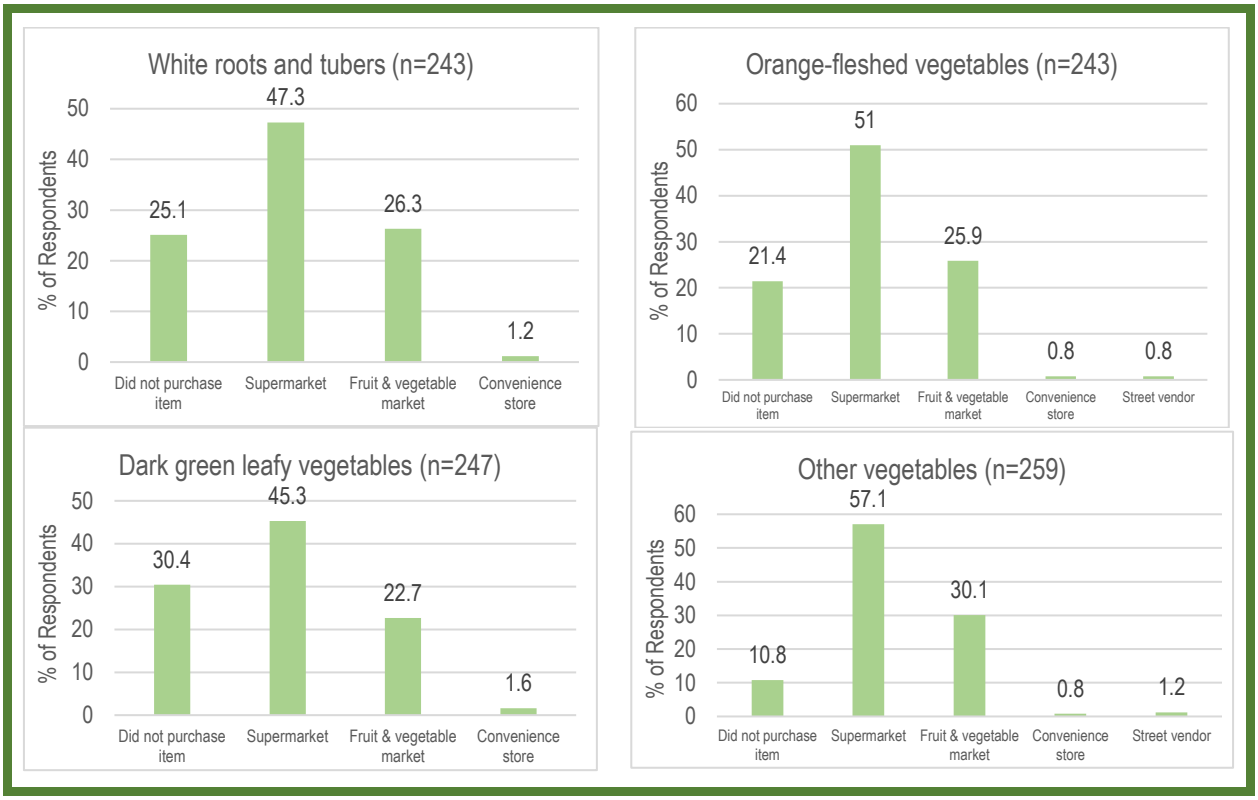

FIGURE 4.5: FOOD STORES WHERE VEGETABLES ARE PURCHASED

Most of the respondents purchased white roots and tuber vegetables (47,3 %, n=115) at a supermarket, followed by 26,3 % (n=64) who purchase these vegetables at a fruit and vegetable market. A quarter of the respondents (25,1 %, n=61) indicated that they did not purchase white roots and tuber vegetables during the previous seven days. Just over half of the respondents (51 %, n=124) purchase orange-fleshed vegetables from a supermarket. Over a quarter of the respondents (25,9 %, n=63) indicated that they purchase orange-fleshed vegetables at a fruit and vegetable market, followed by 21,4 % (n=52) of the respondents who indicated that they have not purchased these vegetables at all during the previous seven days. Most of the respondents (45,3 %, n=112) indicated that they purchase dark green leafy vegetables at the supermarket, with 30,4 % (n=75) of the respondents indicating that they did not purchase it at all during the previous seven days. Just over a quarter of the respondents (22,7 %, n=56) indicated that they purchase dark green leafy vegetables at the fruit and vegetable market. The majority of the respondents (57,1 %, n=148) indicated that they purchase other vegetables at the supermarket, followed by 30,1 % (n=78) who indicated that they purchase it at a fruit and vegetable market.

In conclusion, most of the respondents purchase fruits and vegetables at a supermarket, followed by those who purchase these at a fruit and vegetable market. It is however notable that more than 10 % of the respondents did not purchase certain fruits and vegetable products at all during the previous week. A possible explanation why some of the products were not purchased at all during the previous seven days by some of the respondents may be due to the fact that some of these products can be bought in larger quantities and could be kept for more than a week.

Figure 4.6 presents the results on where milk and dairy products have been purchased. The milk and dairy products included: milk (fresh, powdered, UHT, maas), cheese, cottage cheese, yogurt and dairy beverages (Yogi sip, dairy fruit beverages).

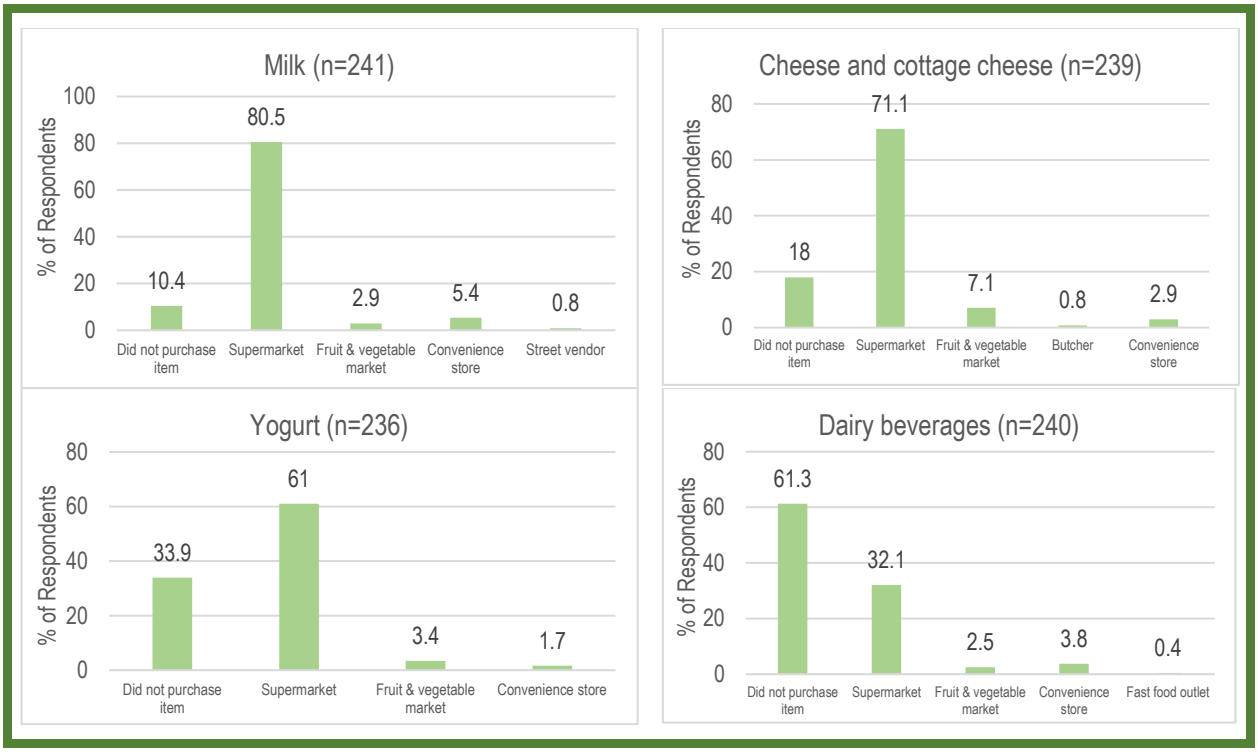

FIGURE 4.6: FOOD STORES WHERE MILK AND DAIRY PRODUCTS ARE PURCHASED

The majority of the respondents (80,5 %, n=194) indicated that they purchase milk at a supermarket. Only a few respondents (5,4 %, n=13) indicated that they purchase milk at a convenience store. Some respondents (10,4 %, n=25) indicated that they had not purchased milk at all during the previous seven days. The majority of the respondents (71,1 %, n=170) indicated that they purchase cheese and cottage cheese at a supermarket with only 7,1 % (n=17) purchasing it at the fruit and vegetable market. A few respondents (18 %, n=43) indicated that they have not purchased cheese and cottage cheese products at all during the previous seven days. Yogurt was purchased at a supermarket by the majority of respondents (61 %, n=144) with just over a third of the respondents (33,9 %, n=80) who indicated that they did not purchase yogurt at all during the previous seven days. The majority of the respondents (61,3 %, n=147) indicated that they did not purchase any dairy beverages during the previous seven days. Just over a third of the respondents (32,1 %, n=77) indicated that they purchase dairy beverages at a supermarket with only 3,8 % (n=9) indicating that they purchase it from a convenience store.

Figure 4.7 presents the results of where beverages are purchased. The beverages included fruit juice, cordials and concentrates (Oros, Wild Island, Carribean) and soft drinks (fizzy and energy drinks).

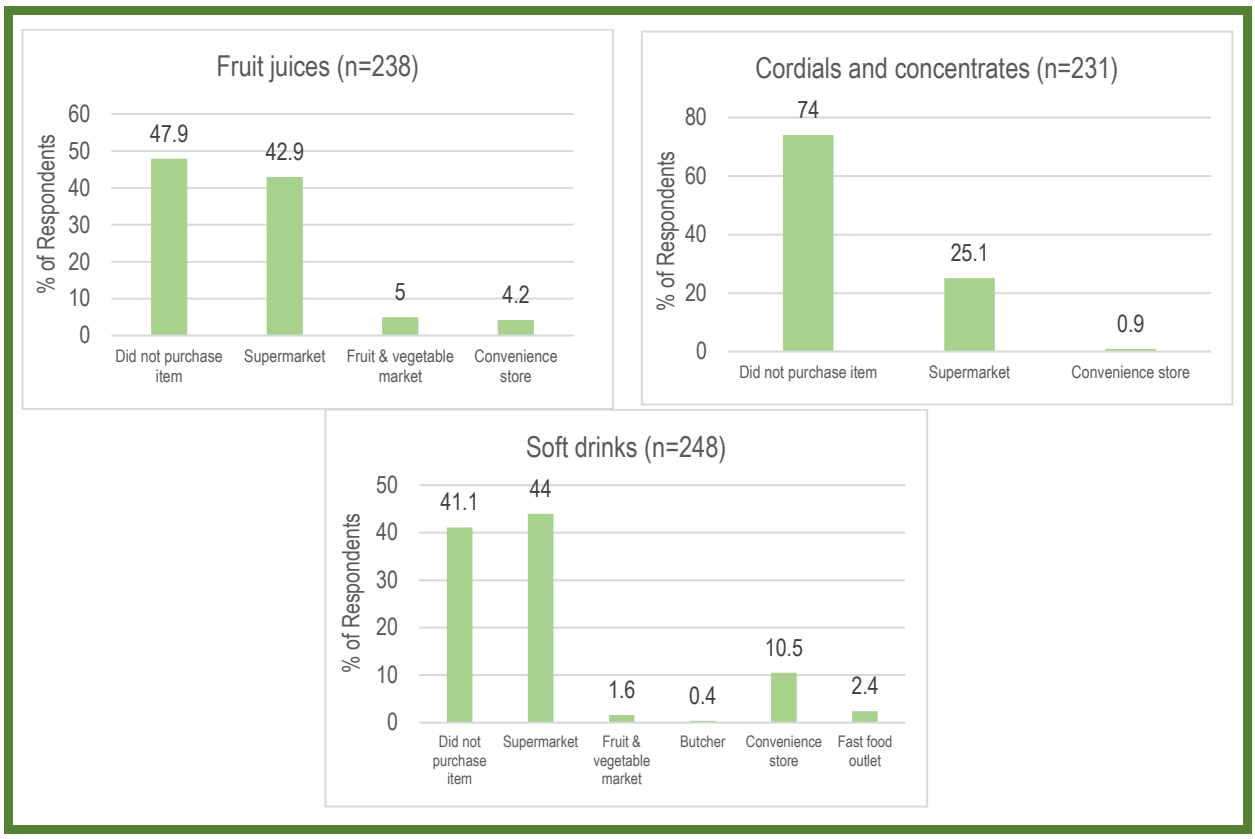

FIGURE 4.7: FOOD STORES WHERE BEVERAGES ARE PURCHASED

Almost half of the respondents (47,9 %, n=114) have not purchased fruit juices during the previous seven days. Some of the respondents (42,9 %, n=102) did purchase fruit juices at a supermarket, followed by 5 % (n=11) of the respondents who purchase fruit juices at a fruit and vegetable market and 4,2 % (n=9) who purchase fruit juices at a convenience store. The majority of the respondents (74 %, n=171) did not purchase cordials and concentrates during the previous seven days, followed by 25,1 % (n=58) who purchased cordials and concentrates at a supermarket. Almost half of the respondents (44 %, n=109) purchase soft drinks at a supermarket, followed by 41,1% (n=102) who did not purchase soft drinks during the previous seven days. A small percentage of 10,5 % (n=24) of the respondents purchase cordials and soft drinks at a convenience store.

Figure 4.8 presents the results of where meat and meat products are purchased. Meat and meat products included beef, mutton / lamb, goat meat, chicken, pork, boerewors, offal cuts, bacon, processed meat (ham, cold cuts, polony, Viennas, Russians) and biltong.

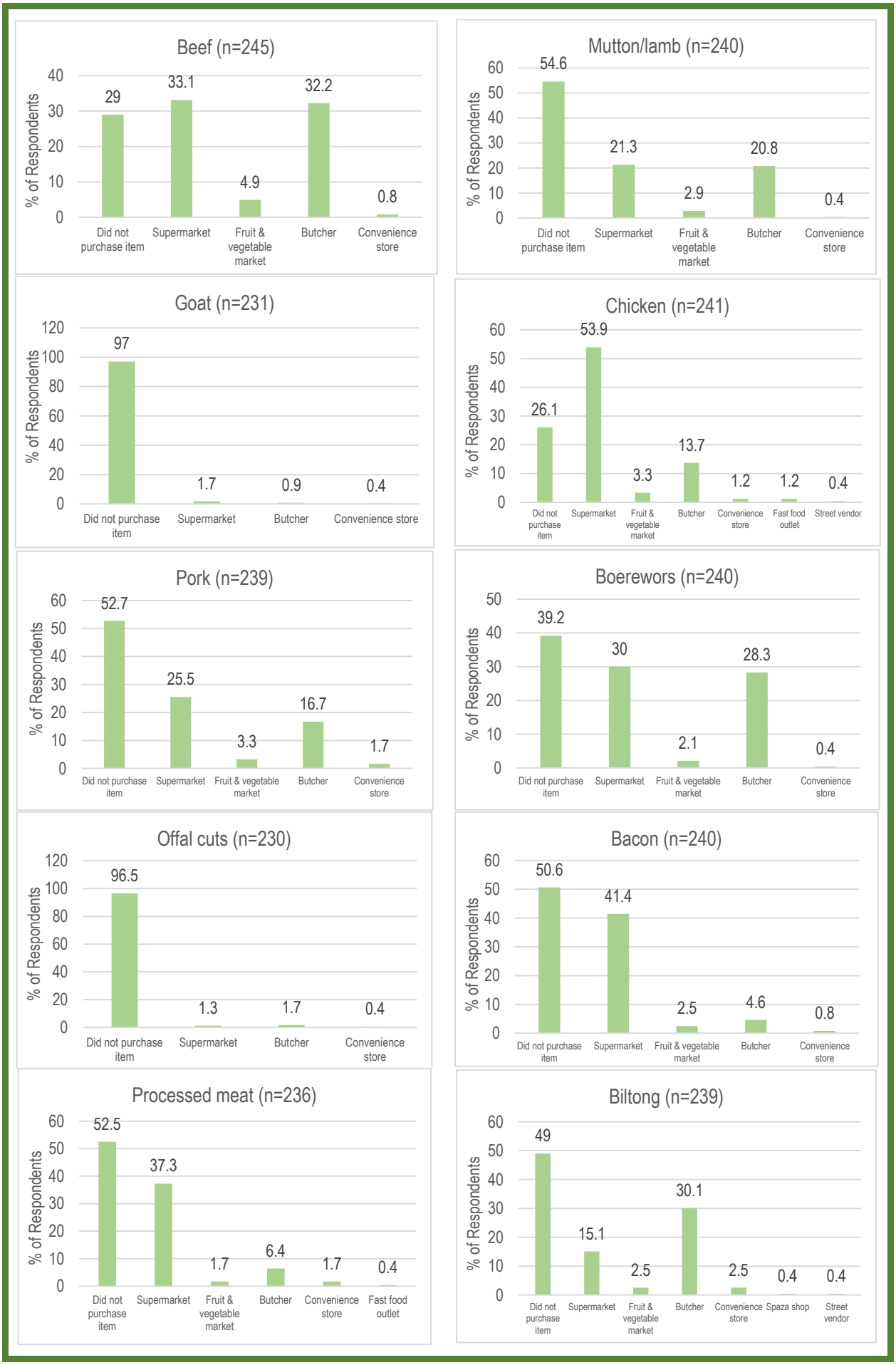

FIGURE 4.8: FOOD STORES WHERE MEAT AND MEAT PRODUCTS ARE PURCHASED

A third of the respondents (33,1 %, n=81) purchase beef at a supermarket with another third of the respondents (32,2 %, n=79) that purchase it from the butcher. Just less than a third of the respondents (29,0 %, n=71) indicated that they have not purchased beef at all during the previous seven days. More than half of the respondents (54,6 %, n=131) indicated that they did not purchase mutton at all during the previous seven days. Some respondents (21,3 %, n=51) indicated that they purchase mutton from a supermarket and 20,8 % (n=50) indicated that they purchase it from a butcher. The reason for these results could be that mutton / lamb are more expensive meats. The majority of the respondents (97 %, n=224) indicated that they have not purchased goat meat at all during the previous seven days with only 1,7 % (n=4) of the respondents who indicated that they purchase goat meat from a supermarket. The majority of the respondents (53,9 %, n=130) indicated that they purchase chicken from a supermarket and 26,1 % (n=63) of the respondents indicated that they did not purchase chicken during the previous seven days at all. Only 13,7 % (n=33) indicated that they purchase chicken from a butcher.

More than half of the respondents (52,7 %, n=126) indicated that they have not purchased pork during the previous seven days. Those respondents who have purchased pork indicated that they purchase it from a supermarket (25,5 %, n=61) and from a butcher (16,7 %, n=40). More than a third of the respondents (39,2 %, n= 94) indicated that they have not purchased boerewors at all during the previous seven days. Another 30 % (n= 72) indicated that they purchase boerewors from a supermarket whereas 28,3 % (n=68) indicated that they purchase it from a butcher. The majority of the respondents (96,5 %, n=222) indicated that they have not purchased offal cuts at all during the previous seven days. Only a few respondents indicated otherwise as only 1,3 % (n=3) indicated that they purchase it from a supermarket, with 1,7 % (n=4) indicating that they purchase it from a butcher and only one respondent (0,4 %, n=1) purchase it from a convenience store. A possible reason for this could be that offal meat is not in everyone's taste and preference and also not readily available. Another reason could be that some offal cuts such as oxtail is expensive. Bacon was not purchased by more than half of the respondents (50,6 %, n=120) during the previous seven days followed by 41,4 % (n=98) who purchase bacon from a supermarket and only 4,6 % (n=11) who purchase it from a butcher.

The majority of the respondents (52,5 %, n=124) indicated that they have not purchased processed meat during the previous seven days. More than a third of the respondents (37,3 %, n=88) purchase processed meat from a supermarket and only 6,4 % (n=15) purchase it from a butcher. Nearly half of the respondents (49,0 %, n=117) indicated that they have not purchased biltong at all during the past seven days. Some respondents (30,1 %, n=72) indicated that they purchase biltong from a butcher and only 15,1 % (n=36) of the respondents purchase it from a supermarket.

In conclusion, most of the respondents purchase fresh meat from a supermarket although some indicated that they purchase it from a butcher. It is however notable that many respondents indicated that they have not purchased any meat and meat products during the previous seven days. A possible reason for this could be that meat was bought monthly by these respondents and therefore not at the time of data collection.

Figure 4.9 presents the results of the bread and bread-like products purchased. The bread and bread-like products included bread (white and brown), buns / bread rolls, sweet buns, scones, fat cakes, crisp breads / crackers and rusks.

FIGURE 4.9: FOOD STORES WHERE BREAD AND BREAD-LIKE PRODUCTS ARE PURCHASED

The majority of the respondents (75,9 %, n=189) indicated that they purchase bread from a supermarket with only a few of the respondents (10,8 %, n=27) who indicated that they purchase it from a convenience store. Some of the respondents (10,8 %, n=27) indicated that they have not purchased bread at all during the previous seven days. More than half of the respondents (53,4 %, n=126) indicated that they purchase buns / bread rolls from a supermarket. Many respondents (40,7 %, n=96) indicated that they have not purchased buns during the previous seven days and only 4,7 % (n=11) of the respondents indicated that they purchase buns from a convenience store.

More that 70 % of the respondents indicated that they have not purchased sweet buns (87,1 %, n=203), scones (90,9 %, n=210), fat cakes (87,8 %, n=202) and crisp breads (72,5 %, n= 169) during the previous seven days. Some respondents who do purchase these products, purchase them from a supermarket. More than half of the respondents (61,9 %, n=143) indicated that they have not purchased rusks during the previous seven days with nearly a third of the respondents (30,7 %, n=71) indicating that they have purchased rusks at a supermarket during the previous seven days.

Figure 4.10 presents the results of where cereal products are purchased. The cereal products included maize meal, rice, flour (cake and bread), sorghum and pasta products (macaroni, spaghetti and noodles).

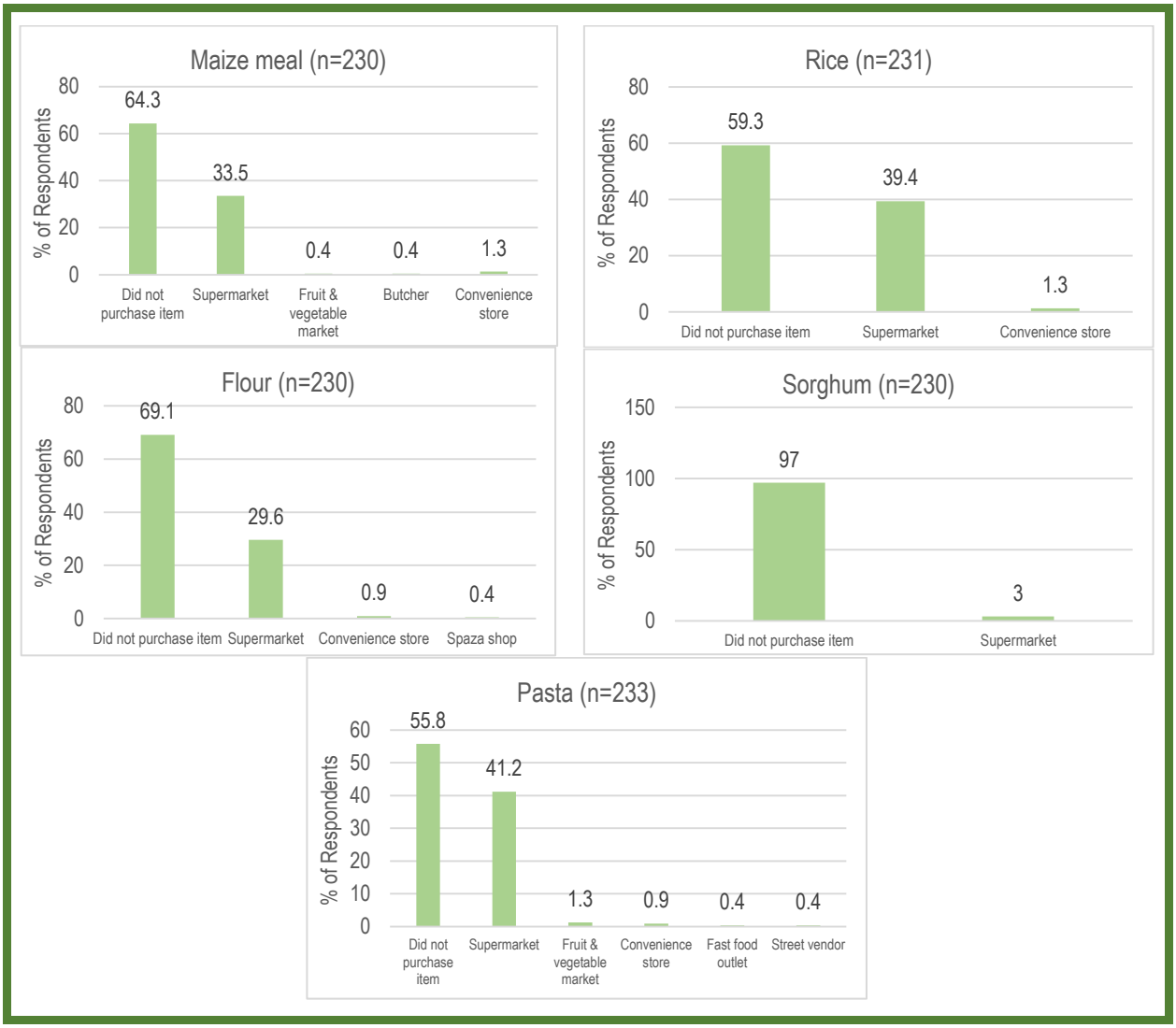

FIGURE 4.10: FOOD STORES WHERE CEREAL PRODUCTS ARE PURCHASED

The majority (between 55,8 % and 97 %) of the respondents indicated that they have not purchased the listed cereal products during the previous week. However, when these cereal products are being purchased, it is done at a supermarket. A possible reason for not purchasing cereal products could be that cereal products are not perishable products and have a long shelf life and could have been bought at another stage and not when this questionnaire was conducted. The majority of the respondents (64,3 %, n=148) indicated that they have not purchased maize meal during the previous week, although 33,5 % (n=77) of the respondents purchase it from a supermarket. An explanation for not having purchased maize meal could be because it is a product with a long shelf life and the respondents still had supplies.

The majority of the respondents (59,3 %, n=137) indicated that they have not purchased rice during the past seven days with only 39,4 % of the respondents purchasing it from a supermarket. Only 1,3 % (n=3) of the respondents indicated that they purchase rice from a convenience store. The majority of the respondents (69,1 %, n=159) indicated that they have not purchased flour during the previous seven days. Almost a third of the respondents (29,6 %, n=68) indicated that

they purchase flour from a supermarket. The majority of the respondents (97 %, n=223) indicated that they have not purchased sorghum during the previous seven days with only 3 % (n=7) of the respondents purchasing sorghum from a supermarket. This result could possibly be because sorghum is an expensive product and also not readily available. More than half of the respondents (55,8 %, n=130) indicated that they have not purchased pasta during the previous seven days. Some of the respondents (41,2 %, n=96) indicated that they purchase pasta from a supermarket. A possible explanation for this could be attributed to the fact that these cereal products are non-perishable products and not likely to be bought weekly, therefore the respondents might still have had supplies of these products and did not purchase it during the previous week.

Figure 4.11 presents the results of where oils and fats are purchased. The oils and fats included oil (sunflower, olive and canola), margarine (brick), margarine (tub), butter and lard.

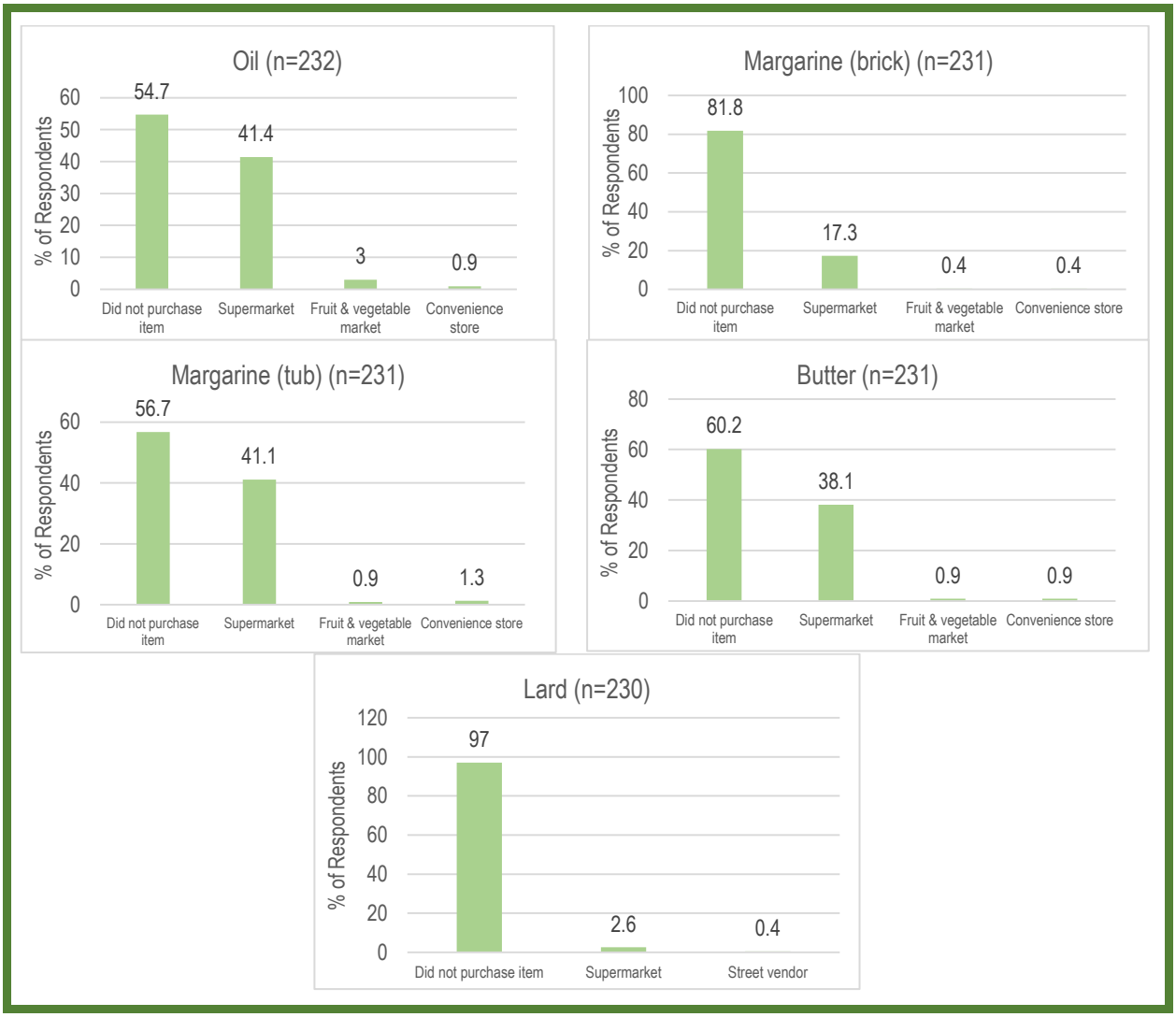

FIGURE 4.11: FOOD STORES WHERE OILS AND FATS ARE PURCHASED

Although 41,4 % (n=96) of the respondents indicated that they purchase oil at a supermarket, 54,7 % (n=127) of the respondents indicated that they have not purchased oil during the previous

seven days. The majority of the respondents (81,8 %, n=189) indicated that they have not purchased brick margarine during the previous seven days. Only 17,3 % (n=40) indicated that they purchase brick margarine from a supermarket. The majority of the respondents (56,7 %, n=131) however have not purchased a tub of margarine during the previous seven days, although 41,1 % (n=95) indicated that they have purchased a tub of margarine at a supermarket. The majority of the respondents (60,2 %, n=139) indicated that they have not purchased butter during the previous seven days; the other 38,1 % (n=88) of the respondents purchase it from a supermarket. The majority of the respondents (97,0 %, n=223) indicated that they have not purchased lard during the previous seven days. Only 2,6 % (n=6) of the respondents indicated that they have purchased lard from a supermarket.

Most of the respondents indicated that they have not purchased oil and fat products during the previous seven days. Those respondents who did purchase it, mostly purchased it from a supermarket. A possible explanation for these results might be that these are non-perishable products which are not likely to be bought weekly and that the respondents probably already had stock at the time when the questionnaire was completed.

Figure 4.12 presents the results of where eggs are purchased at various stores and will be explained below.

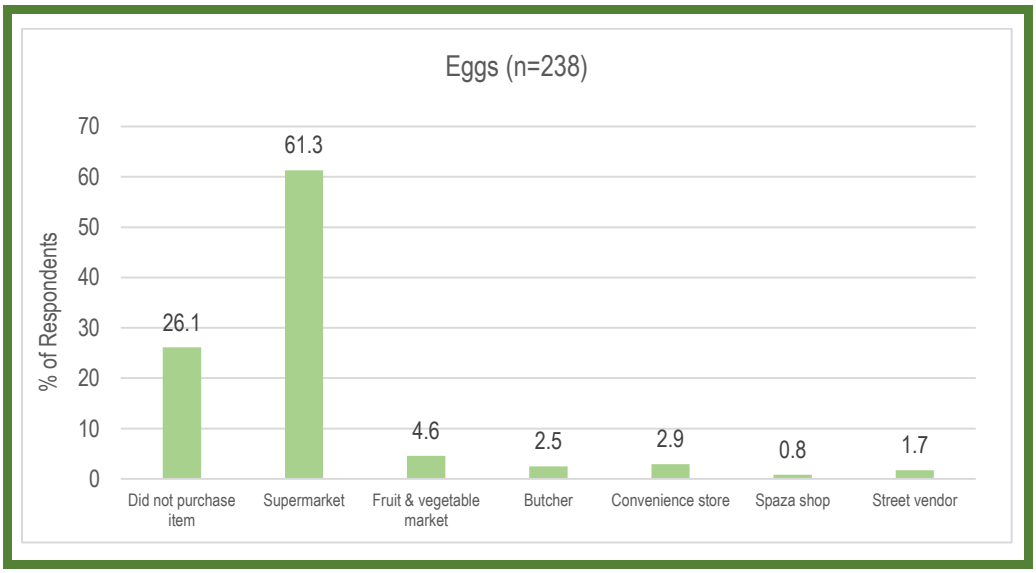

FIGURE 4.12: FOOD STORES WHERE EGGS ARE PURCHASED (n=238)

The majority of the respondents (61,3 %, n=146) indicated that they purchase eggs at a supermarket. Some of the respondents (26,1 %, n= 62) indicated that they have not purchased eggs during the previous seven days. A small percentage of 4,6 % (n=11) of the respondents indicated that they purchase eggs from a fruit and vegetable market.

Figure 4.13 presents the results of where legumes and nuts are purchased. The legumes and nuts included dry beans (sugar and butter), split and peas, lentils and nuts (peanuts, pecan, walnuts and macadamia).

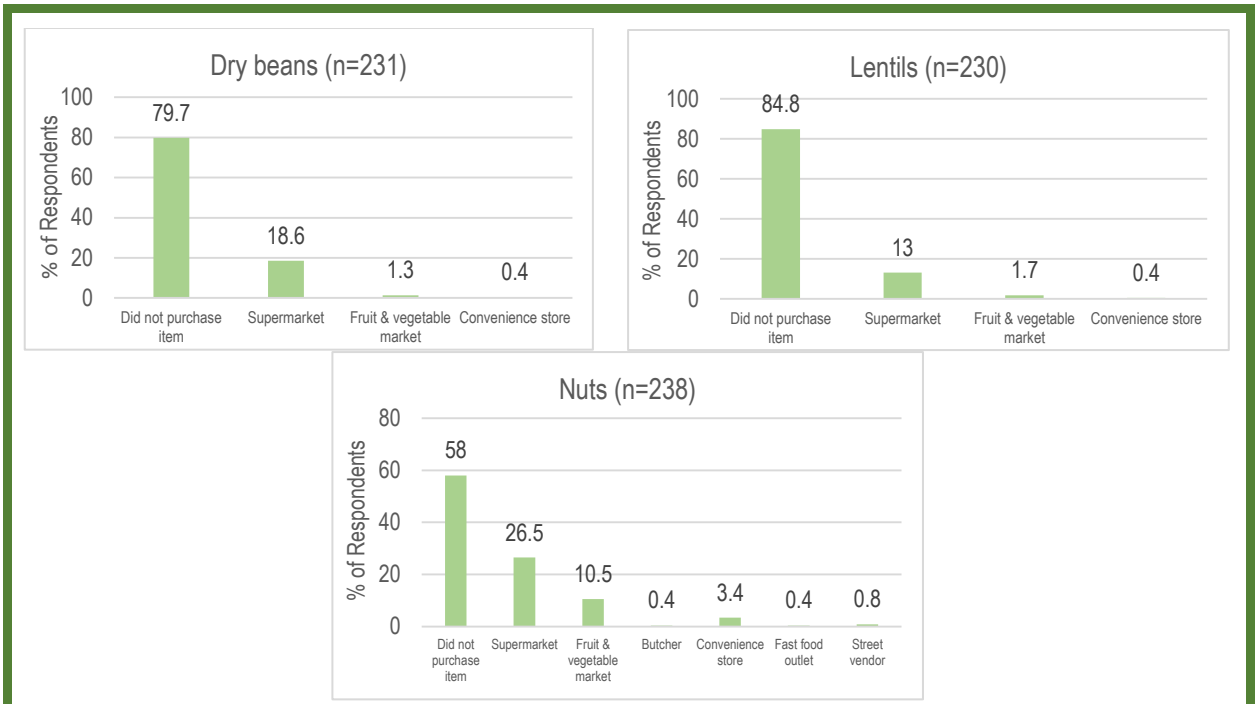

FIGURE 4.13: FOOD STORES WHERE LEGUMES AND NUTS ARE PURCHASED

The majority of the respondents indicated that they have not purchased any legumes and nuts during the previous seven days. The respondents who indicated that they do purchase some of these products, purchase it from a supermarket. The majority of the respondents (79,7 %, n=184) indicated that they have not purchased dry beans during the previous seven days, although 18,6 % (n=43) of the respondents purchase it from a supermarket. Most of the respondents (84,8 %, n=195) indicated that they have not purchased lentils during the previous seven days. Only a few respondents (13 %, n=30) indicated that they purchase lentils from a supermarket. More than half of the respondents (58 %, n=138) indicated that they have not purchased nuts during the previous seven days with only 26,5 % (n=63) of the respondents purchasing nuts from a supermarket. Only 10,5 % (n=25) of the respondents indicated that they purchase nuts from a fruit and vegetable market.

In conclusion, regarding the results on how often as well as where the respondents purchase food products, supermarkets were the food outlet where the majority of respondents purchase most of their food on a weekly basis. This confirms that there is sufficient availability and accessibility of food stores, more specifically supermarkets, in the areas where the respondents reside.

As stated earlier (see 5.4) the first access dimension addresses the availability of food stores as well as food products. The availability of food products will now be discussed. Two statements on the availability of food measured the respondents' level of agreement. The results are given in Table 4.5.

A 5-point Likert-type scale was used to measure the level of agreement.

TABLE 4.5: LEVEL OF AGREEMENT REGARDING AVAILABILITY OF FOOD (n=230)

	Strongly agree		Agree		Undecided		Disagree		Strongly disagree	
n=230	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Good quality fruit and vegetable products are available in the food outlets where I normally shop	85	37,0	122	**53,0**	13	5,7	8	3,5	2	0,9
Healthy food are available in the food outlets where I normally shop	85	37,0	120	**52,2**	16	7,0	8	3,5	1	0,4

Ninety percent of the respondents agreed (53,0 %, n=122 agreed and 37,0 %, n=85 strongly agreed) that good quality fruit and vegetable products are available in the food outlets they normally purchase from. Only 0,9 % (n=2) of the respondents indicated that they strongly disagreed with this statement. Nearly 90 % of the respondents agreed that healthy food are available in the outlets where they usually purchase their food from, (52,2 %, n=120 agreed and 37,0 %, n=85 strongly agreed). Only 7,0 % (n=16) of the respondents were undecided and 3,5 % (n=8) disagreed that healthy food are available where they normally purchase their food.

It can be concluded that good quality fruit and vegetable products and other healthy food are available to the respondents. The GIS mapping and spatial analysis showed that there are multiple food stores available to the consumer. This was also confirmed by the results on the frequency of food purchases from the stores listed. A variety of food stores are available and accessible to the respondents such as supermarkets, fresh fruit and vegetable markets, butchers, convenience stores and fast-food outlets. These stores are all visited to some extent to purchase food products from. Although supermarkets are the food stores where the majority of respondents purchase most of their food from on a weekly basis, the results confirm that a variety of food stores, and more specifically supermarkets, are available and accessible in the areas where the respondents reside.

The access dimension of accessibility goes hand-in-hand with availability and will be discussed next.

4.5.2 Accessibility

Making the available food obtainable to consumers relates to the accessibility of food (Caspi *et al.*, 2012:1178). Respondents had to indicate their level of agreement to statements about the accessibility of the food outlets they purchase from. A 5-point Likert-type scale was used to measure this access dimensions of accessibility and Table 4.6 presents these results.

TABLE 4.6: LEVEL OF AGREEMENT REGARDING ACCESSIBILITY OF FOOD OUTLETS AND FOOD (n=230)

	Strongly agree		Agree		Undecided		Disagree		Strongly disagree	
n=230	n	%	n	%	n	%	n	%	n	%
I am satisfied with the range of food outlets I have access to in my neighbourhood	109	**47,4**	106	46,1	4	1,7	6	2,6	5	2,2
I usually buy food at the food outlets closest to where I live	85	37,0	107	**46,5**	12	5,2	23	10,0	3	1,3
I am satisfied with the types (variety) of food I have regular access to	83	36,1	125	**54,3**	9	3,9	11	4,8	2	0,9
I have to travel some distance to buy good quality food	10	4,3	35	15,2	22	9,6	111	**48,3**	52	22,6

More than 90 % of the respondents agreed (47,4 %, n=109 strongly agreed and 46,1 %, n=106 agreed) that they are satisfied with the range of food outlets they have access to in their neighbourhood with only a small number of respondents (2,2 %, n=5) who strongly disagreed. Just over 80 % of the respondents (46,5 %, n=107 agreed and 37,0 %, n=85 strongly agreed) agreed that they purchase their food at food outlets that are located closest to where they live. This indicates that they have access to food outlets close to them. Only some of the respondents (10,0 %, n=23) disagreed and 1,3 % (n=3) strongly disagreed that they do not usually purchase at the food outlets closest to where they live. Over 90 % of the respondents agreed and were satisfied with the types (variety) of food they had regular access to (54,3 %, n=125 agreed and 36,1 %, n=83 strongly agreed). Only two respondents (0,9 %) strongly disagreed with this statement as they were not satisfied with the types (variety) of food they have access to. Most of the respondents (48,3 %, n=111) indicated that they disagree with the statement that they have to travel a distance to buy good quality food and another 22,6 % (n=52) strongly disagreed. Thus, the majority of the respondents confirmed that they had easy and close access to food stores as they were not required to travel a distance to buy good quality food.

The majority of the respondents were thus satisfied with the range of food outlets including the types or variety of food products they have access to. The respondents also agreed that they have access to food stores close to them and do not have to travel some distance to purchase good quality food. Store density is confirmed through the GIS mapping system as can be seen in Figure 4.1 where multiple food retail outlets are available and accessible in each sub-place where

the respondents reside. The store observations also confirmed that multiple and various food retail stores and food products are available and accessible in close proximity to the respondents. People often tend to shop for food in their own neighbourhood as they have easy access to food stores and don't have to travel for long distances (Cannuscio *et al.*, 2014:609).

4.5.3 Acceptability

Acceptability refers to people's attitudes about qualities of their local food environment, and whether the given supply of products meets their personal standards, preferences and norms or not. It also includes whether the quality of the food products are acceptable to the consumer (Caspi *et al.*, 2012:1178). The results on acceptability of the food available and accessible to the respondents will be presented next. Respondents had to indicate their level of agreement to statements about the food outlets and food products. A 5-point Likert-type scale was used to measure this access dimensions of acceptability and Table 4.7 presents these results.

TABLE 4.7: LEVEL OF AGREEMENT REGARDING ACCEPTABILITY OF FOOD OUTLETS AND FOOD PRODUCTS (n=230)

	Strongly agree		Agree		Undecided		Disagree		Strongly disagree	
n=230	n	%	n	%	n	%	n	%	n	%
I am satisfied with the range of food outlets I have access to in my neighbourhood.	109	**47,4**	106	46,1	4	1,7	6	2,6	5	2,2
Good quality fruit and vegetable products are available in the food outlets I normally shop at.	85	37,0	122	**53,0**	13	5,7	8	3,5	2	0,9
I am satisfied with the types (variety) of food I have regular access to.	83	36,1	125	**54,3**	9	3,9	11	4,8	2	0,9
The food stores in my neighbourhood compare well with food stores in other areas of Tshwane.	88	38,3	99	**43,0**	24	10,4	16	7,0	3	1,3

Just over 90 % of the respondents agreed (47,4 %, n=109 strongly agreed and 46,1 %, n=106 agreed) that they are satisfied with the range of food outlets they have access to in their neighbourhood with only a small number of respondents (2,2 %, n=5) who strongly disagreed. This means that the majority of the respondents find the range of food outlets acceptable to them. Over 80 % of the respondents agreed that good quality fruit and vegetable products are available in the food outlets they normally purchase from (53,0 %, n=122 agreed and 37,0 %, n=85 strongly agreed) with this statement. More than 90 % of the respondents agreed and were satisfied with the types (variety) of food they have regular access to (54,3 %, n=125 agreed and 36,1 %, n=83 strongly agreed) which indicates that the majority of the respondents feel that the variety of food products they have access to are acceptable to them. Only two respondents (0,9 %) strongly disagreed with the statement that they were not satisfied with the types (variety) of food they have access to. Over 80 % of the respondents (43,0 %, n=99 agreed and 38,3 %, n=88) strongly

agreed) were of the opinion that the food stores in their neighbourhood compared well to the food stores in other areas of Tshwane. This indicates that most of the respondents feel that the food stores and the food products they offer, in their neighbourhood, are acceptable to them. Some respondents (10,4 %, n=24) were undecided and only 1,3 % (n=3) of the respondents strongly disagreed with this statement.

The results confirm that the food stores and food products that are available and accessible to the respondents are acceptable to them. The respondents are satisfied with the range of food outlets, the type (variety), as well as the good quality of fruit and vegetables they have access to. This was also confirmed through the observation data as the stores were within close proximity in each of the different regions observed. The stores sell a variety of good quality, affordable food products and accommodate the needs of the consumers through the store operating hours and payment options, which make the food stores and food products acceptable to the consumers.

4.5.4 Affordability

The affordability of food products was also measured and respondents had to indicate their level of agreement to a statement about the affordability of fruit and vegetables. Affordability refers to the ability to obtain food, controlled by the amount of money the consumer has to purchase the available food (Larson *et al.*, 2009; Bryant *et al.*, 2003:14). It is simultaneously governed by the time, skills and facilities the consumer has for preparation and storage of a particular food (Larson *et al*., 2009; Bryant *et al.*, 2003:14). A 5-point Likert-type scale was used to measure this access dimensions of affordability and Table 4.7 presents these results.

TABLE 4.8: LEVEL OF AGREEMENT REGARDING THE AFFORDABILITY OF FOOD PRODUCTS (n=230)

	Strongly agree		Agree		Undecided		Disagree		Strongly disagree	
n=230	n	%	n	%	n	%	n	%	n	%
Fruit and vegetables are affordable (reasonable priced) in the food outlets I normally buy from.	31	13,5	92	**40,0**	55	23,9	45	19,6	7	3,0

More than half of the respondents agreed (40,0 %, n=92 agreed and 13,5 %, n=3 strongly agreed respectively) and were satisfied with the affordability of the fruit and vegetables in the food outlets they normally purchase from. However, 23,9 % (n=55) were undecided that fruit and vegetables are affordable (reasonably priced) in the food outlets they purchase from. Another 19,6 % (n=45) of the respondents disagreed with the statement that fruit and vegetables are affordable (reasonable priced) at the food outlets they purchase from.

Together with the above-mentioned statement of affordability of fruit and vegetables, a food basket was compiled and data were gathered to compare the price of food available in the formal food retail sector of the Tshwane metropolitan area with the Consumer Price Index (CPI). The food basket was developed and altered from the National Agricultural Marketing Council's (NAMC) 28-item urban food basket together with the Victoria Health Food Basket (Palmero & Wilson, 2007) and also based on a previous study done in Worcester in the Western Cape. The NAMC monitors food prices at retail level and then release regular authoritative reports. The Consumer Price Index releases monthly reports on the prices of certain chosen food products and is representative of consumer spending on food. The food items that were included were items that the respondents of this study indicated as items frequently purchased. The comparison of the food prices for this study was done in November 2017.

4.5.4.1 Food basket

Retail stores where data were gathered for the food basket included Pick n Pay, Spar, Shoprite Checkers and Woolworths. Six stores in each retail group, in the regions where most of the respondents reside (regions 3, 4 and 6), were visited to observe and obtain the price of the listed food items.

Table 4.9 presents the list of food items included in Addendum E. The food basket prices that were recorded can be seen in Table 4.9 and are compared to the Consumer Price Index applicable in November 2017.

TABLE 4.9: FOOD BASKET ITEMS

Food groups and items:	Average prices:				Consumer Price Index Nov. 2017
Food stores:	**Pick n Pay**	**Spar**	**Checkers**	**Woolworths**	
Breads & Cereals					
Corn Flakes (500 g)	R33,99	R32,99	R27,99	R33,99	
Loaf of white bread (700 g)	R11,49	R10,99	R10,49	R13,99	R12,92
Loaf of brown bread (700 g)	R11,99	R12,99	R9,99	R13,99	R11,87
Oats (1 kg)	R23,99	R27,99	R27,99	R29,99	
Spaghetti / Macaroni (500 g)	R13,00	R10,99	R9,99	R14,99	
Super maize meal (5 kg)	R31,99	R39,99	R32,99	R45,99	R38,36
Super maize meal (2.5 kg)	R16,00	R21,99	R21,99	R22,99	
Special maize meal (2.5 kg)	R25,00	R21,99	R16,99	R29,99	
Weet-Bix (450 g)	R25,99	R24,99	R22,99	R21,99	
White rice (2 kg)	R18,99	R21,00	R21,99	R27,99	R25,49
Fruits					
Apples (1 kg)	R12,99	R12,00	R15,99	R16,99	R18,83
Bananas (1 kg)	R18,00	R17,19	R14,00	R16,99	R14,38
Grapes (500 g)	R34,99	R39,99	R34,99	R34,99	
Oranges (1 kg)	R12,99	R13,99	R16,99	R19,99	R14,86
Pawpaw (1 kg)	R10,00	R19,99	R12,99	R12,99	
Sultanas (250 g)	R25,00	R18,99	R24,99	R20,99	
Tinned fruit salad in natural juice (410 g)	R20,99	R20,99	R16,99	R20,99	
Orange juice 100 %, no added sugar (2 L)	R28,00	R38,99	R28,00	R30,00	

Food groups and items:	Average prices:				Consumer Price Index Nov. 2017
Food stores:	**Pick n Pay**	**Spar**	**Checkers**	**Woolworths**	
Vegetables					
Beetroot, fresh (1 kg)	R9,99	R12,99	R12,99	R15,99	
Butternut, fresh (1 kg)	R14,99	R9,99	R14,99	R15,99	
Cabbage, fresh (1 kg)	R11,99	R13,99	R11,99	R15,99	R12,99
Carrots, fresh (1 kg)	R6,99	R9,99	R7,49	R12,99	
Lettuce (medium, whole)	R9,99	R12,99	R9,99	R12,99	
Onions, fresh (1 kg)	R15,99	R15,99	R15,99	R14,99	R13,69
Potatoes, fresh (1 kg)	R11,99	R14,99	R12,99	R16,00	R11,79
Tomatoes, fresh (1 kg)	R17,00	R19,99	R17,99	R19,99	R17,21
Spinach, fresh (bunch)	R6,99	R10,99	R17,99	R29,99	
Frozen peas (1 kg)	R36,99	R33,99	R27,99	R54,99	
Tinned corn kernels (mealies) (410 g)	R13,99	R13,99	R11,99	R13,99	
Tinned beetroot (410 g)	R14,99		R12,99	R16,99	
Tinned tomatoes (410 g)	R11,99	R12,99	R14,99	R15,99	
Legumes					
Tinned baked beans (410 g)	R8,50	R10,49	R8,99	R10,99	R9,95
Dried beans (500 g)	R21,99		R18,99	R26,99	R19,40
Peanut butter (400 g)	R22,99	R28,99	R26,99	R27,99	R27,48
Dairy & eggs					
Fresh milk, full cream (1 L)	R12,00	R11,00	R15,99	R18,95	R14,00
Fresh milk,low fat (2 L)	R21,99	R25,00	R22,00	R29,95	
Long life milk, full fat (1 L)	R11,99	R13,49	R11,99	R13,99	
Yogurt, plain, medium fat (1 kg)	R25,00	R30,00	R25,99	R31,95	
Yogurt, low fat, flavoured (1 kg)	R25,00	R28,99	R24,99	R36,95	
Maas (1 L)	R14,59	R14,00	R15,99	R15,00	
Cheese, cheddar (1 kg)	R94,99	R109,00	R112,99	R120,00	R106,72
Eggs, large – min 50 g (18)	R47,99	R36,00	R37,99	R61,99	R42,65
Meat products					
Beef, mince, fresh regular (1 kg)	R79,99	R80,66	R70,99	R80,99	R79,50
Beef, offal, fresh (1 kg)					R42,52
Boerewors (1 kg)	R70,52	R80,00	R78,00	R84,99	
Chicken, breast, fillets, fresh (1 kg)	R60,00	R70,00	R75,00	R100,99	
Chicken portions, (indiv.) quick frozen (2 kg)	R64,00	R65,00	R64,00	R69,99	R65,62
Chicken giblets (1 kg)	R45,00		R47,00		R34,59
Fish tinned (pilchards) (400 g)	R15,99	R19,49	R17,99	R15,99	R17,27
Fish, frozen hake (800 g)	R89,99	R96,00	R97,99	R167,99	
Ham, fresh (1 kg)					
Mutton chops, forequarter (1 kg)	R140,00	R160,00	R134,99	R209,99	
Polony (1 kg)	R38,99	R23,00	R28,99		R41,29
Tinned, tuna in brine (170 g)	R16,99	R18,99	R13,99	R19,99	
Tinned, tuna in sunflower (170 g)	R15,99	R18,99	R13,99	R19,99	
Fats/ oils					
Canola oil (750 ml)	R21,99	R21,99	R18,99	R23,99	
Sunflower oil (750 ml)	R17,99	R17,99	R17,99	R18,99	R22,24
Margarine, brick (500 g)	R15,99	R18,99	R15,99	R24,99	R21,69
Margarine, tub polyunsaturated (500 g)	R23,99	R22,99	R16,99	R25,99	
Beverages					
Instant coffee (250 g)	R29,99	R35,99	R32,00	R27,99	R35,75
Ceylon / black tea (250 g)	R34,99	R30,00	R24,00	R33,99	R33,08
Cordials (Oros, Wild island, Carribean) (1 L)	R18,00	R12,99	R9,99	R19,00	
Fizzy sweetened beverage (Coke, Sprite) (330 ml)	R9,99	R8,99	R8,99	R9,99	
Non-core foods					
Sugar, white (2.5 kg)	R32,99	R39,99	R32,99	R38,99	R38,30
Biscuits (assorted, tennis) (200 g)	R9,99	R9,99	R14,99	R16,99	
Chocolate bar (Kit Kat) (45 g)	R8,99	R8,99	R8,99	R8,99	
Potato crisps / chips (150 g)	R11,49	R12,99	R9,99	R13,95	
Total of basket:	**R1 740,15**	**R1 771,90**	**R1 736,44**	**R2 116,22**	

Breads and cereals

In the bread and cereal group the following food items were chosen and priced: corn flakes (500 g), loaf of brown bread (700 g), loaf of white bread (700 g), oats (1 kg), Spaghetti / macaroni (500 g), super maize meal (5 kg and 2,5 kg), special maize meal (2,5kg), Wheat Bix (500 g) and white rice (2 kg). Most of the products were priced comparable with a small range of between R4 and R6 difference between the different stores. The price comparison between the products observed in store and the CPI products differed between R1,00 and R2,50 for white bread. Brown bread differed between R0,12 and R2,12 and for super maize meal it differed between R1,60 and R7,60. The difference on the price on rice was between R2,50 and R6,50.

Fruit

In the fruit group the following food items were chosen and priced: apples (1 kg), bananas (1 kg), grapes (500 g), oranges (1 kg), pawpaw (each), sultanas (250 g), Tinned fruit salad in natural juice (410 g) and orange juice 100 % with no added sugar (2 L). Most of the products were priced very comparable with a range of between R4 and R10 difference between the different stores. The price comparison between the products observed in store and the CPI products differed between R1,84 and R6,83 for apples. Bananas differed between R0,38 and R3,62 and oranges differed between R1,87 and R5.

Vegetables

In the vegetable group the following food items were chosen and priced: beetroot (1 kg), butternut (1 kg), cabbage (1 kg), carrots (1 kg), lettuce (whole), onions (1 kg), potatoes (1 kg), tomatoes (1 kg), spinach (bunch), frozen peas (1 kg) and tinned corn kernels, beetroot and tomatoes (410 g each). Most of the products were priced comparable with a small range of between R1 and R6 difference between the stores. The price comparison between the products observed in store and the CPI products differed between R1,00 and R3,00 for cabbage. Onions differed between R1,30 and R2,30 and the price on potatoes differed between R0,20 and R4,21. The difference on the price of tomatoes was between R0,21 and R2,78.

Legumes

In the legumes group the following food items were chosen and priced: tinned baked beans (410 g), dried beans (500 g) and peanut butter (400 g). Most of these products were priced the same with only between R2 and R6 difference between the stores. The price comparison between the products observed in store and the CPI products differed with approximately R1,05 for tinned baked beans. Dried beans differed between R0,41 and R7,59 and peanut butter differed between R1,51 and R4,49.

Dairy and eggs

In the dairy and eggs group the following food items were chosen and priced: fresh milk, full cream (1 L), fresh milk, low fat (2 L), long-life milk, full fat (1L), yogurt, plain (1 kg), yogurt, flavoured (1 kg), maas (1 L), cheese, cheddar (1 kg) and eggs (18). Most of the products were priced comparable with a range of between R5 and R12 difference between the stores. The price comparison between the products observed in store and the CPI products differed between R3,00 and R4,95 for fresh full-cream milk. Cheddar cheese differed between R11,73 and R13,28. The difference on the price of eggs was between R6,65 and R19,34.

Meat products

In the meat products group the following food items were chosen and priced; beef mince (1 kg), boerewors (1 kg), chicken − breast fillets (1 kg), chicken − portions (1 kg), fish − tinned (400 g), fish − frozen hake (1 kg), mutton chops (1 kg), polony (1 kg), tinned tuna in brine (170 g) and tinned tuna in sunflower oil (170 g). Most of these products' prices differed considerably, with up to R70 between the different stores. The price comparison between the products observed in store and the CPI products differed between R1,49 and R8,51 for beef mince. Chicken portions differed between R1,62 and R4,37 and for chicken giblets it differed between R10,41 and R12,41. The difference on the price of tinned fish was between R1,28 and R2,22 and for polony it differed between R2,30 and R18,29.

Fats / oils

In the fat / oil group the following food items were chosen and priced: canola oil (750 ml), sunflower oil (750 ml), margarine − brick (500 g) and margarine − tub (500 g). Most of the products were priced comparable with a range between R5 and R10 difference between the stores. The price comparison between the products observed in store and the CPI products differed between R3,25 and R4,25 for sunflower oil. Margarine differed between R3,30 and R5,70.

Beverages

In the beverages group the following food items were chosen and priced: instant coffee (250 g), Ceylon / black tea, cordials like Oros, Wild Island and Carribean (1 L), fizzy sweetened beverages like Coke and Sprite (330 ml). Most of the products were priced comparable with a very small range of between R1 and R3 difference between the stores. The price comparison between the products observed in store and the CPI products differed between R0,24 and R7,76 for instant coffee. The difference on the price of Ceylon tea was between R1,91 and R9,08.

Non-core food items

In the non-core food item group the following food items were chosen and priced: sugar − white (2,5 kg), biscuits (200 g), chocolate bar (45 g) and potato crisps (150 g). Most of these products

were priced very comparable with a small difference of R4 between the stores. The price comparison between the products observed in store and the CPI products differed between R1,69 and R5,31 for white sugar.

In conclusion, the differences in prices at the various stores were minimal with an exception to meat products which differed between two stores. The evaluation of food prices in Tshwane versus the national food prices of similar products compared well and differed minimally, with the only exception of eggs and polony which differed between two stores. Therefore it can be concluded that most of the food products are affordable to the respondents of Tshwane.

Together with the above-mentioned results regarding the affordability of food, the next set of results is to substantiate whether the food is affordable in terms of the monthly household income and food budget spent. These two questions were optional questions in the survey questionnaire. Table 4.9 presents the results.

TABLE 4.10 APPROXIMATE MONTHLY HOUSEHOLD INCOME AND FOOD BUDGET

Characteristics		Frequency (n)	%
Approximate monthly household income	R0 – R16 000	28	12.2
	R16 001– R25 000	25	10.9
	R25 001 – R40 000	42	18.3
	R40 001 – R60 000	35	15.2
	R60 001 – R100 000	45	19.6
	More than R100 000	19.6	8.3
	Prefer not to answer	36	15.7
Approximate monthly household food budget	R0 - R1 000	10	7.9
	R1 200 – R2 000	20	8.6
	R2 500 – R3 500	41	17.8
	R4 000 – R4 500	42	18.3
	R5 000 – R6 000	34	14.7
	R6 500 – R15 000	27	11.6
	R18 000 – R20 000	6	2.5
	Did not answer	50	21.7

Approximate monthly household income

Most of the respondents (19,6 %, n=45), indicated that their household income is between R60 000 and R100 000 a month. This group was followed by the income group between R25 001 and R40 000 a month (18,3 %, n=42). Although 15,7 % (n=36) of the respondents preferred not to answer the question regarding their monthly household income, the majority of the respondents had a household income with a minimum of R25 000 or more per month.

Approximate monthly household food budget

Most of the respondents (18,3 %, n=42) indicated to have a monthly food budget between R4 000 and R4 500, followed by 17,8 % (n=41) who indicated to have a monthly food budget between R2 500 and R3 500. 14,7 % (n=34) indicated that their monthly food budget was between R5 000

and R6 000. Only 10 of the respondents (7,9 %) indicated to have a monthly budget between R0 and R1 000, while 20 respondents (8,6 %) indicated a monthly food budget of between R1 200 and R2 000. There were 27 respondents (11,6 %) who indicated a monthly food budget between R6 500 and R15 000 and 6 respondents (2,5 %) indicated a monthly food budget between R18 000 and R20 000. There were 50 respondents (21,7 %) who did not answer the question regarding their household's monthly food budget. Further analysis showed that the average percentage of the respondents' monthly household income spent on food is 12,7 % which is represented by a mean of R6 076,67 with a median value of R4 000,00 a month and a standard deviation of R15 160,60. Statistics South Africa (2015) confirmed that non-poor households spend 10,5 % of their household income on food, where the poor households spend 30 % of their household income on food. Since this study was done on the middle-income households with good education, it compares well with the statistics of the non-poor households.

4.5.5 Accommodation

Accommodation includes how well food retailers and suppliers accept, adapt and accommodate the needs and desires of their consumers (Caspi *et al.*, 2012:1179). Accommodation, the last access dimension measured, will be discussed next. A 5-point Likert-type scale was used to measure the level of agreement if food outlets accommodate the needs of the consumer. Table 4.10 presents these results.

TABLE 4.11: LEVEL OF AGREEMENT IF FOOD OUTLETS ACCOMMODATE CONSUMERS' NEEDS (n=230)

	Strongly agree		Agree		Undecided		Disagree		Strongly disagree	
n=230	**n**	**%**	**n**	**%**	**N**	**%**	**N**	**%**	**n**	**%**
I am satisfied with the types (variety) of food I have regular access to	83	36,1	125	**54,3**	9	3,9	11	4,8	2	0,9
These outlets accommodate my needs (i.e. credit options, extended hours)	77	33,5	130	**56,5**	17	7,4	4	1,7	2	0,9

More than 90 % of the respondents agreed and were satisfied with the type (variety) of food they had regularly access to (54,3 %, n=125 agreed and 36,1 %, n=83 strongly agreed). Only two respondents (0,9 %) strongly disagreed with the statement that they were satisfied with the type (variety) of food they have access to. The majority of the respondents (56,5 %, n=130) agreed that the food outlets they purchased from accommodated their needs in terms of credit options and extended hours with another 33,5 % (n=77) who strongly agreed with this statement.

During the store observations previously mentioned (4.4.1 Formal food retail sector, Objective 2), it was also recorded whether these stores accommodate the consumers' needs in terms of trading hours and payment options. All the stores are open for at least 10 to 12 hours during weekdays and at least 8 hours on weekends. Some stores open as early as 07:00 and some stores close as late as 21:00 during weekdays. These trading hours especially accommodate the needs of working consumers to do their grocery shopping before or after work. The payment options of most of the stores include cash or debit and credit cards. Some stores such as Woolworths have Woolworths store cards, Woolworths credit cards, vouchers and gift cards that can also be used as payment. Some Pick n Pay stores offer tap n go, which is where customers do not have to enter a pin, but only tap the card on the machine to make a payment. The other stores offer cash or debit and credit card payments.

In conclusion, from the results above the majority of the respondents agreed that there is a variety of good quality and healthy food options available − accessible and acceptable − close to them. They also mostly agreed that the fruit and vegetable products are affordable at the outlets they purchase from and this was also supported by the prices of food in Tshwane that compare well with the national food prices. The respondents' needs are also accommodated in terms of providing good quality food of a wide variety at reasonable prices and then also regarding the food stores' operating hours and payment options. As described above, a variety of food retail options and food products are readily available and accessible to consumers (see 4.3, in the local urban food environment). Ample food retail options are available and a variety of food stores accommodate the needs of the consumers. The food products offered by these stores are acceptable and affordable to most.

It can therefore be concluded that the food access dimensions of availability, accessibility, affordability, acceptability and accommodation, together with the local urban food environment, relate to the food choices of urban consumers. The respondents strongly agreed that the access to food, as measured by the five food access dimensions, is adequate as they indicated to be mostly satisfied with the availability, accessibility, affordability, acceptability and accommodation of food in their local urban food environments. In terms of location, the results confirm that there are many food stores available and accessible to these urban consumers. Figure 4.1 shows a map indicating the respondents and retail outlets per sub-place in the city of Tshwane. This map confirms that there are many retail outlets and food stores in close distance to most of the respondents.

The next section deals with the objective on how the access dimensions contribute to the food choices of the study group.

4.6 CONTRIBUTION OF THE FOOD ACCESS DIMENSIONS TO THE CONSUMPTION PATTERNS AND THE FOOD CHOICES OF THE STUDY GROUP

The fourth objective of the study was to describe how the food access dimensions contribute to the food choices of the study group. As the gatekeeper plays an important role in determining what food enters the home and what is available and accessible, data on who this person is were also collected. Data on the food consumption patterns of the study group as part of their food choices were included to determine and describe the meal patterns and meal composition, as well as the frequency of consumption of selected food groups. This was supported by data obtained from a non-quantitative food frequency questionnaire as well as what kind of food was available in the homes of the study group.

4.6.1 Food available and accessible in the home

Family members and the home food environment are important influences on the type of food consumed (Story *et al*., 2008). The parents or meal preparers play a significant role in shaping the food habits of household members. The food preparers determine what kind of food is available in the household, how it is prepared and also how it can promote the development of healthful eating behaviours through modelling the consumption of nutritious food, transmit positive attitudes towards healthy eating and determine the structure of the shared meals (Sedibe, Feeley, Voorend, Griffiths, Doak & Norris, 2014). A variety of factors within the home food environment has been associated with healthful dietary behaviours. Among the strongest factors are availability and accessibility of healthy foods, the frequency of family meals, and parenting practices (Story *et al*., 2008).

In a household there is usually a gatekeeper who is responsible for controlling what food comes into the home and how the food is prepared and served (Burton, Reid, Worsley & Mavondo*,* 2017; McLeod, Campbell & Hesketh, 2011; Jilcott, Laraia, Evenson & Ammerman, 2009). Females are usually regarded as the household gatekeepers who make most of the decisions regarding food purchases and preparation (Sishana *et al.,* 2014:11; Damman & Smith, 2009:249).

4.6.1.1 Food purchases

Table 4.11 presents results regarding the person who is responsible for food purchases in the household. This was measured to get a more comprehensive picture of the food consumption patterns of the study group.

TABLE 4.12: PERSON RESPONSIBLE FOR FOOD PURCHASES

Food purchases		n	%
Responsible for household's food purchases	Yourself	105	45.7
	Husband / wife / partner	116	50.4
	Children	1	0.4
	Another person in the household	8	3.5

The majority of the respondents indicated that their spouse or partner (50,4 %, n=116) is responsible for the household's food purchases. Further analysis of the data revealed that it would be a female that is responsible for this task and Table 4.12 below shows these results.

TABLE 4.13: GENDER OF PERSON RESPONSIBLE FOR FOOD PURCHASES

Food purchases		n	%
Gender of person mainly responsible for food purchases	Male	61	26.5
	Female	160	69.9

It can be assumed that females are generally held more responsible for the food decisions of families and are therefore also the food purchasers (De Ruijter & Van der Lippe, 2009:8; Sishana *et al.*, 2014).

4.6.1.2 Food preparation

Table 4.13 presents the results of the person mainly responsible for most of the household's food preparation. This was measured to get a clear idea and bigger picture of the food consumption patterns of the respondents of Tshwane.

TABLE 4.14: PERSON RESPONSIBLE FOR FOOD PREPARATION

Food preparation		n	%
Responsible for household's food preparation	Respondent self	66	28,7
	Husband / wife / partner	134	58.3
	Children	4	1.7
	Domestic worker	17	7.4
	Another person in the household	9	3.9

The majority of the respondents indicated that their spouse (58,3 %, n=134) is responsible for the household's food preparation with 28,7 % (n=66) who indicated that they do the household's food preparation themselves. Further analysis indicated that the majority of the respondents (67,4 %, n=200) mainly responsible for the household's food preparation are females, which confirms that the cultural tradition of females being responsible for food preparation still exists (Sishana *et al.*, 2014, Bryant *et al.*, 2003:194).

Figure 4.14 presents the results on statements regarding meal preparation and the availability of

selected health and non-essential food items in the home. The respondents were asked to indicate how the given statements applied to the availability and accessibility of selected food items in their homes.

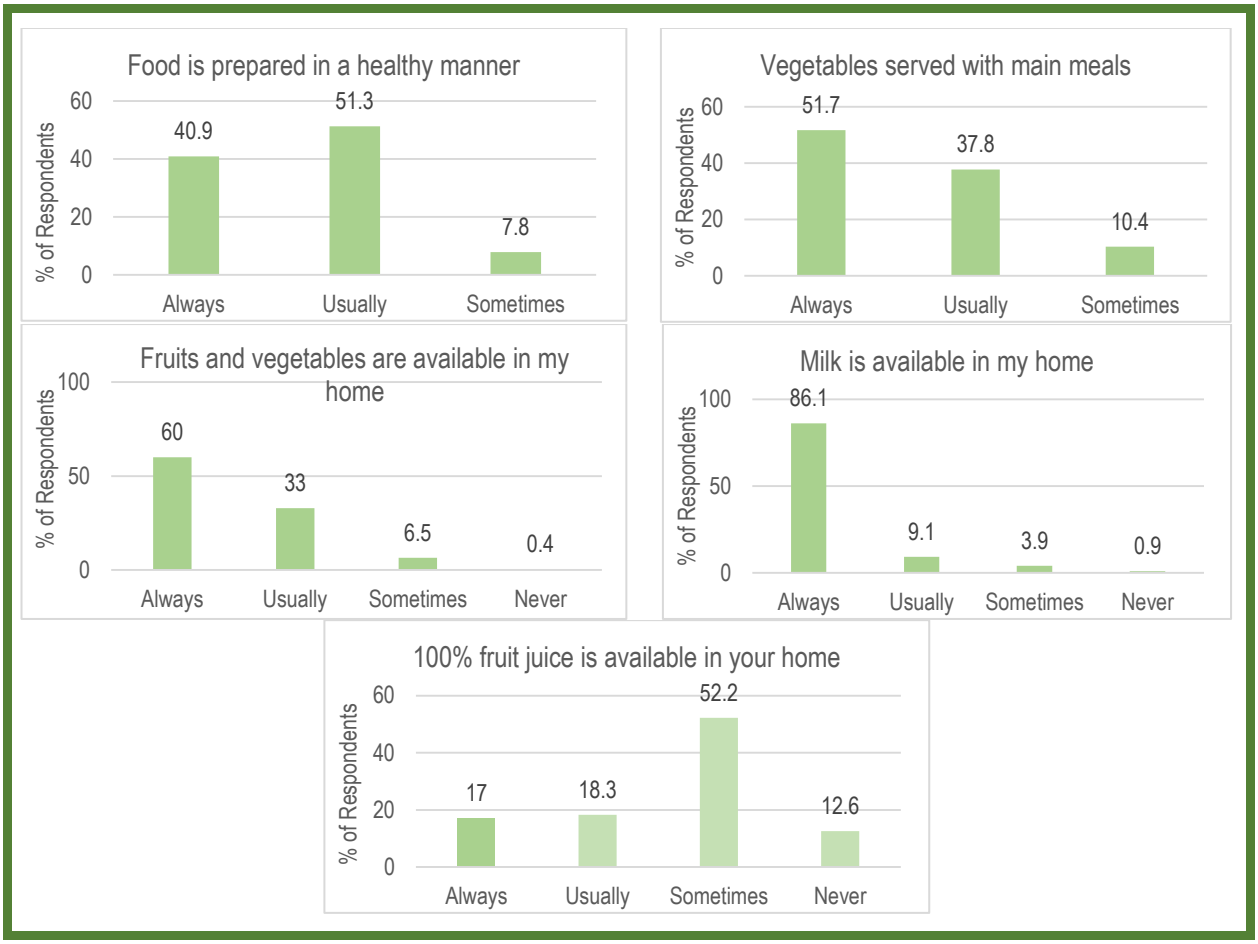

FIGURE 4.14: MEAL PREPARATION AND AVAILABILITY OF HEALTHY FOOD ITEMS IN THE HOME (n=230)

The majority of the respondents (51,3 %, n=118) indicated that food is usually prepared in a healthy manner in their homes, followed by many (40,9 %, n=94) who indicated that food is always prepared in a healthy manner in their home. More than half of the respondents (51,7 %, n=119) indicated that vegetables are always served with main meals in their homes, whereas more than a third of the respondents (37,8 %, n=87) indicated that vegetables are usually served with main meals in their homes, with only 10,4 % (n=24) who indicated that vegetables are only sometimes served with main meals in their homes. Most of the respondents (60,0 %, n=138) indicated that fruit and vegetables are always available in their homes, with a third of the respondents (33,0 %, n=76) who indicated that fruit and vegetables are usually available in their homes. Most of the respondents (86,1 %, n=198) indicated that milk is always available in their homes, with only 9,1 % (n=21) respondents who indicated that milk is usually available in their homes. Most of the respondents (52,2 %, n=120) indicated that 100 % fruit juice is only sometimes available in their

homes, with 18,3 % (n=42) who indicated that it is usually available in their homes and 17,0 % (n=39) indicated that it is always available in their homes.

Figure 4.15 presents the results of the availability of selected food items in the home not essential for health. The respondents were asked to indicate how certain statements given applied to the availability of selected food items in their homes.

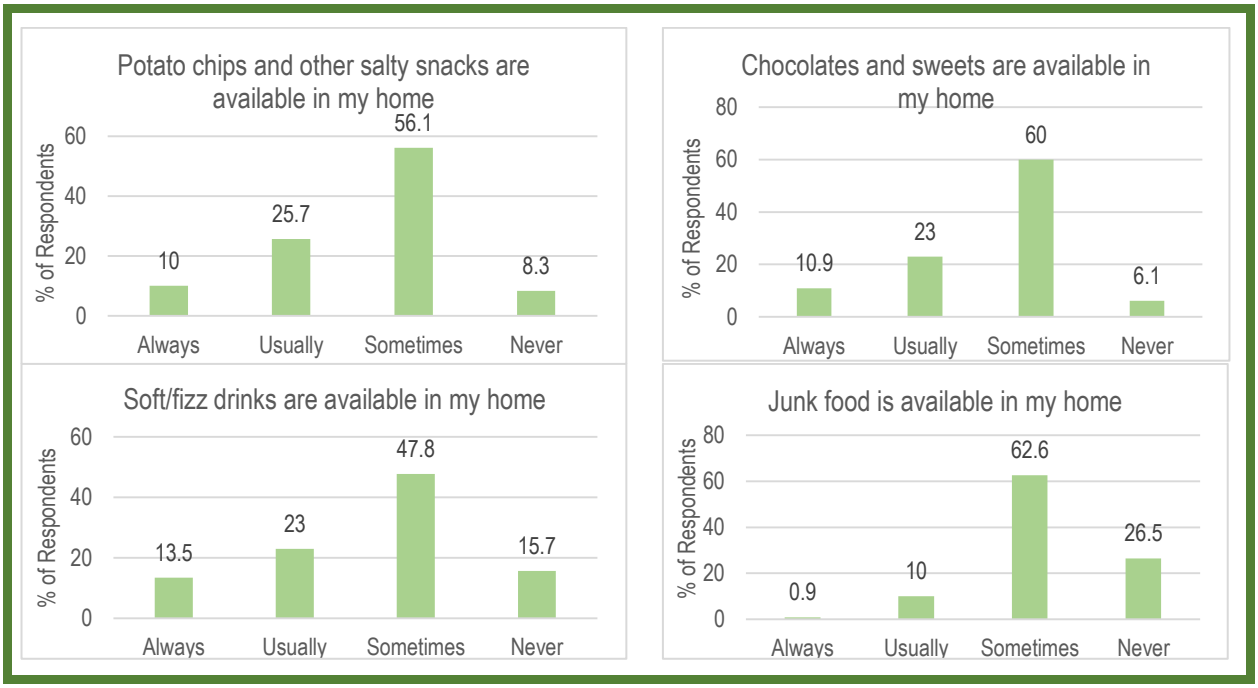

FIGURE 4.15: AVAILABILITY OF FOOD ITEMS IN THE HOME NOT ESSENTIAL FOR HEALTH (n=230)

More than half of the respondents (52,2 %, n=120) indicated that potato chips and other salty snacks are only sometimes available in their homes and 25,7 % (n=59) of the respondents indicated that potato chips and other salty snacks are usually available in their homes. Most of the respondents (60,0 %, n=138) indicated that chocolates and other sweets are only sometimes available in their homes. Only 23,0 % (n=53) of the respondents indicated that chocolates and other sweets are usually available in their homes. Almost half of the respondents (47,8 %, n=110) indicated that soft / fizzy drinks are only sometimes available in their homes and 23,0 % (n=53) indicated that soft / fizzy drinks are usually available in their homes. The availability of soft drinks in a household is strongly associated with soft drink consumption (Story *et al*., 2008:255). The high popularity, accessibility and availability of potato chips, chocolates, soft or fizzy drinks are usually associated with increased consumption of these food items (Audain, Kassier & Veldman, 2014). Two thirds of the respondents (62,6 %, n=144) indicated that junk food is sometimes available in their homes. Some respondents (26,5 %, n=61) indicated that junk food is never available in their homes with 10,0 % (n=23) that indicated that junk food is usually available in their homes.

To summarise, almost 90 % of the respondents indicated that fruit and vegetables are available in their homes and served with main meals, with more than 80 % who indicated that milk is always available in their homes. Fruit juice is also indicated to be available in their homes most of the time. A high 80 % of the respondents indicated that potato chips and other salty snacks as well as chocolates and sweets are sometimes available in their homes. It was also indicated that almost 70 % of the respondents have soft / fizzy drinks and sometimes junk food available in their homes.

4.6.2 Food consumption patterns

4.6.2.1 Meal pattern

To determine the meal pattern respondents had to indicate how many meals they eat a day, how many days a week they eat breakfast, lunch, supper and snack between meals. They also had to indicate how many meals they eat at home on a weekday. Results are shown in Table 4.14.

TABLE 4.15: MEAL PATTERN OF RESPONDENTS (n=230)

Food consumption patterns:		n	%
Number of meals eaten a day	1	10	4.3
	2	60	26.1
	3	143	62.2
	More than 3	16	6.8
Number of days breakfast is eaten	Never	13	5.7
	1-2 days	14	6.1
	3-4 days	17	7.4
	5-6 days	28	12.2
	Everyday	158	68.7
Number of days lunch is eaten	Never	8	3.5
	1-2 days	36	15.7
	3-4 days	37	16.1
	5-6 days	27	11.7
	Everyday	122	53.0
Number of days supper is eaten	1-2 days	3	1.3
	3-4 days	9	3.9
	5-6 days	27	11.7
	Everyday	191	83.0
Number of days snacks are eaten between meals	Never	34	14.8
	1-2 days	71	30.9
	3-4 days	35	15.2
	5-6 days	18	7.8
	Everyday	72	31.3
Number of daily meals eaten at home on a week day	None	6	2.6
	1 meal	59	25.7
	2 meals	80	34.8
	All meals	85	37.0

The majority of the respondents (62,2 %, n=143) indicated that they ate three meals a day followed by 26,1 % (n=60) of the respondents who only ate two meals a day. It therefore appears

that most of the respondents followed a Western-orientated meal pattern of having more than two meals a day. The majority of the respondents (68.7 %, n=158) indicated that they have eaten breakfast every day during the previous week. Some respondents (12,2 %, n=28) only ate breakfast 5 to 6 times and 7,4 % (n=17) 3 to 4 times during the previous week. Breakfast consumption has been shown to be an important indicator of a healthy lifestyle. Eating breakfast is associated with a reduced risk of being overweight and improves mental health, moreover, breakfast eaters are less depressed and show a better cognitive performance than people who skip breakfast (Reeves, Halsey, McMeel & Huber, 2013; Sjöberg, Hallberg, Hoglund & Hulthen, 2003). The majority of the respondents (53,0 %, n=122) indicated that they have eaten lunch every day during the previous week. This was followed by 16,1 % (n=37) who ate lunch only 3 to 4 days during the previous week. Some of the respondents (15,7 %, n=36) only ate lunch 1 to 2 days during the previous week. The majority of the respondents (83,0 %, n=191) indicated that they have eaten supper every day during the previous week with 11,7 % (n=27) who ate supper 5 to 6 days during the past week. A third of the respondents (31,3 %, n=72) indicated that they ate snacks every day between their meals and another third (30,9 %, n=71) indicated that they ate snacks only 1 to 2 times between meals during the previous week. Only 14,8 % (n=34) of the respondents indicated that they never snack between meals. More than a third of the respondents (37,0 %, n=85) indicated that they eat all of their daily meals at home during weekdays, followed by another third (34,8 %, n=80) who eat two meals a day at home during weekdays. Some respondents (25,7 %, n=59) indicated that they eat only one meal at home during a weekday.

As part of usual food consumption patterns, the respondents were asked to indicate how often they consume meals away from home and where they eat those meals. The results are shown in Figure 4.16.

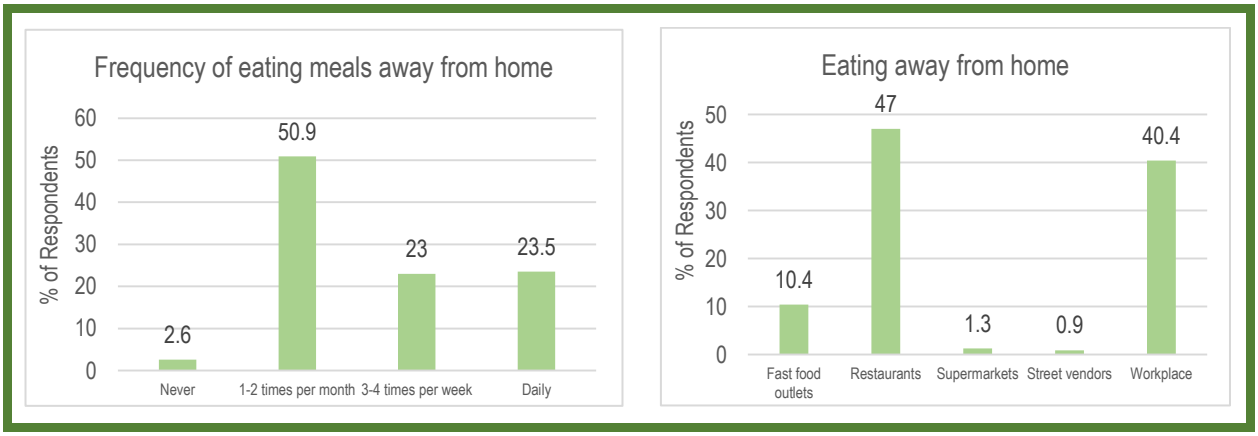

FIGURE 4.16: EATING FOOD AWAY FROM HOME (n=230)

Just over half of the respondents (50,9 %, n=117) indicated that they consume meals away from home 1 to 2 times a month. This was followed by 23,5 % (n=54) of the respondents who daily consume meals away from home, with another 23 % (n=53) of the respondents who consume

meals away from home 3 to 4 times per week. Only 2,6 % (n=6) of the respondents stated that they never consume food products away from home. Just less than half of the respondents (47 %, n=108) who indicated that they consume meals away from home, eat at restaurants. This was followed by 40,4 % (n=93) of the respondents who consume meals at the workplace. Some of the respondents (10,4 %, n=24) indicated that they consume their meals at fast-food outlets if they eat away from home.

In conclusion, about 97 % (n=223) of the respondents do consume meals away from home at least 1 to 2 times a month with almost 47 % (108) that eat these meals away from home, 3 to 4 times a week or even daily. Most of these meals were consumed at restaurants or their workplace. The consumption of meals eaten away from home is on the increase. A possible reason for the consumption of meals at restaurants or the respondents' workplace might be that most of the respondents are employed and therefore eat their meals in or around the workplace. Only 10 % (n=24) of these meals are consumed at fast-food outlets. The food that is prepared away from home has been documented to usually be high in fat and more energy-dense (De Vogli, Kouven, & Gimenoc, 2014; Fortin & Yazbeck, 2011, Popkin, 2011).

4.6.2.2 Meal composition

As part of the usual food consumption pattern, respondents had to provide information on their meal composition to measure the dietary diversity. Dietary diversity was measured to not only get an indication of what was consumed by the respondents, but it also gives and indication of the food adequacy and the access to food (Kennedy *et al.*, 2011). Respondents were asked to indicate whether they consumed foods from the following food groups as part of their meals or snacks the previous day. The food groups were starchy staples (cereals and white roots and tubers), orange-fleshed vegetables and fruits, dark green leafy vegetables, other fruits and vegetables, legumes and nuts, fats and oils, meat, poultry or fish, milk and dairy products, eggs. The 15 food groups of Kennedy *et al.* (2011) that were in the questionnaire were collapsed into nine food groups in order to compare the results to other South African studies. The respondents had to answer by marking yes or no to each of the nine groups of food.

Table 4.16 below presents the results of the food groups consumed by the respondents the previous day.

TABLE 4.16: FOOD GROUPS CONSUMED THE PREVIOUS DAY (n=230)

Food Group	Yes		No	
	n	%	n	%
Starchy staples: maize, rice, wheat, sorghum and any other foods made from cereals such as porridge, bread, pasta and noodles and white roots and tubers **(**potatoes and white sweet potatoes)	199	86.5	31	13.5
Orange-fleshed vegetables and fruit: pumpkin, carrots, butternut, orange-fleshed sweet potatoes, yellow peaches, pawpaw, mangoes, plums, spanspek, apricots	139	60.4	91	39.6
Dark leafy green vegetables: spinach, kale, indigenous green leafy vegetables	100	43.5	130	56.5
Other vegetables & fruit: tomatoes, onion, green beans, lettuce, cabbage, broccoli, cauliflower, eggplant, gem squash, beetroot, apples, bananas, grapes, pears, litchis, oranges, naartjies	210	91.3	20	8.7
Legumes and nuts: dried beans, dried peas, lentils, nuts or food made from these (i.e. peanut butter, hummus)	68	29.6	162	70.4
Fats and oils: oils, fats or butter added to food or used in cooking	178	77.4	52	22.6
Meat, poultry or fish: beef, pork, mutton/lamb, goat, chicken, duck, fresh, froze, tinned, dried fish or shellfish	213	92.6	17	7.4
Milk and dairy products: milk, maas, cheese, yogurt or any other milk products	206	89.6	24	10.4
Eggs: eggs from chicken, duck or any other egg	114	49.6	116	50.4

Starchy staples included the cereals such as maize, rice, wheat, sorghum and any other foods made from cereals such as porridge, bread, pasta and noodles and the white roots and tubers (potatoes and white sweet potatoes). The majority of the respondents (86,5 %, n=199) indicated that they consumed starchy staples the previous day and 13,5 % (n=31) indicated that they did not consume starchy staples the day before.

Orange-fleshed vegetables and fruit included pumpkin, carrots, butternut, orange-fleshed sweet potatoes, yellow peaches, pawpaw, mangoes, plums, spanspek and apricots. The majority of the respondents (60,4 %, n=139) indicated that they consumed orange-fleshed vegetables and fruit with only 39,6 % (n=91) of the respondents who did not consume it.

Dark green leafy vegetables included spinach, kale and indigenous green leafy vegetables. More than half of the respondents (56,5 %, n=130) indicated that they did not consume dark green leafy vegetables although 43,5 % (n=100) of the respondents indicated that they had consumed dark green leafy vegetables the previous day.

Other vegetables and fruit included other vegetables such as tomatoes, onion, green beans, lettuce, cabbage, broccoli, cauliflower, eggplant, gem squash and beetroot, and fruit referred to apples, bananas, grapes, pears, litchis, oranges and naartjies. The majority of the respondents (91,3 %, n=210) indicated that they consumed other vegetables and fruit and only 18,7 % (n=20) indicated that they did not consume other vegetables and fruit the previous day.

Legumes and nuts included dried beans, dried peas, lentils and nuts or food made from these (i.e. peanut butter, hummus). The majority of the respondents (70,4 %, n=162) indicated that they have not consumed legumes and nuts the previous day.

Fats and oils included oils, fats or butter added to food during cooking. The majority of the respondents (77,4 %, n=178) indicated that they have consumed fats and oils the previous day.

Meat, poultry or fish included beef, pork, mutton / lamb, goat, chicken, duck, and fresh, frozen, tinned or dried fish or shellfish. The majority of the respondents (92,6 %, n=213) indicated that they consumed meat, poultry or fish the previous day.

Milk and dairy products included milk, maas, cheese and yogurt or any other milk product. The majority of the respondents (89,6 %, n=206) indicated that they had milk and dairy products as a meal or as a snack the previous day. The other 10,4 % of the respondents (n=24) indicated that they did not consume any milk or dairy products the previous day.

Eggs included eggs from chicken, duck, or any other birds. Just more than half of the respondents (50,4 %, n=116) indicated that they did not consume eggs whereas 49,6 % (n=114) indicated that they had consumed eggs the previous day.

The table below shows that the Dietary Diversity Score (DDS) was calculated by summing the average number of each food group consumed the previous day. A DDS of nine indicates a very varied diet while a DDS of four or less indicates poor dietary diversity and can be used as an indicator for food insecurity (Claasen *et al.,* 2016; Steyn & Ochse, 2013:15). Each food group was only counted once when calculating the DDS (Steyn & Ochse, 2013:15). Table 4.16 below presents the distribution of the DDS amongst respondents.

TABLE 4.17: DISTRIBUTION OF THE DIETARY DIVERSITY SCORE (n=230)

Number of food groups consumed	Frequency	Percentage
	N	%
2	2	0,9
3	8	3,5
4	22	9,6
5	41	17,8
6	54	23,5
7	53	23,0
8	39	17,0
9	11	4,8
Mean	**6,20**	
Std. deviation	**1,523**	

Further analysis showed that the majority of the respondents (68,3 %, n=157) included at least six and more than six of the nine food groups as part of their meals or snacks the previous day. This indicates that their DDS shows a varied diet. Only 17,8 % (n=41) of the respondents included five food groups and only 14 % (n=32) of the respondents included four groups or less. A medium varied diet is indicated by the mean frequency that was calculated at a DDS of 6,20. The standard deviation was 1,523 which indicated that the majority of respondents also had a high DDS (dietary diversity score) of either five or seven. Results from another South African study show similar results. Whites showed to have the highest mean DDS of 4,96 and constituted the lowest percentage of individuals (9 %) with a DDS lower than 4 in the study conducted by Steyn & Ochse (2013:15). In the SANHANES-1 study (Sishana *et al.,* 2014) the national DDS of South Africans was 4,2 and 39,7 % of the population had a DDS of less than 4. The DDS of the white population of Tshwane was therefore more varied than the national populations' DDS. These results are further confirmation that a variety of food items are available and accessible to the study group.

The following four food groups were not part of the nine food groups that serve as representation for an adequate nutrient intake as it is not part of dietary diversity, but were also incorporated as part of this study as it provided information on what the study group consumed the previous day. These four food groups included sweets (such as sugar, honey, sugary foods such as chocolates, candy, cookies, cakes or sugar-sweetened beverages such as fizzy drinks and cordials), spices and condiments (such as spices, salt and pepper, condiments, i.e. tomato sauce, soy sauce, salad dressing), beverages (such as coffee, tea and herbal teas) and alcoholic beverages (such as beer, wine, whiskey, brandy, vodka). Results are presented in Table 4.18.

TABLE 4.18: OTHER FOODS INCLUDED AS PART OF MEALS OR SNACKS THE PREVIOUS DAY (n=230)

Food Group	Yes		No	
	n	%	n	%
Sweets: sugar, honey, sugary foods such as chocolates, candy, cookies, cakes or sugar-sweetened beverages such as fizzy drinks and cordials	130	56,5	100	43,5
Spices and condiments: spices, salt and pepper, condiments (i.e. tomato sauce, soy sauce, salad dressing)	208	90,4	22	9,6
Beverages: coffee, tea, herbal teas	220	95,7	10	4,3
Alcoholic beverages: beer, wine, whiskey, brandy, vodka	77	33,5	153	66,5

Sweets included sugar, honey, sugary foods such as chocolates, candy, cookies, cakes and sugar-sweetened beverages such as fizzy drinks and cordials. The majority of the respondents (56,5 %, n=130) indicated that they have consumed sweets the previous day with 43,5 % (n=100) indicating that they did not consume sweets the previous day.

Spices and condiments included spices, salt and pepper and condiments (i.e. tomato sauce, soy sauce, salad dressing). The majority of the respondents (90,4 %, n=208) indicated that they have consumed spices and condiments the previous day.

Beverages included coffee, tea and herbal teas. Almost all the respondents (95,7 %, n=220) indicated that they have consumed some of these beverages the previous day, with only 4,3 % (n=10) who indicated that they have not.

Other alcoholic beverages included beer, wine, whisky, brandy and vodka. 66,5 % (n=153) indicated that they have not consumed alcoholic beverages the previous day. Over a third of the respondents (33,5 %, n=77) have consumed alcohol beverages the day before.

In conclusion, the majority of the respondents (86,5 %, n=199) have consumed starchy staples the previous day. The majority of the respondents (60,4 %, n=139) have consumed orange-fleshed vegetables and fruits which also indicates that more than a third of the respondents (39,6 %, n=91) have not consumed orange-fleshed vegetables and fruits the previous day. More than half of the respondents (56,5 %, n=130) have not consumed dark leafy green vegetables the previous day. A study conducted in the United States on fresh fruit and vegetables purchased in an urban supermarket reported that fruit and vegetable consumption of consumers were low (Phipps, Stittes, Wallace & Braitman, 2013; Dickson-Spillmann & Siegrist, 2011). Another study done in South Africa stated that there is a major association between fruit and vegetable intake and nutrition-related diseases (Claasen *et al.*, 2016; Naudé, 2013). The majority of the respondents (91,3%, n=210) included other vegetables and fruit as part of their meals or snacks the previous day. A result of 70 % of respondents did not consume legumes and nuts. Almost 90 % of the respondents have consumed milk and dairy products. More than half of the

respondents (56,5 %, n=130) did consume sweets, which is also concerning and can be seen as an unhealthy food choice as it is high in sugar (Abrahams *et al.*, 2011; Temple, Steyn, Myburg & Nel, 2006). More than 90 % of the respondents consumed spices and condiments as well as beverages the previous day. Over a third of the respondents consumed alcoholic beverages the previous day.

The next section deals with the frequency of consumption of food and beverages.

4.6.3 Frequency of food consumption of selected groups of food

In addition to food group consumption data, respondents were further requested to indicate how frequently they consume certain food items as a cross-check to the type of foods consumed. A list of the typical food and beverages consumed by the South African population was included in the non-quantitative frequency questionnaire.

Foods were grouped into nine sub-groups and the respondents had to indicate the frequency of consumption according to the following time interval scale: daily, 3-4 times a week, 1-2 times a week, seldom and never. The nine groups included: protein-rich foods, dairy products, fruit, vegetables and salads, fats and oils, bread and cereal, legumes and nuts, beverages, fast foods and savoury snacks, and lastly sweets and confectionary.

Table 4.19 presents the frequency of consumption results of food products.

TABLE 4.19: FREQUENCY OF FOOD CONSUMPTION (n=230)

	Daily		3-4 x /week		1-2 x /week		Seldom		Never	
	n	%	n	%	n	%	n	%	n	%
Protein-rich foods										
Red meat	23	10	119	51,7	69	30	17	7,4	2	0,9
Chicken	8	3,5	82	35,7	128	55,7	10	4,3	2	0,9
Boerewors	6	2,6	100	43,5	114	49,6	10	4,3	2	0,9
Processed meat	4	1,7	6	2,6	41	17,8	126	54,8	53	23
Fish	0	0	20	8,7	108	47	93	40,4	9	3,9
Eggs	30	13	51	22,2	100	43,5	46	20	3	1,3
Dairy products										
Full-cream milk	94	40,9	14	6,1	20	8,7	43	18,7	59	25,7
Low-fat milk	68	29,6	17	7,4	15	6,5	38	16,5	92	40
Cheese	40	17,4	70	30,4	82	35,7	32	13,9	6	2,6
Yogurt	43	18,7	41	17,8	49	21,3	73	31,7	24	10,4
Fruit, vegetables and salads										
Fruit	95	41,3	61	26,5	44	19,1	28	12,2	2	0,9
Vegetables	120	52,2	76	33	31	13,5	3	1,3	0	0
Salads	60	26,1	71	30,9	58	25,2	37	16,1	4	1,7
Fats and oils										
Butter	55	23,9	32	13,9	35	15,2	66	28,7	42	18,3
Margarine (tub)	50	21,7	36	15,7	23	10	38	16,5	83	36,1
Margarine (brick)	5	2,2	8	3,5	9	3,9	52	22,6	156	67,8
Vegetable oil	33	14,3	53	23	44	19,1	70	30,4	30	13
Bread and cereal										
White bread, bread rolls and buns	23	10	30	13	31	13,5	93	40,4	53	23
Brown or wholewheat bread	33	14,3	44	19,1	61	26,5	68	29,6	24	10,4
Breakfast cereals	63	27,4	24	10,4	39	17	69	30	35	15,2
Maize meal porridge	2	0,9	17	7,4	44	19,1	102	44,3	65	28,3
Rice	4	1,7	42	18,3	103	44,8	68	29,6	13	5,7
Pasta	0	0	20	8,7	123	53,5	74	32,3	13	5,7
Potatoes	6	2,6	49	21,3	114	49,6	51	22,2	10	4,3
Legumes and nuts										
Legumes	0	0	13	5,7	44	19,1	133	57,8	40	17,4
Nuts	12	5,2	29	12,6	55	23,9	115	50	19	8,3
Beverages										
Fruit juice	17	7,4	21	9,1	47	20,4	111	48,3	34	14,8
Soft drinks	24	10,4	16	7,0	32	13,9	92	40	66	28,7
Sport or energy drinks	1	0,4	3	1,3	13	5,7	73	31,7	140	60,9
Water	200	87	20	8,7	4	1,7	4	1,7	2	0,9
Cordials	6	2,6	10	4,3	31	13,5	90	39,1	93	40,4
Fast food and savoury snacks										
Pizza	0	0	0	0	34	14,8	186	80,9	10	4,3
Potato chips	2	0,9	11	4,8	44	19,1	145	63	28	12,2
Fried chips	0	0	3	1,3	51	22,2	152	66,1	24	10,4
Hamburger	0	0	1	0,4	37	16,1	153	66,5	39	17
Meat pie	0	0	2	0,9	20	8,7	161	70	47	20,4
Sweets and confectionary										
Bar of chocolate	5	2,2	19	8,3	47	20,4	134	58,3	25	10,9
Sweets	5	2,2	12	5,2	45	19,6	133	57,8	35	15,2
Cake, tart, cupcakes or muffins	0	0	4	1,7	46	20	149	64,8	31	13,5
Cookies, biscuits	5	2,2	12	5,2	68	29,6	127	55,2	18	7,8

Protein-rich foods

More than half of the respondents (51,7 %, n=119) indicated that they consume red meat 3 to 4 times a week followed by 30,0 % (n=69) who consume red meat 1 to 2 times a week. The majority of the respondents (55,7 %, n=128) indicated that they consume chicken 1 to 2 times a week,

followed by 35,7 % (n=82) of the respondents who consume chicken 3 to 4 times a week. Currently, chicken is the leading protein-rich food product consumed in South Africa (Schönfeldt, Pretorius & Hall, 2013). These findings on the frequent consumption of chicken concur with other studies in South Africa that chicken is an affordable item of choice for the South African population (Schönfeldt *et al*., 2013; Van Zyl *et al*., 2010). Nearly half of the respondents (49,6 %, n=114) indicated that they seldom consume boerewors, with 43,5 % (n=100) indicating that they consume boerewors 1 to 2 times a week. The majority of the respondents (54,8 %, n=126) indicated that they seldom consume processed meat and 23,0 % (n=53) of the respondents indicated that they never consume processed meat. Generally the results indicate a low frequency of consumption of processed meat products. This could be attributed to the fact that these meat products are more expensive than fresh meat (Schönfeldt *et al*., 2013). Nearly half of the respondents (47,0 %, n=108) indicated that they consume fish 1 to 2 times a week and 40,4 % (n=93) indicated that they seldom consume fish. Most of the respondents (43,5 %, n=100) indicated that they consume eggs 1 to 2 times a week and 22,2 % (n=51) indicated that they consume eggs 3 to 4 times a week. Only 13 % (n=30) of the respondents indicated that they consume eggs daily. The protein-rich food seems to be consumed correctly according the dietary guidelines (Vorster, 2013; Vorster, Wenhold, Wright, Wentzel-Viljoen, Venter & Vermaak, 2013), probably because it is available, accessible and affordable to the respondents.

Dairy products

Most of the respondents (40,8 %, n=94) indicated that they daily consume full-cream milk, although a quarter of the respondents (25,7 %, n=59) never consume full-cream milk. Most of the respondents (40,0 %, n=92) indicated that they never consume low-fat milk while 29,6 % (n=68) indicated that they daily consume low-fat milk. More than a third of the respondents (35,7 %, n=82) indicated that they consume cheese 1 to 2 times a week and 30,4 % (n=70) indicated that they consume cheese 3 to 4 times a week. Nearly a third of the respondents (31,7 %, n=73) indicated that they seldom consume yogurt with 21,3 % (n=49) that consume yogurt 1 to 2 times a week. 18,7 % (n=43) of the respondents indicated that they consume yogurt daily and 17,8 % (n=41) consume it 3 to 4 times a week. It seems as if the dairy products are consumed according to the dietary guidelines (Vorster, 2013; Vorster *et al.*, 2013).

Fruit and vegetables

Only 41,3 % (n=95) of the respondents indicated that they consume fruit daily, with just over a quarter (26,5 %, n=61) who consume fruit 3 to 4 times a week. More than half of the respondents (52,2 %, n=120) indicated that they consume vegetables daily and 33,0 % (n=76) indicated that they consume vegetables 3 to 4 times a week. Other South African studies reported a similar low consumption of fruit and vegetables (MacIntyre *et al*., 2012; Louwrens, Rautenbach & Venter, 2009). The Food-Based Dietary Guidelines (FBDG) recommend eating plenty of fruit and

vegetables a day (Vorster, 2013; Vorster *et al.*, 2013). Nearly a third (30,9 %, n=71) indicated that they consume salad 3-4 times a week and 26,1 % (n=60) indicated that they consume salad daily. Nearly half (49,6 %, n=114) of the respondents indicated that they consume potatoes 1 to 2 times a week and 22,2 % (n=51) indicated that they consume potatoes only seldomly. Only 21,3 % (n=49) of the respondents indicated that they consume potatoes 3 to 4 times a week.

Fats and oils

Although nearly a quarter (23,9 %, n=55) of the respondents consume butter daily, almost half of the respondents indicated that they seldom or never consume butter (28,7 %, n=66 and 18,3 %, n=42 respectively). In comparison to brick margarine that was never consumed by more than two thirds of the respondents (67,8 %, n=156), tub margarine was consumed more often. Although more than a third of the respondents (36,1 %, n=83) never consume tub margarine, 21,7 % (n=50) of the respondents indicated that they consume tub margarine daily, followed by 15,7 % (n=36) who consume it 3 to 4 times a week. Nearly a third of the respondents (30,4 %, n=70) indicated that they seldom consume vegetable oil and 23,0 % (n=53) of the respondents indicated that they consume vegetable oil 3 to 4 times a week. Only 19,1 % (n=44) of the respondents indicated that they consume vegetable oil 1 to 2 times a week and 14,3 % (n=33) consume it daily.

Bread and cereal

Most of the respondents (40,4 %, n=93) indicated that they seldom consume white bread, bread rolls and buns, while another 23,0 % (n=53) never consume white bread, bread rolls and buns. Although some of the respondents indicated that they seldom (29,6 %, n=68) and never (10,4 %, n=24) consume brown bread or wholewheat bread respectively, 26,5 % (n=61) consume brown bread or wholewheat bread 1 to 2 times a week. Some respondents (19,1 %, n=44) indicated that they consume brown bread or wholewheat bread 3 to 4 times a week and 14,3 % (n=33) consume it daily.

Although 27,4 % (n=63) of the respondents daily consume breakfast cereal, nearly a third of the respondents (30,0 %, n=69) indicated that they seldom consume it and 15,2 % (n=35) never consume it. Most of the respondents (44,3 %, n=102) indicated that they seldom consume maize meal porridge and 28,3 % (n=65) of the respondents indicated that they never consume maize meal porridge.

A large percentage (44,8 %, n=103) of the respondents indicated that they consume rice 1 to 2 times a week although 29,6 % (n=68) indicated that they seldom consume rice. The majority of the respondents (53,5 %, n=123) indicated that they consume pasta 1 to 2 times a week although nearly a third (32,2 %, n=74) indicated that they seldom consume pasta.

Legumes and nuts

Legumes included dry beans, lentils and split peas. The majority of the respondents (57,8 %, n=133) indicated that they seldom consume legumes, with only 19,1 % (n=44) who indicated that they consume legumes 1 to 2 times a week. Regarding nuts, 50,0 % (n=115) of the respondents indicated that they seldom consume nuts and 23,9 % (n=55) indicated that they consume nuts 1 to 2 times a week. It seems as if most of the respondents did not adhere to the Food-Based Dietary Guidelines (FBDG) that recommend consuming dry beans, split peas, lentils and soya regularly (Vorster, 2013; Vorster *et al.*, 2013).

Beverages

More than half of the respondents indicated that they seldom (48,3 %, n=111) or never (14,8 %, n=34) consume fruit juice. A small percentage of 20,4 % (n=47) consume fruit juice 1 to 2 times a week. A quarter of the respondents (40,0 %, n=92) indicated that they seldom consume soft drinks, with 10 % (n=23) who consume it daily and 28,7 % (n=66) of the respondents indicated that they never consume soft drinks. The majority of the respondents (60,9 %, n=140) indicated that they never consume sport or energy drinks and nearly a third (31,7 %, n=73) indicated that they seldom consume sport or energy drinks. The majority of the respondents (87,0 %, n=200) indicated that they daily consume water with only 0,9 % (n=2) of the respondents indicating that they never consume water. Some respondents (8.7 %, n=20) indicated that they consume water 3 to 4 times a week. A daily fluid intake of two litres is recommended, which can be taken in the form of tap water, coffee, tea or any other water-based beverage (Louwrens *et al*., 2009). Some respondents (40,4 %, n=93) indicated that they never drink cordials and 39,1 % (n=90) indicated that they consume it only seldom.

Fast food and savoury snacks

The majority of respondents (80,9 %, n=186) indicated that they seldom consume pizza and 14,8 % (n=34) indicated that they consumed pizza 1 to 2 times a week. The majority of the respondents (63,0 %, n=145) indicated that they seldom consume potato chips, followed by 19,1 % (n=44) of the respondents that consume potato chips 1 to 2 times a week. Two thirds of the respondents (66,1 %, n=152) indicated that they seldom consume fried chips, although 22,2 % (n=51) consume fried chips 1 to 2 times a week. The majority of the respondents (70,0 %, n=161) indicated that they seldom consume meat pies and 20,4 % (n=47) never consume meat pies respectively. More than half of the respondents (66,5 %, n=153) indicated that they seldom consume hamburgers and 17,0 % (n=39) of the respondents indicated that they never consume hamburgers. Only 16,1 % (n=37) of the respondents indicated that they consume hamburgers 1 to 2 times a week.

Sweets and confectionary

Most of the respondents (64,8 %, n=149) indicated that they seldom consume cake, tart, cupcakes or muffins, with 20,0 % (n=46) indicating that they consume it 1 to 2 times a week, and 13,5 % (n=31) indicating that they never consume it. More than half of the respondents 58,3 % (n=134) indicated that they seldom consume a bar of chocolate and 20,4 % (n=47) indicated that they consume it 1 to 2 times a week, followed by 8,3 % (n=19) that consume it 3 to 4 times a week. The majority of the respondents (57,8 %, n=133) indicated that they seldom consume sweets and 19,6 % (n=45) of the respondents indicated that they consume sweets 1 to 2 times a week. The majority of the respondents (55,2 %, n=127) indicated that they seldom consume cookies or biscuits with 29,6 % (n=68) of the respondents indicated that they consume cookies or biscuits 1 to 2 times a week.

Summarising the results above, 80 to 90 % of the respondents consumed red meat and chicken at least 1 to 2 times a week. More than 80 % of the respondents do consume fruit, vegetables and salads more than 1 to 2 times a week, but not daily as it should be according to the food based dietary guidelines (Vorster, 2013; Vorster *et al.*, 2013). More than a third, 36 %, of the respondents never consume tub margarine. Most of the respondents choose to consume brown bread rather than white bread. More than 60 % of the respondents consume rice, pasta and potatoes between 1 to 2 and 3 to 4 times a week. More than 70 % of the respondents seldom consume legumes or do not consume it at all. Nuts, however, are consumed by more than 40 % at least 1 to 2 times a week, which results in 60 % that do not often consume nuts. This might be due to the fact that nuts are expensive. Between 70 to 90 % of the respondents do not consume soft drinks, sport or energy drinks and cordials, with almost 90 % of the respondents who do consume water daily. Almost 70 % of the respondents seldomly consume pizza, potato chips, fried chips, meat pies and hamburgers. Sweets, cookies and biscuits however is consumed by almost 40 % of the respondents, although it does not happen often.

Results from this study reveal that the respondents' food intake reflects a diet that is low in fruit and vegetables as well as legumes and nuts. Available data indicates that at national, household and individual level in South Africa, the quantities of vegetables and fruit that are available and consumed are much lower than the amount recommended by the FBDG (Naudé, 2013). The primary barriers to an adequate intake of fruit and vegetables are usually given as affordability and availability. In this study it is readily available, accessible and affordable to the respondents as they have indicated (see 4.5 – Objective 3, food access dimensions of the study group). The reason for the low intake might rather be that the respondents might not be well enough educated on the sufficient amount needed.

The results on the dietary diversity and the non-quantitative Food Frequency Questionnaire (FFQ) further revealed the following results regarding the adequacy of the study group's food consumption in terms of adherence to the FBDG for South Africans (Vorster *et al.*, 2013).

4.6.4 Adequacy of food consumed

The results on the dietary diversity and the non-quantitative Food Frequency Questionnaire (FFQ) further revealed the following regarding the adequacy of the study group's food consumption in terms of adherence to the FBDG for South Africans (Vorster *et al.,* 2013). (See Addendum G for the revised general FBDG for South Africans.)

TABLE 4.20: SUMMARY ON ADEQUACY OF FOOD CONSUMPTION

FOOD GROUP	Consumed the previous day	Food frequency questionnaire
STARCHY FOODS	86.5 %	Varied but confirmed consumed the previous day
FRUIT, VEGETABLES AND SALADS Orange-fleshed fruit Dark green vegetables Other fruit and vegetables	 60.4 % 43.5 % 91,3 %	 52 % daily, however, there were many +/- who did so only 2-4 times a week
LEGUMES AND NUTS	29.6 %	Majority seldom 58 %
MILK AND DAIRY PRODUCTS	89.6 %	More than 70 %
PROTEIN-RICH FOODS Meat ,Fish, Chicken Eggs	 92.6 % 49.6 %	 Varied but confirmed consumed daily
FATS AND OIL	77 %	Varied in terms of fats

From the results derived from the Dietary Diversity Score (DDS) it was found that the majority of respondents consumed a variety of food. This score was calculated by summing the average number of each food group consumed the previous day. Most of the respondents' Dietary Diversity Score was six or more as 50 % of the respondents included six or more of the nine food groups as part of their meals or snacks the previous day. It therefore seems as if the guideline *"enjoy a variety of foods"* was followed by the majority.

The majority included starchy foods the previous day as part of their meals and snacks, but according to the food frequency most of the respondents indicated that they consume many of the starchy foods 1 to 2 times a week (rice, pasta and potatoes) or seldom (white bread, brown bread, breakfast cereal and maize meal porridge), which does not concur with the guidelines of the FBDG to *"make starchy foods part of most meals".*

An extensive body of research indicates that there is an association between vegetables and fruit intake and reduced disease risk (Naude, 2013). Although more than 60 % of the respondents did indicate that they have included orange fruit and vegetables in their meals or snacks the previous

day and that fruit and vegetables are also available in their homes, only half of the respondents indicated that they eat fruit and vegetables daily. The other respondents consume fruit and vegetables less than 4 times a week which raises concern in terms of the quantities consumed. These results concur with findings from a study conducted on global and regional food consumption patterns as it also reports low consumption of fruit and vegetables that indicates that the study group do not take the FBDG into account when making food choices. According to the FBDG, an intake of five portions (400 g) of fruit and vegetables per day is recommended as they work towards protection against non-communicable diseases (NCD) such as cancer, type 2 diabetes and other related risk factors (Naude, 2013; Sishana *et al*., 2014). It is estimated that approximately 2,8 % of deaths worldwide are attributable to low fruit and vegetable consumption (Vasileska & Rechkoska, 2012).

Most of the respondents have not included legumes and nuts into their diet the previous day and indicated to only consume legumes and nuts seldom. It seems as if the guideline of *"eat dry beans, split peas, lentils and soya regularly"* is not followed by many of the respondents.

The majority of respondents included milk and dairy products the previous day as part of their meals and snacks. More than 80 % of the respondents also indicated that milk is available in their home. According to the food frequency more than 70 % of the respondents do consume milk every day. It seems as if the guideline of *"have milk, maas and yogurt every day"* was followed by most of the respondents.

More than 90 % of the respondents indicated to have made protein-rich food part of their meals and snacks the previous day and therefore followed the guideline that states *"fish, chicken, lean meat or eggs can be eaten daily".* However, the intake of eggs varied, as only half of the respondents indicated to have made eggs part of their meals or snacks the previous day.

More than 75 % of the respondents included fats and oils as part of their meals and snacks the previous day, but indicated to only use butter and margarine seldom. It is important for the respondents to stick to the guidelines regarding the type of fat consumed, as it states *"choose vegetable oils, rather than hard fat".* Most of the respondents indicated that they never use margarine which is a vegetable fat, but rather use butter which is an animal fat. These results therefore seem that most of respondents did not adhere to the FBDG concerning the type of fats consumed.

In the next sub-objective the respondents' attitudes towards healthy eating as well as their perceptions of how much their friends and family cared about healthy eating were measured.

4.6.5 Attitude towards healthy eating

The respondents' attitude towards healthy eating as well as their perception of how much their family and friends cared about healthy eating were determined. This was measured by a closed-ended question where the degree of care had to be marked as not at all, a little bit, somewhat or very much. The attitudes of the respondents and their perception of their significant others gave insightful information regarding the social influences that might influence the food environments of the respondents.

The next figure (Figure 4.17) presents the attitude of the respondents towards healthy eating.

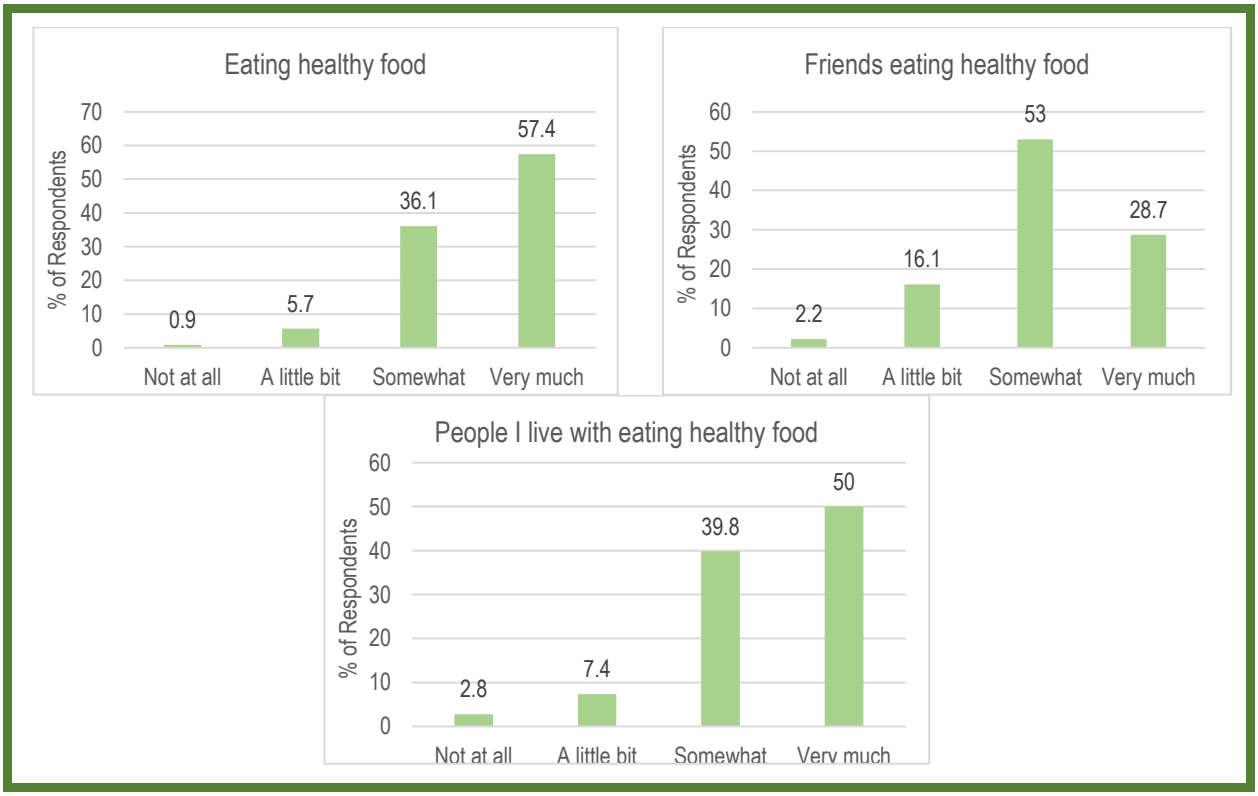

FIGURE 4.17: EATING HEALTHY (n=230)

The majority of the respondents (57,4 %, n=132) indicated that they themselves care very much about healthy eating. More than a third of the respondents (36,1 %, n=83) care somewhat about healthy eating. There were a few of the respondents (5,7 %, n=13) that indicated that they only care about healthy eating a little bit.

Just more than half of the respondents (53,0 %, n=122) indicated that their friends care somewhat about eating healthy food. This was followed by 28,7 % (n=66) of the respondents whose friends care very much about eating healthy food. Most of the respondents (50 %, n=108) indicated that the people they live with, care very much about eating healthy food. Over a third of the

respondents (39,8 %, n=86) indicated that the people they live with somewhat care about healthy eating.

Further analysis was done to get the results of the gender of the respondents that cared about eating healthy. Table 4.21 presents the gender of the respondents eating healthy.

TABLE 4.21: GENDER OF RESPONDENTS EATING HEALTHY (n=230)

I care about healthy eating: What is your gender?		
	Male	**Female**
Not at all	1,4 %	0,0 %
A little bit	6,4 %	4,5 %
Somewhat	36,9 %	34,8 %
Very much	55,3 %	60,7 %

According to Story *et al*. (2008) social influences within the home, such as parents and siblings both modelling healthful eating practices and having more frequent family meals, might promote healthy food consumption. Further analysis showed that 60,7 % (n=140) of the respondents who care very much about eating healthy were female and 55,3 % (n=127) were male. Further analysis showed that 36,9 % (n=84) of the respondents who care somewhat about eating healthy were male and 34,8 % (n=80) were female. Only 6,4 % (n=14) of the respondents that indicated that they only care about healthy eating a little bit were male and 4,5 % (n=10) were female.

Further analysis was done to get the results of the age categories of the respondents that cared about eating healthy. Table 4.22 presents the age categories of the respondents eating healthy

TABLE 4.22: AGE CATEGORIES OF RESPONDENTS EATING HEALTHY (n=230)

I care about healthy eating: Generation categories				
	Generation Y	**Generation X**	**Baby Boomers**	**Matures**
Not at all	0,0 %	0,0 %	1,9 %	0,,0 %
A little bit	0,0 %	16,1 %	2,8 %	4,2 %
Somewhat	41,5 %	44,6 %	31,5 %	8,7 %
Very much	58,5 %	39,3 %	63,9 %	66,7 %

In terms of generation groups the majority of the respondents (66,7 %, n=153) who indicated that they care very much about eating healthy, were the Matures followed by the Baby Boomers (63,9 %, n=147) and Generation Y, (58,5 %, n=134). Generation X showed a response of 39,3 % (n=90) of the respondents who care very much about eating healthy. Most of the respondents that care somewhat about eating healthy were from Generation X (44,6 %, n=102) followed by Generation Y (41,5 %, n=95). Most of the respondents who indicated that they care a little bit about eating healthy were from Generation X (16,1 %, n=37), followed by the Baby Boomers (2,8 %, n=6).

4.6.6 Concluding summary on how the access dimensions contribute to the food choices of the study group

The local urban food environment together with the food access dimensions of availability, accessibility, affordability, acceptability and accommodation contribute to the food choices of the urban consumers. The results of this study confirm that this is also the case with regard to the food choices of the study group. The respondents strongly agreed that the access to food as measured by the five food access dimensions is adequate as they indicated to be mostly satisfied with the availability, accessibility, affordability, acceptability and accommodation of food in their local urban food environments.

The GIS mapping and spatial analysis showed that there are multiple food stores available to the consumers. This was also confirmed by the results on the frequency of food purchases from the stores listed. A variety of food stores are available and accessible to the respondents such as supermarkets, fresh fruit and vegetable markets, butchers, convenience stores and fast-food outlets. These stores are all visited to some extent to purchase food products from. Although supermarkets are the food stores where the majority of respondents purchase most of their food from on a weekly basis, the results confirm that a variety of food stores, and more specifically supermarkets, are available and accessible in close proximity to where the respondents reside.

The results also confirm that the food stores and food products that are available and accessible to the respondents are acceptable to them. The respondents are satisfied with the range of food outlets, the type (variety), as well as the good quality of fruit and vegetables they have access to. The respondents also mostly agreed that the fruit and vegetable products are affordable at the outlets they purchase from and this was also supported by the prices of food in Tshwane that compare well with the national food prices. The respondents' needs are also accommodated in terms of providing good quality food of a wide variety at reasonable prices and then also regarding the food stores' operating hours and payment options

Therefore it can be concluded that the ample food retail stores available and accessible to the consumers with good quality, affordable food options influence and contribute to the food choices of the study group as the results show that they do consume a fairly good diet. It can also be concluded that, if an individual wanted to make even healthier food choices, for example to consume more legumes, nuts, fruit and vegetables, that it would be easy to do so since their current food environment do have ample, good quality food options available close to them.

4.7 CHAPTER CONCLUSION

The findings of this study have given in-depth insights regarding the contribution of food access dimensions to the local urban food environment and the food choices of the study group. It has been guided by executing the objectives and sub-objectives of the study, which helped to reach the aim developed for the study.

A demographic profile of the respondents was presented at the beginning of this chapter. Objective 1 described the local urban food environment (formal and informal food retail sectors). Objective 2 observed and described the type, quality and price of food available in the food sector (formal and informal). Objective 3 described the food access dimensions of the local urban food environment. Lastly, Objective 4 discussed the contribution of the access dimensions towards the respondents' food choices.

In the next and final chapter of this study, the conclusions of the study are given in terms of the contribution of the access dimensions to the respondents' food choices in the local urban food environment of white adults in the eastern suburbs of Tshwane. An evaluation of and recommendations on the study are also included.

Chapter 5
Conclusions and recommendations

5.1 INTRODUCTION

This chapter presents the conclusions derived from this research study. The aim of the study was to explore and describe the various food access dimensions to the local, urban food environment of adults residing in the eastern suburbs of Tshwane metropolitan area in order to describe how it contributes to the food choices of the study group. The significance of the study and its limitations, recommendations based on the findings, and suggestions for future research are given. The final conclusions of the study are also included.

The modern urban environment is regarded as a contributing factor to food consumption and lifestyle changes that are associated with the rising rate of overweight and obesity which are, in turn, linked to many non-communicable diseases (NCD's) such as diabetes mellitus type 2, cardiovascular diseases and some cancers (Belahsen, 2014; Steyn & Mchiza, 2014; Popkin *et al.*, 2012; Abrahams *et al.*, 2011; Kearney, 2010:2793; Patel & Burke, 2009:741; World Health Organisation, 2003; Popkin, 1999:1914). This urban environmental change is due to a number of social structural changes such as migration, modernisation, globalisation, economic advancement and acculturation (Kittler *et al*., 2011:1). The urban consumer's lifestyle has undergone changes as they have longer workdays, more women are educated and follow career paths and people spend a substantial amount of time to travel from home to work and back every day. The resulting modern urban lifestyle therefore has a major influence on their food environments. The local urban food environment thus influences people's food choices, which in turn is directly associated with food intake, health and well-being.

Together with the changed, modernised urban food environment associated with the food choices, urban consumers' food choices are not only driven by their own needs, but are also influenced by several food access dimensions. These access dimensions include what type of food items are available (availability), at what prices (affordability), proximity to grocery stores (accessibility), if the consumer is being accommodated according to his or her needs (accommodation) and if the food stores and food products are acceptable to the consumers (acceptability) (Martin *et al.*, 2014). People eat what is available and accessible in the environment they live in (Antin & Hunt, 2012; Caspi *et al*., 2012:1180).

There currently is limited research on the food access dimensions of the South African urban food environment and how it contributes to the food choices of urban consumers. As far as the researcher could establish only two reported studies on this topic were conducted. One of the studies was conducted in the rural towns of the Western Cape Province (Temple *et al*., 2011) and the other in a low-income, urban community in Worcester (Roos *et al*., 2013). No recent study on the food access dimensions of the urban food environment and how it contributes to the food choices of urban consumers in the Tshwane metropolitan area could be found. This study on the food access dimensions of the urban food environment in Tshwane aims to fill this void.

The purpose of this study was thus to investigate the food access dimensions of the local, urban food environment of adults residing in the eastern suburbs of the Tshwane metropolitan area and to describe how it contributes to the food choices of the study group.

5.2 CONCLUSIONS ON THE OBJECTIVES OF THE STUDY

The objectives of this study were successfully met and the main conclusions drawn from the results on each of the formulated objectives for this study are presented next.

5.2.1 Conclusions on the local urban food environment of the study group

The first objective included sub-objectives that dealt with locating, exploring and describing the local urban food environment in the formal as well as the informal food retail sector of the eastern regions of Tshwane. GIS mapping and spatial analysis were used to gather this information.

5.2.1.1 Formal food retail sector

In the formal food retail sector a variety of food stores were available in close proximity and accessible to where the respondents reside. These formal food retail stores included supermarkets, fruit and vegetable markets, convenience stores, butchers, fast food outlets and restaurants. The four major retailers observed through the GIS mapping that were available in close proximity and accessible to where the respondents reside were Woolworths, Pick n Pay, Shoprite Checkers and Spar. More than 80 % of the respondents indicated that they make use of supermarkets to do their food purchasing. Most of these retailers mentioned were situated at big shopping malls or at smaller shopping centres in close proximity to the residential areas in regions 3, 4 and 6 of the Tshwane metropolitan area.

5.2.1.2 Informal food retail sector

In the informal food retail sector a number of open markets were also located in close proximity to where the respondents reside in regions 3, 4 and 6. These markets included the Hazelwood Food Market, Market @ Sheds, the Brooklyn Design Fair, Pretoria Boeremark, the Centurion Urban Market and Irene Village Market. The open markets were open weekly, mostly on Saturdays, and provide more ready-made food products. Most of the respondents did however indicate that they do not make use of open markets to do food purchasing, with more than half of the respondents (52,2 %, n=120) who do so only on special occasions.

It is concluded that there are multiple and a large variety of food stores available and easy accessible in the formal as well as the informal food retail sector of the suburbs investigated (regions 3, 4 and 6). The general availability of chain supermarkets, other food stores, fast food restaurants and convenience or speciality options are also witnessed in the eastern and southern suburbs of the Tshwane metropolitan area. The food stores readily supply food at affordable prices and a service that contributes to the availability and accessibility of food products that accommodate the needs of the consumer.

5.2.2 Conclusions on the type, quality and price of the food available in the formal and informal food sector of the eastern suburbs of Tshwane (objective 2)

The second objective of the study dealt with exploring and describing the type, quality and price of food available in the formal as well as the informal food sector. For this objective data were collected through food store and open-market observations.

5.2.2.1 Formal food retail sector

For the formal food retail sector, the different stores that were observed included Woolworths, Food Lovers Market, Pick n Pay, Shoprite Checkers and Spar. During the store observations, different sections in the store were observed for the type or selection, quality and price of the food items. The sections included fresh fruit, vegetables, dairy, meat, bread, soft drinks, beverages and juices and other products like tobacco, alcoholic beverages, sweets and chocolates.

Type of food products

In the formal food retail sector, it was observed that all the stores (20 stores) investigated, offered a wide selection or type of food products as all the stores offer most of the products observed in all the different sections. In the fresh fruit section, some stores offered different packaging sizes of the fruit products to accommodate the needs of the consumers. Eight of the stores did not offer low-fat, 2 % low-fat, fat-free, or skim milk. Only two stores offered fresh fish products and three

stores did not offer lean ground mince. All three stores that did not offer lean ground mince were situated in Centurion. It was observed that most of these stores have an in-store butchery where fresh meat can be cut to the customers preferences. Woolworths, Food Lovers Market and most of the Shoprite Checkers stores did not offer tobacco products.

Quality of food products

The quality of food products available in the food stores were observed through sensory attributes (texture, colour and aroma), the expiry dates and labels on the products, as well as delivery procedures followed, as all of these factors influence quality of food products. All of the products observed (fresh and processed) had expiry dates (sell-by and use-by dates) indicated on the package. No products in the stores were observed to be past their expiry dates and, from the observation, were of good quality. In most of the stores there were employees allocated to check the quality and expiry dates of perishable products every day and discard those that are past the date or not of good quality in terms of appearance and freshness. Managers were asked about the deliveries of their products to determine the quality of products that is available in store. Most of the stores indicated that they have most of their products delivered daily and some of the products every second day or twice a week. Fruit, vegetables, bread and some meat products were delivered daily, which results in good quality products in store and not products that are on the shelf for too long. Some stores also indicated that they do their deliveries on order depending on the stock thereof. These products were also observed through sensory attributes (texture, colour and aroma) and were of good quality.

Price of food products

In the formal food retail sector, some products (1 kg bananas, 1 kg carrots, 500 g brick margarine and 1 kg lean mince) were observed for their prices. These prices were observed to be able to compare prices throughout the different stores across the different regions. Most of the prices were comparable between the different stores throughout the different regions with minimal differences.

5.2.2.2 Informal food retail sector

For the informal food sector, the different markets that were observed were Pretoria Boeremark, Hazelwood Food Market and Irene Market. These markets were observed for the type or variety, quality and price of food products available.

Type of food products

In the informal food sector, it was observed that most of the products at these markets were all ready-to-eat, unique items that are prepared on site. Most of the products at these markets were also speciality food such as deli-style foods. Very little fresh produce such as vegetables and

salads or raw meat, which need to be prepared at home, were sold at the markets. There weren't such a big variety of products in comparison to what is sold in the retail stores but some options were available to choose from. Most of these food items observed could be described as unhealthy food choices as they are recognised as energy-dense food (Abrahams *et al.*, 2011; Temple *et al.*, 2006). The open markets might rather be the place to go and have an interesting, unique meal together with the social aspects that come with it, rather than the place to purchase monthly groceries at.

Quality of food products

For the informal food sector it was observed that the quality of the food products was good. All products were fresh with a good colour and aroma; no products were spoiled. Most of the food products on sale were ready-to-eat meals and therefore freshly made on site. Fresh produce was from some local farmers and observed to be of good quality.

Price of food products

In the informal food sector the prices differed a lot from the formal food retail sector as most of the products were ready-to-eat, speciality food items that are unique in a way that it's not products that one will find in the supermarket or frequently make at home, and therefore priced higher. A possible reason for this could be because these products are labour intensive to produce. Customers therefore not only pay for the food item but also for its uniqueness and whole social experience associated with it. A possible reason why the respondents did not indicate that they make use of open markets or any other informal food purchasing and consumption method like street vendors and spaza shops might be that brick and mortar food retail stores are so readily available, easy accessible and affordable to the respondents.

In conclusion, the type, quality and price of food products available in the formal and informal food sector of the eastern suburbs of Tshwane were observed to be of good variety (type), quality, reasonable and affordable.

5.2.3 Conclusions on the food access dimensions (availability, accessibility, affordability, acceptability and accommodation) to the study group

The third objective of the study dealt with determining and describing the food access dimensions (availability, accessibility, affordability, acceptability and accommodation) of the study group. Some questions in the survey questionnaire helped with concluding this objective. GIS mapping and spatial analysis were also used to determine the availability and accessibility of food stores by exploring the density and location of the food stores. Thereafter the information from the GIS mapping and spatial analysis was used to purposefully select the stores in each region to conduct

in store, as well as open-market observations to explore the food access dimensions. To further determine the affordability of food products, a food basket was compiled and prices of food products were observed and compared at 20 different stores and then also compared with the Customer Price Index.

Availability

As described above (see 5.2.1 and 5.2.2), a variety of food stores as well as food products are available in close proximity to where the respondents reside. This is confirmed with the results that just over 90 % of the respondents agreed (47,4 %, n=109 strongly agreed and 46,1 %, n=106 agreed) that they were satisfied with the range of food outlets they have access to in their neighbourhood with only a small number of respondents (2,2 %, n=5) who strongly disagreed. Therefore, the majority of the respondents indicated that a range of food outlets were available close to them. The majority of the respondents (95,7 %, n=220) indicated that they do not make use of online or internet shopping to purchase food. Only 4.3 % (n=10) of the respondents indicated that they purchase food online. The possible reason for this could be that brick and mortar food stores are readily available and convenient to reach for respondents to purchase food products from as South African consumers are also largely in the habit of purchasing their food products at supermarkets (Ronquest-Ross *et al*., 2015).

The results indicated that a variety of food stores were available and accessible to the respondents as it indicates that food stores including supermarkets, fresh fruit and vegetable markets, butchers, convenience stores and fast food outlets were all visited to some extent to purchase food products. Although the majority of the respondents (85 %, n=197) purchase most of their food products from a supermarket on a weekly basis, fruit and vegetables were to some extent purchased at fruit and vegetable markets (40 %, n=92), and meat products bought from butchers (85 %, n=197) by some respondents. Only a few respondents (17 %, n=39) made use of convenience stores. Results, however, showed that there were respondents (80 %, n=184) who did make use of fast-food outlets on special occasions and even more than 3 times per month.

Results also showed that healthy food as well as good quality fruit and vegetable products were available to most of the respondents (90 %, n=207) in the food outlets where they normally shop at. Therefore it can be concluded that good quality and a variety of food products are available to the respondents.

Accessibility

Closely related to the access dimension of availability is accessibility. The results concurred with what was stated above (see 5.2.1), namely that the respondents (more than 90 %, n=215) were

satisfied with the range of food outlets they have access to in their neighbourhood and that the majority of the respondents (more than 80 %, n=192) usually buy food at the food outlets closest to where they live. Respondents (48,3 %, n=111) also agreed that they do not have to travel some distance to buy good quality food. Respondents (more than 90 %, n=208) were satisfied with the type (variety) of food products they have regular access to. The store observations also confirmed that multiple and a variety of food retail stores and variety and type of food products are available and accessible in close proximity to the respondents. People often tend to shop for food in their own neighbourhood as they have easy access to food stores and do not have to travel long distances (Cannuscio *et al*., 2014:609). It can therefore be concluded that the respondents do have access to a range of food outlets as well as a variety of food products close to them.

The GIS mapping and spatial analysis also confirmed (see Figure 4.1) that multiple and a variety of food retail stores and food products are available and easily accessible in close proximity to where most of the respondents reside in regions 3, 4 and 6.

Acceptability

The results confirmed that the food stores and food products that are available and accessible to the respondents are acceptable to them, as most of the respondents (more than 90 %, n=115) are satisfied with the range of food outlets they have access to in their neighbourhood. The majority of the respondents (90 %, n=207) also indicated that good quality fruit and vegetable products are available in the food outlets they normally shop from and that the majority of the respondents (more than 90 %, n=208) are satisfied with the type (variety) of food products they have regular access to. The majority of the respondents (more than 80 %, n=187) also agreed that the food stores in their neighbourhood compare well with food stores in other areas and can therefore conclude that the food stores in their neighbourhood or close to them are acceptable to the respondents. This dimension of acceptability was also confirmed through the observation data (see 4.3 and 4.4). Stores were in close proximity to where respondents reside in each of the different regions observed, the stores sell a variety of good quality, affordable food products, and the food stores accommodate the needs of the consumers through the store operating hours and payment options which makes the food stores and food products acceptable to the consumers.

Affordability

Affordability was also measured and just over half of the respondents (53,5 %, n=95) confirmed that fruits and vegetables are affordable (reasonable priced) in the food outlets they normally purchase form. This dimension was also measured by means of the store and open-market observations (see 5.2.2). From different categories, chosen food product prices were compared throughout different stores, across the different regions. These categories included fruit with 1 kg bananas, vegetables with 1 kg carrots, meat with 1 kg lean ground mince and dairy with a 500 g

brick margarine. Through the observations it was resulted that all the prices are comparable and affordable between the different stores with minimal differences, with the only exceptions of meat and dairy products which differ more significantly. Affordability was then also measured by means of a food basket where a variety of food products from different food groups were selected to compile a food basket. The prices were then compared with the national prices of similar food products. The evaluation of how the food prices in Tshwane compare to the national food prices of similar products showed a minimal difference. To confirm the affordability of food in terms of monthly household income and the food budget, the results showed that the average percentage of the respondents' monthly household income spent on food is 12,7 %. Statistics South Africa (2015) confirmed that non-poor households spend 10,5 % of their household income on food, where the poor households spend 30 % of their household income on food. Since this study was done on the middle-income households with good education, it compares well with the statistics of the non-poor households. This concludes that food products are affordable to the consumers and compare well across the different regions.

Accommodation

The last dimension of accommodation's results showed that the majority of the respondents (90 %, n=207) are satisfied with the type (variety) of food products they have regular access to. The majority of the respondents (90 %, n=207) also agreed that the food stores accommodate their needs in terms of credit options and extended hours. During the store observations it was also recorded that the stores accommodate the consumers' needs in terms of credit facilities and operating hours of the stores. All the stores do offer credit facilities and their operating hours were more than 10 to 12 hours a day during the week and at least 8 hours during weekends. This concludes that the food stores accommodate and satisfy the needs of the consumers.

In conclusion, from the results the majority of the respondents agreed that there is a variety of food retail options and good quality food products available, accessible and acceptable, close to them (see 4.3, in the local urban food environment). They also mostly agreed that the fruit and vegetable products are affordable at the outlets they purchase from and this was also supported by the outcome of the study that the prices of food in Tshwane compares well with the national food prices and are affordable to consumers. The respondents' needs are also accommodated in terms of providing good quality food of a wide variety at reasonable prices and then also regarding the food stores' operating hours and payment options. The respondents strongly agreed that the access to food as measured by the five food access dimensions is adequate as they indicated to be mostly satisfied with the availability, accessibility, affordability, acceptability and accommodation of food in their local urban food environments.

5.2.4 Contribution of the food access dimensions to the food choices of the study group

It is evident from the results obtained in Objective 3 that the Tshwane urban food environment supports and enhances easy access to food to consumers, as all five the food access dimensions (availability, accessibility, acceptability, affordability and accommodation) were to their satisfaction. These in turn contributed to the easy procurement of a wide variety of quality food at affordable prices.

The last objective of the study dealt with describing how the food access dimensions contribute to the food choices of the study group. In order to describe the contribution of the food access dimensions to the food consumption patterns and food choices of the study group, data on what food is available and accessible in the home and the food consumption patterns were collected. Frequency of food consumption of selected food groups, adequacy of food consumed and their attitude towards healthy eating were also measured.

Other aspects of importance to the food choice and consumption of individuals relate to the food that is available and accessible in their homes.

Food available and accessible in the home

The gatekeeper determines what food is available in the household and how it is prepared. This then in turn promotes the development of healthy eating practices through making nutritious food available and setting an example of positive attitudes towards healthy eating (Sedibe *et al.*, 2014).

Results show that the person mostly responsible for food purchases and food preparation is the female of the household (50,4 %, n=116 and 69,9 %, n=160 respectively). These results tie in with the literature regarding females being the gatekeepers in most households and thus responsible for preparation and purchasing decisions regarding food in the home (Cannuscio *et al.,* 2013; Liese, Bell, Barnes, Colabianchi, Hibbert, Blake & Freedman, 2013:2598; Botonaki & Mattas, 2010; Dibsdall, Lambert, Bobbin & Frewer 2002).

Food available in the home is most likely to be a key influence on food intake (Bryant & Stevens, 2006). For example, the availability, accessibility and exposure to a range of fruit and vegetables in the home are linked to the frequent consumption of fruit and vegetables (Swinburn, Dominick, & Vandevijvere, 2014). More than 90 % of the respondents indicated that fruit and vegetables are available in their homes as well as that they serve vegetables with main meals. The majority of the respondents (86,1%, n=198) indicated that milk is always available in their homes. Just over 60 % of the respondents indicated that 100 % fruit juice is only sometimes or never available in their homes with just less than 40 % who indicated that 100 % fruit juice is usually or always

available in their homes. More than 90 % of the respondents indicated that food is usually prepared in a healthy manner in their homes. It is concluded that heathier food products are available in the respondents' homes and that they more than often try to prepare it in a healthy manner. Although healthier food choices are made according to these respondents, 80 % of the respondents indicated that they do have potato chips, other salty snacks, chocolates and other sweets available in their homes with over 70 % of the respondents indicated that soft or fizzy drinks as well as junk food are available in their homes. This concludes that healthier food options are chosen, but also that some more unhealthier food choices are chosen by many respondents regarding the food products available in their homes.

Food consumption patterns

The results indicated that the majority of the respondents (62,2 %, n=143) eat three meals a day which include breakfast, lunch and supper. A third of the respondents also include daily snacking in-between meals. Most of the respondents indicated that most of their meals are eaten at home during weekdays. The results also showed that almost 97 % of the respondents do eat meals away from home at least one to two times per month where most of these meals are eaten at restaurants.

Apart from meal patterns of the study group, the type of food consumed is also of importance. Results showed that almost half of the respondents have consumed white roots and tubers, orange-fleshed vegetables, fruit and dark green leafy vegetables the previous day and half of the respondents have not. Seventy percent of respondents do not consume legumes and nuts. Almost 90 % of the respondents consume milk and dairy products. More than half of the respondents consume sweets, which can be seen as an unhealthy food choice as it is high in sugar (Abrahams *et al.*, 2011; Temple *et al.*, 2006).

Information on how diverse the study group's food intake is, was also determined. Results showed that the majority of the respondents (68,3 %, n=157) include at least six and more than six of the nine food groups as part of their meals or snacks. This indicates that their dietary diversity score shows a very varied diet. A dietary diversity score of 4 and less indicates a poor dietary diversity. Only 17,8 % (n=41) of the respondents include five food groups and only 14 % (n=32) of the respondents include four groups or less. A varied diet is indicated by the mean frequency that was calculated at a dietary diversity score of 6,20. The standard deviation was 1,523 which indicated that the majority of respondents also have a high DD (dietary diversity) of either five or seven. These results are further confirmation that a variety of food items are available and accessible to the study group. Results from other South African studies show somewhat different results. Whites from another study had a mean dietary diversity score of only 4,96, however they constituted the lowest percentage of individuals (9 %) with a dietary diversity score lower than 4

(Steyn & Ochse, 2013:15). In the SANHANES-1 study (Sishana *et al.,* 2014) the national dietary diversity score of South Africans was 4,20 and 39,7 % of the population had a dietary diversity score of less than 4. The dietary diversity score of the white population of Tshwane was therefore higher than the national populations' dietary diversity score.

Frequency of food consumption of selected food groups

In addition to the food consumption pattern, the frequency of consumption of eight food groups (protein-rich foods, milk and dairy products, fruit, vegetables and salads, fats and oils, starchy foods, legumes and nuts, beverages, fast and snack foods) was measured. This was done as a cross-check of the type of food consumed. The results showed that between 80 and 90 % of the respondents consumed red meat and chicken at least one to two times a week. More than half of the respondents do consume fruit (67,8%, n=156), vegetables (85,2%, n=196) and salads (57%, n=131) at least three to four times per week, but not daily as recommended. Almost 60 % of the respondents choose to consume brown bread rather than white bread. More than 60 % of the respondents consume rice, pasta and potatoes more than once a week. Legumes and nuts were only rarely consumed by the majority of the respondents, however, more than a third (36,5 %, n=84) consume nuts at least a few times a week. The majority of the respondents do not consume soft drinks, sport or energy drinks and cordials, with 87 % (n=200) of the respondents that do consume water daily. Almost 70 % of the respondents seldomly consume pizza, potato chips, fried chips, meat pie and hamburgers. Sweets, cookies and biscuits however are consumed by almost 40 % of the respondents, although it is not often. Results indicate that it seems as if the respondents do not consume the recommended quantities of fruit and vegetables; neither of legumes and nuts.

The results on the dietary diversity and the Frequency of Food Consumption (FFC) were used to assess the adequacy of the study group's food consumption in terms of adherence to the Food-Based Dietary Guidelines (FBDG) for South Africans (Vorster *et al.*, 2013).

Adequacy of food consumed

From the results derived from the Dietary Diversity Score (DDS), it can be concluded that the majority of respondents consume a variety of food. The majority of respondents include six or more of the nine food groups as part of their meals or snacks and a mean DDS of 6,20 is evident that the guideline, namely *"enjoy a variety of foods"*, was followed by the majority. The majority of the respondents (86 %, n=198) have included starchy foods as part of their meals and snacks the previous day and it seems as if the guideline of the FBDG, namely *"to make starchy foods part of most meals"* is followed by most.

Although more than 60 % of the respondents indicated that they consumed fruit and vegetables

in their meals or snacks the previous day and that fruit and vegetables are also available in their homes, only half of the respondents indicated that they eat fruit and vegetables daily. The other respondents consume fruit and vegetables only at least once a week which raises concern. According to the Food-Based Dietary Guidelines every person should *"eat plenty of vegetables and fruit every day".*

The majority of the respondents (70,4 %, n=162) do not usually include legumes and nuts in their diet and more than half of the respondents indicated to only consume legumes and nuts seldom. It seems as if the guideline of *"eat dry beans, split peas, lentils and soya regularly"* is not followed by many of the respondents. The majority of respondents include milk and dairy products as part of their meals and snacks. More than 80 % of the respondents also indicated that milk is available in their homes. According to the food frequency more than 70 % of the respondents consume milk every day. It seems as if the guideline of *"have milk, maas and yogurt every day"* is being followed by most of the respondents.

More than 90 % of the respondents indicated to make protein-rich foods part of their meals and snacks and therefore follow the guideline that states *"fish, chicken, lean meat or eggs can be eaten daily"*. More than 75 % of the respondents included fats and oils as part of their meals and snacks the previous day, but most respondents (almost 30%) indicated to use butter and vegetable oil only seldom and never use margarine. It is important for the respondents to stick to the guidelines regarding the type of fat consumed, as it states *"use fats sparingly, choose vegetable oils, rather than hard fats".* Most of the respondents indicated that they never use margarine which is a vegetable fat, but rather use butter which is an animal fat. These results therefore seem that most of respondents did not adhere to the FBDG concerning the type of fats consumed.

When it came to the respondents' opinions and attitudes regarding healthy eating, most indicated that this was an important factor for themselves and the people they live with. Over 80 % of the respondents indicated that they themselves, their friends and the people they live with, do care somewhat to very much about healthy eating. Further analysis showed that, from the respondents who have indicated this, most are female and also from the Mature generation group (71 years and older). This indicates some level of recognition of the importance of healthy eating and the consequences or disadvantages related to unhealthy eating.

In conclusion, the local urban food environment together with the food access dimensions of availability, accessibility, affordability, acceptability and accommodation contribute to the food choices of urban consumers. The results of this study confirm that this is also the case with regard to the food choices of the mentioned study group. The respondents strongly agree that the access

to food as measured by the five food access dimensions is satisfactory as they indicated to be mostly satisfied with the availability, accessibility, affordability, acceptability and accommodation of food in their local urban food environments. It can be concluded that the majority of respondents do most of their food shopping at supermarkets which are available and accessible within close proximity. Similar results regarding supermarkets being the preferred choice for food shopping have also been reported in other studies (Cannuscio *et al*., 2014; Cannuscio *et al*., 2013; Freedman & Bell, 2009; D'Haese & Van Huylenbroeck, 2005). Regarding accessibility of food in the local urban food environment, most of the respondents do not have to travel far distances to purchase good quality food and these food outlets are easily accessible and within close proximity. The food products were explored to be of good quality and affordable to the respondents. Most of the respondents indicated that these food outlets also accommodate their needs. Overall, the access dimensions of the respondents in the local urban food environment are adequate as they have close availability and regular access to healthy and good quality foods that are affordable at these outlets.

Therefore it can be concluded that ample food retail stores that offer good quality, affordable food options are available and accessible to consumers. This contributes to the food choices of the study group as the results show that the environment provides the opportunity to make sound food choices. Most of the respondents do adhere to the recommendations of the Food-Based Dietary Guidelines, however, there is some room for improvement regarding the guidelines of fruit and vegetables as well as legumes and nuts. It can also be concluded that, if an individual wants to make even healthier food choices, for example to consume more legumes, nuts, fruit and vegetables, that it would be easy to do so since their current food environment does have ample, good quality food options available close to them.

The next section addresses the overall significance of the study.

5.3 SIGNIFICANCE OF THE STUDY

The aim of this study was to explore and describe the various food access dimensions to the local, urban food environment of adults residing in the eastern suburbs of Tshwane metropolitan area and to describe how it contributes to the food choices of the study group. The study contributed to closing an important gap in the knowledge on the food access dimensions in Tshwane. This is the first study that attempts to look at the local food environment. Valuable information on the contribution of the urban environment to the food access dimensions was gathered. The results confirm that the local urban food environment by means of the food access dimensions contribute to the food choices of the study group. All the access dimensions

(availability, accessibility, acceptability, affordability and accommodation) are in place and are being satisfied within regions 3, 4 and 6 in the Tshwane Metropolitan area. A big variety of food stores (supermarkets, fast-food outlets, convenience options) are available and easily accessible. The retail food stores resulted to be affordable and accommodating to the needs of the consumers; making a wide variety of food options available and acceptable to the consumer has an impact on their food choices.

Food stores are available and easily accessible to consumers in the eastern suburbs of Tshwane. This was confirmed through the GIS mapping and spatial analysis of the food stores in the areas where the respondents reside. The majority of the respondents prefer to rather physically drive with a car to a food store, rather than to purchase food on the internet. The majority of respondents purchase most of their products at supermarkets (weekly), while a variety of different stores are available. A large variety of good quality and affordable food products are also available, accessible, as well as acceptable to consumers. The food stores accommodate the needs of the consumers and satisfy them by providing good quality food of a wide variety at reasonable prices and then also regarding the food stores' credit facilities and operating hours. There is however room for improvement regarding adhering to certain of the Food-Based Dietary Guidelines, specifically concerning the consumption of fruit and vegetables, as well as legumes and nuts. The age group (Baby Boomers) of most of the respondents portrays that they still prepare most of their own meals. This might be that most of these respondents have more time and work less and can therefore prepare meals instead of making use of the unhealthy convenience and fast-food options. These white urban adults follow a varied diet, although they do not consume enough fruit and vegetables or legumes and nuts.

This study is significant and valuable to consumer educators and can assist in the development of intervention strategies to promote healthier food choices and even better food choices amongst white urban consumers, since there is room for improvement on the consumption of fruit and vegetables and legumes and nuts.

Since the study was limited to only certain regions (region 3, 4 and 6) in Tshwane, the results cannot be generalised and applied to the whole of Tshwane.

The next section deals with the limitations of the study.

5.4 LIMITATIONS OF THE STUDY

In conducting a study there are often limitations present. This study is no exception.

5.4.1 Age and gender distribution

Although the study focused on urban adults, the age distribution of the respondents was not even. Firstly, the majority of the respondents were between 52 and 70 years old and many respondents were 40 to 51 years of age. Consequently the results do not give a clear picture of the influence that the access dimensions have on the food choices of younger adults between 24 to 40 years of age. The gender distribution were also not evenly distributed as there were more males than females who participated in the study.

5.4.2 Employment status and time limitations

Although great caution was taken when developing the survey questionnaire, it would have been useful to have obtained information on the employment status of the study group and if they experienced time constraints that prevented them to spend enough time to plan their food purchases and food preparation activities. This could have served as an indication whether he respondents could possibly experience time limitations for food purchasing and food preparation and if this influenced the type of food (healthy or not healthy) they purchased.

5.4.3 Food intake shortcomings

The nature of the survey questionnaire allowed for only one day's food intake recall. It is advisable that, when using a food intake recall, to repeat the recall more than once, preferably on three different occasions and also specifically record quantities of food consumption. In this study only one day's food recall was recorded due to limited time and the nature of the survey questionnaire, which could have influenced the results obtained.

5.5 RECOMMENDATIONS

Based on the results of this study, the following recommendations to improve the food choices of the study group are made:

- Consumer facilitators and educators should educate consumers, especially young consumers on some of the recommendations of the Food-Based Dietary Guidelines that consumers do not adhere to, more specifically the consumption of fruit and vegetables and legumes and nuts. Consumers have adequate access to healthy food in the local urban food environments, but do not necessarily adhere to certain guidelines of the Food-Based Dietary Guidelines, and therefore these consumers should be educated on the importance

of adherence to these guidelines starting at a young age when independent food decisions commence.

- Based on the results of this study it is also recommended that consumer facilitators and educators ensure that consumers are informed about how healthy or unhealthy their everyday food choices are. Although food and drinks high in sugar were only rarely consumed by the study group, consumers should still be made aware of the dangers of a high sugar intake and the benefits of the regular intake of healthy food.

5.6 SUGGESTIONS FOR FUTURE RESEARCH

Suggestions for future research on the topic of food access dimensions to the local, urban food environment of adults and describing how it contributes to the food choices of the study group, as based on the results of the study, include the following:

- It could be helpful in the future to have an equal representation of the different generation groups in order to obtain more detailed information on their food choices. It is thus recommended to execute the study on younger adults and families from Generation X and Y to be able to compare whether the access dimensions of the local, urban food environment contribute differently to the food choices of that study group.

- It is further recommended to replicate the study in other regions where white urban adults of South Africa reside in Gauteng, and even in other provinces, for example the Free State and Western Cape, to see if similar results will follow, as the assumed dimensions could differ.

5.7 CONCLUDING REMARKS

Although very little has been published on the access dimensions specifically in the urban food environment and the food choices of urban consumers, this study offers insight into the access dimensions and how it contributes to the food choices of urban consumers in the Tshwane metropolitan area. This research contributed to a better understanding of how the access dimensions in local urban environment contribute to urban consumers' food choices. By exploring the local urban food environments of urban consumers in Tshwane, this study contributed to fill the knowledge gap on this topic in South Africa.

The findings of the study confirm that the local urban environment contributes to the degree of access that consumers have to food. The local urban food environment in the Eastern suburbs of Tshwane is accessible to consumers as a variety of different food outlets that offer good quality, fresh and healthy foods in close proximity to the consumers are easily reached. It was also found that supermarkets were the most preferred choice for all food purchases amongst this study group. The findings of this study further reveal that the respondents have access to a variety of good quality and affordably-priced food products where the food stores accommodate and satisfy the consumers' needs. Although the respondents have these options available, they do not always purchase and consume the healthier food products and more specifically do not follow all the guidelines of the Food-Based Dietary Guidelines for a healthier diet, which might have an impact on their health.

In conclusion, the findings of the study show that white urban consumers in regions 3, 4 and 6 of Tshwane eat a variety of food, follow most of the Food-Based Dietary Guidelines and have a positive attitude towards healthy eating. The study achieved all of its formulated objectives and therefore could be considered to make a valuable contribution to the research knowledge in this study field.

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ADDENDUM A

INFORMED CONSENT FORM

Dear respondent,

QUESTIONNAIRE ON FOOD PRACTICES

The purpose of the study is to learn about the food purchasing and eating patterns of adults in Tshwane. Through this research we would like to understand how urban consumers make their food choices and how the local urban, home and individual environments influence what, where, when and why food is bought and eaten. The current knowledge on the food practices of urban South African adults is limited and this study will to enable us to plan and give more meaningful consumer education on healthy food choices and eating.

Thank you for taking time to share your food shopping and eating practices.

You will be asked to answer a number of questions regarding food shopping and eating patterns. All answers will be recorded for further use by the investigators only. You are welcome to refrain from answering any questions that pose, or is the cause of any discomfort or infringement of your privacy. Refusal to participate or withdrawal of consent, or discontinued participation will not result in any penalty. Please note that your participation is voluntary and does in no way release the researchers of the involved institutions from their legal and professional responsibilities. All information will be treated as highly confidential and the identity of respondents need not be disclosed and will remain anonymous. The results of this study will be presented anonymously.

Your decision to respond to the questions will be interpreted as confirmation that you agree to participate.

Should you wish to partake in future on-going research such as focus group discussions pertaining to this study please give a contact number or e-mail address in the space provided.

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Fakulteit Natuur- en Landbouwetenskappe
Lefapha la Disaense tsa Tlhago le Temo

QUESTIONNAIRE ON THE FOOD ENVIRONMENTS OF ADULTS IN TSHWANE

For official use only

Respondent Number | | | | | |

Section A: Socio-demographic information

A1 What is your age? | | | A1 | | |

A2 What is your gender? Male 1 | Female 2 | A2 | |

A3 Please indicate your area of residence with the Tshwane Metropolitan Area

	A4	

A4 What is your highest level of education?

Lower than grade 12	1
Grade 12	2
Grade 12 plus a degree/diploma	3
Postgraduate degree	4

A5 What is your approximate monthly household income rounded up to the nearest R1000? (this question is optional)

R

A6 What is the approximate monthly food budget for your household, rounded up to the nearest R1000?

R

A7 What is your preferred home language?

Afrikaans	1
English	2
Ndebele	3
Northern Sotho	4
Sotho	5
Swazi	6
Tsonga	7
Tswana	8
Venda	9
Xhosa	10
Zulu	11
Other	12

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A8 How many people live in your household?

A9 Indicate the structure that best describes your family/ household. Mark only one.

Single (living on my own)	1
Married couple (without children)	2
Nuclear family (both parents and children)	3
Extended family (parents, children and other family members)	4
Single parent family (father / mother and children)	5
Living with other family members (not parents or children)	6
Living with partner / friends or others	7

A10 Please indicate the number of **dependent children** under 18 years old who are part of your household?

A11 Please indicate how many children of the following age groups is currently part of your household?

Infants (0-2 years of age)	
Toddlers and pre-schoolers (between 3-6 years of age)	
Primary schoolers (between 7-12 years of age)	
Secondary schoolers (between 13-18 years of age)	

A12 Please indicate the number of **adults (older than 18 years**) that are currently part of your household

A13 Who is **mainly** responsible for **most** of your household's **food purchases**?

Yourself	1
Husband / Wife / Partner	2
Children	3
Another person in the household	4

A14 Who is **mainly** responsible for **most** of your household's **food preparation**?

Yourself	1
Husband / Wife / Partner	2
Children	3
Domestic worker / helper	4
Another person in the household	5

A15 In terms of the employment Equity Act of SA, to which population group do you belong to?

African	1
Asian	2
Coloured	3
Indian	4
White	5
Other	6

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Section B: Usual food shopping patterns

B1 How often do you buy from the stores or food outlets listed below?

Shop or food outlet	Daily	3 – 4 times per week	1-2 times per week	more than 3 times per month	Special occasions	Never
Supermarket (i.e. Shoprite, Checkers, Spar, Pick n Pay, Woolworths food store)	1	2	3	4	5	6
Fast Food outlet (i.e. KFC, Nandos, McDonalds, Hungry Lion)	1	2	3	4	5	6
Convenience store (i.e. Caltex, BP Express, Shell Select, Sasol)	1	2	3	4	5	6
Fresh Fruit and Vegetable Food Market (Fruit stop, fruit shop, food lovers market, green grocer)	1	2	3	4	5	6
Street Vendor	1	2	3	4	5	6
Spaza Shop	1	2	3	4	5	6
Open or community market	1	2	3	4	5	6

B2 Please indicate which of the listed items you have purchased from which food outlet in the past 7 days. **You may mark more than one outlet per group of items**.

Item	Did not purchase item	Supermarket	Fast food outlet	Fruit and Vegetable Market	Street vendor	Spaza shop	Convenience store
Fruit (includes fresh, frozen, canned or in jar)							
Citrus fruit (oranges, lemons, naartjies)	1	2	3	4	5	6	7
Orange-coloured fruit (yellow peaches, mangoes, pawpaw, spanspek, plums)	1	2	3	4	5	6	7
Other fruit (apples, bananas, grapes, pears, litchis)	1	2	3	4	5	6	7
Vegetables (includes fresh, frozen, canned or boxed)							
White roots and tubers (potatoes, white sweet potatoes)	1	2	3	4	5	6	7
Orange-fleshed vegetables (pumpkin, carrot, butternut, orange-fleshed sweet potato)	1	2	3	4	5	6	7
Dark green leafy vegetables(spinach, kale, indigenous green leafy vegetables)	1	2	3	4	5	6	7
Other vegetables (tomatoes, onion, green beans, cabbage, gem squash, peas, beetroot)	1	2	3	4	5	6	7

Item	Did not purchase item	Supermarket	Fast food outlet	Fruit and Vegetable Market	Street vendor	Spaza shop	Convenience store
Milk and dairy products							
Milk (fresh, powdered , UHT,maas)	1	2	3	4	5	6	7
Cheese and cottage cheese	1	2	3	4	5	6	7
Yoghurt	1	2	3	4	5	6	7
Dairy beverages (yogi sip, dairy-fruit beverages)	1	2	3	4	5	6	7
Beverages							
Fruit juice	1	2	3	4	5	6	7
Cordials and concentrates (Oros, Wild island, Carribean)	1	2	3	4	5	6	7
Soft drinks (fizzy and energy drinks)	1	2	3	4	5	6	7
Meat							
Beef	1	2	3	4	5	6	7
Mutton/ Lamb	1	2	3	4	5	6	7
Goat Meat	1	2	3	4	5	6	7
Chicken	1	2	3	4	5	6	7
Pork	1	2	3	4	5	6	7
Boerewors	1	2	3	4	5	6	7
Offal cuts	1	2	3	4	5	6	7
Bacon	1	2	3	4	5	6	7
Processed meat (ham, cold cuts, polony, Viennas, Russians)	1	2	3	4	5	6	7
Biltong	1	2	3	4	5	6	7
Bread and bread-like products							
Bread (white, brown),	1	2	3	4	5	6	7
Buns, bread rolls	1	2	3	4	5	6	7
Sweet buns	1	2	3	4	5	6	7
Scones	1	2	3	4	5	6	7
Fat cakes	1	2	3	4	5	6	7
Crisp breads / Crackers	1	2	3	4	5	6	7
Rusks	1	2	3	4	5	6	7
Cereal products							
Maize meal	1	2	3	4	5	6	7
Rice	1	2	3	4	5	6	7
Flour (cake, bread)	1	2	3	4	5	6	7
Sorghum	1	2	3	4	5	6	7
Pasta (macaroni, spaghetti, noodles)	1	2	3	4	5	6	7
Oils and fats							
Oil (sunflower, olive, canola)	1	2	3	4	5	6	7
Margarine (brick)	1	2	3	4	5	6	7
Margarine (tub)	1	2	3	4	5	6	7
Butter	1	2	3	4	5	6	7
Lard	1	2	3	4	5	6	7

Item	Did not purchase item	Supermarket	Fast food outlet	Fruit and Vegetable Market	Street vendor	Spaza shop	Convenience store
Eggs							
Eggs	1	2	3	4	5	6	7
Legumes and nuts							
Dry beans (sugar, butter), split peas	1	2	3	4	5	6	7
Lentils	1	2	3	4	5	6	7
Nuts (peanuts, pecan, walnuts, macadamia)	1	2	3	4	5	6	7

B3 Indicate to what extend you **agree / disagree** with the following statements about the food outlets you buy from.

	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
I am satisfied with the range of food outlets I have access to in my neighbourhood	1	2	3	4	5
Good quality fruit and vegetable products are available in the food outlets I normally shop	1	2	3	4	5
Healthy foods are available in the food outlets where I normally shop	1	2	3	4	5
I usually buy food at the food outlets closest to where I live	1	2	3	4	5
I am satisfied with the types (variety) of food I have regular access to	1	2	3	4	5
The food stores in my neighbourhood compare well with food stores in other areas of Tshwane	1	2	3	4	5
Fruits and vegetables are affordable (reasonable priced) in the food outlets I normally buy from	1	2	3	4	5
I have to travel some distance to buy good quality food	1	2	3	4	5
These outlets accommodate my needs (i.e. credit options, extended hours)	1	2	3	4	5

B4 Do you make use of on-line / internet shopping for food?

Yes	1	No	2

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B5 How do you normally transport your purchased food home?

I walk and carry it myself.	1
Somebody helps me carry my food.	2
I take a taxi/ bus.	3
I use a car.	4

Section C: Usual eating patterns

C1 How many meals do you eat a day? (this excludes snacking between meals)

C2 During the past week, how many days did you eat **breakfast**?

Never	1
1-2 days	2
3-4 days	3
5-6 days	4
Everyday	5

C3 During the past week, how many days did you eat **lunch**?

Never	1
1-2 days	2
3-4 days	3
5-6 days	4
Everyday	5

C4 During the past week, how many days did you eat **supper**?

Never	1
1-2 days	2
3-4 days	3
5-6 days	4
Everyday	5

C5 During the past week, how many days did you **snack** between meals?

Never	1
1-2 days	2
3-4 days	3
5-6 days	4
Everyday	5

C6 How many of your daily meals do you eat **at home** on a weekday?

None	1
1 meal	2
2 meals	3
All meals	4

C7 How often do you eat a meal or meals **away from home**?

Never	1
1-2 times per month	2
3 times per week	3
Daily	4

If answer is **never** continue with C9

C8 If you eat away from home, where do you eat most often?

Fast food outlets	1
Restaurants	2
Supermarkets	3
Street vendors	4
Workplace	5

C9 How often do you and your family/household members eat a meal together?

Daily	1
3-4 times per week	2
1-2 times per month	3
Never	4
Not applicable I live on my own	5

If your answer is **never/ Not applicable**, continue with question C12

C10 When eating with family/household members, how are most of the meals eaten?

All members of the household eat together at the table	1
Different age groups are formed and eat separately	2
We watch television while eating	3

C11 How strongly do you **agree /disagree** with the following statements?

	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
I enjoy eating meals with my family	1	2	3	4	5
In my family eating brings people together in an enjoyable way	1	2	3	4	5
In my family mealtimes are a time for talking with other family members	1	2	3	4	5
In my family, dinner time is about more than just getting food, we all talk to each other	1	2	3	4	5
In my family we often watch television while eating dinner	1	2	3	4	5

Indicate which statement applies best to you.

C12 I care about eating healthy food

Not at all	1
A little bit	2
Somewhat	3
Very much	4

C13 Many of my friends care about eating healthy food

Not at all	1
A little bit	2
Somewhat	3
Very much	4

C13 The people I live with care about eating healthy food.

Not at all	1
A little bit	2
Somewhat	3
Very much	4
Not applicable – I live on my own	5

C15 Indicate how often the following applies to the food in your home.

	Always	Usually	Sometimes	Never
Fruits and vegetables are available in my home	1	2	3	4
Vegetables are served with main meals in my home	1	2	3	4
Milk is available in my home	1	2	3	4
100% fruit juice is available in my home	1	2	3	4
Potato chips and other salty snacks are available in my home	1	2	3	4
Chocolates and other sweets are available in my home	1	2	3	4
Soft/fizzy drinks (Coke, Sprite, Fanta) are available in my home	1	2	3	4
We have "Junk food" in my home	1	2	3	4
Food is prepared in a healthy manner in my home	1	2	3	4

C16 Please indicate if you have included foods from the following groups as part of your **meals** or **snacks yesterday.**

	Yes	No
Cereals: maize, rice, wheat, sorghum, and any other foods made from cereals such as porridge, bread, pasta and noodles	1	2
White roots and tubers: potatoes and white sweet potatoes	1	2
Orange-fleshed vegetables and fruit: Pumpkin, carrots, butternut, orange-fleshed sweet potatoes, yellow peaches, pawpaw, mangoes, plums, spanspek, apricots	1	2
Dark green leafy vegetables: spinach, kale, indigenous green leafy vegetables	1	2
Other vegetables: tomatoes, onion, green beans, lettuce, cabbage, broccoli, cauliflower, eggplant, gem squash, beetroot	1	2
Other fruit: apples, bananas, grapes, pears, litchis, oranges, naartjies	1	2
Legumes and nuts: dried beans, dried peas, lentils, nuts or foods made from these (i.e. peanut butter, hummus)	1	2
Fats and oils: oils, fats or butter added to food or used in cooking	1	2
Meat, poultry or fish: beef, pork, mutton/lamb, goat, chicken, duck, fresh, frozen, tinned or dried fish or shellfish	1	2
Milk and dairy products: milk, maas, cheese, yogurt or any other milk products	1	2
Eggs: eggs from chicken, duck or any other egg	1	2
Sweets: sugar, honey, sugary foods such as chocolates, candies, cookies, cakes and sugar sweetened beverages such as fizzy drinks and cordials	1	2
Spices and condiments: spices, salt and pepper, condiments (i.e. tomato sauce, soy sauce, salad dressing)	1	2
Beverages: coffee, tea , herbal teas	1	2
Alcoholic beverages: beer, wine, whiskey, brandy, vodka	1	2

C17 **How many servings** of the following foods do you usually eat each day? Use the serving guide provided for each item to determine the approximate serving quantity you eat.

Food	Servings per day
Starchy food (rice, maize meal, bread, pasta, breakfast cereals). ***Serving size:*** 1 slice of bread, ½ cup rice, pasta, porridge,	
Vegetables (fresh, frozen, or salad). ***Serving size***: ½ cup cooked, 1 cup for raw leafy vegetables	
Fruit (all fresh) ***Serving size:*** ½ cup chopped fruit, 1 medium apple, banana, 2 medium sized apricots, plums, ½ cup fruit juice, 2 tablespoons raisins	
Meat, chicken or fish. ***Serving size:*** meat - palm size, slice 10mm, chicken – 1 medium breast, white fish – 1 large piece	
Milk and dairy products (yoghurt, cheese, cottage cheese, maas). ***Serving size:*** 1 cup milk, yoghurt, maas, 1 cube of 30mm cheese.	
Soft drinks (fizzy drinks i.e. Sprite, Coke, Fanta). ***Serving size:*** 340ml can	
Water. ***Serving size***: 1 cup/ 1 glass	
Tea and coffee. ***Serving size****:* 1 cup	
Sugar in tea or coffee. ***Serving size:*** 1 teaspoon	
Potato crisp or other savoury snacks ***Serving size:*** 1 small packet (35g)	
Chocolates bars. ***Serving size:*** 1 bar	

C18 Indicate how often you eat or drink the following foods.

	Daily	3-4 times per week	1-2 times per week	Seldom	Never
Red meat (beef, pork, mutton)	1	2	3	4	5
Chicken	1	2	3	4	5
Boerewors	1	2	3	4	5
Processed meat	1	2	3	4	5
Eggs	1	2	3	4	5
Full cream milk	1	2	3	4	5
Low fat milk	1	2	3	4	5
Cheese	1	2	3	4	5
Yoghurt	1	2	3	4	5
Fruit	1	2	3	4	5
Vegetables	1	2	3	4	5
Salads	1	2	3	4	5
Butter	1	2	3	4	5
Margarine (tub)	1	2	3	4	5
Margarine (brick)	1	2	3	4	5
Vegetable oil	1	2	3	4	5
White bread, bread rolls and buns	1	2	3	4	5
Brown or whole wheat bread	1	2	3	4	5
Breakfast cereals	1	2	3	4	5
Maize meal porridge	1	2	3	4	5

	Daily	3-4 times per week	1-2 times per week	Seldom	Never
Rice	1	2	3	4	5
Pasta (macaroni, spaghetti, noodles)	1	2	3	4	5
Potatoes	1	2	3	4	5
Legumes (dry beans, lentils, split peas)	1	2	3	4	5
Nuts	1	2	3	4	5
Fruit juice	1	2	3	4	5
Soft drinks (fizzy such as Coke, Sprite, Fanta)	1	2	3	4	5
Sport or energy dinks (Energade, Red Bull)	1	2	3	4	5
Water	1	2	3	4	5
Pizza	1	2	3	4	5
Potato chips (crisps)	1	2	3	4	5
Fried chips (slap chips)	1	2	3	4	5
Cake, tart, cup cakes or muffins	1	2	3	4	5
Meat pie	1	2	3	4	5
Bar of chocolate	1	2	3	4	5
Sweets	1	2	3	4	5
Fish	1	2	3	4	5
Cordials (Oros, wild island, Carribean)	1	2	3	4	5
Hamburger	1	2	3	4	5
Cookies , biscuits	1	2	3	4	5

C19 When deciding what foods to **buy** or **eat** on a daily basis, how important is each of the listed aspects below. Mark your level of importance by using the scale provided (1-not at all important, 2- a little important, 3- moderately important, 4- quite a bit important and 5- very important).

Items	Not at all important	A little important	Moderately important	Quite a bit important	Very important
How it tastes	1	2	3	4	5
Whether it is considered a traditional food	1	2	3	4	5
How it smells	1	2	3	4	5
Whether it is easily available in shops and supermarkets	1	2	3	4	5
Degree to which it is good value for money	1	2	3	4	5
Whether I think it will help me cope with stress	1	2	3	4	5
Degree to which it will help me cope with life events	1	2	3	4	5
How likely it is to help me control my weight	1	2	3	4	5
Degree to which it reflects my cultural or ethnic traditions	1	2	3	4	5
Degree to which I can be sure it is not associated with food-borne illness	1	2	3	4	5
Whether it is grown or produced in an environmentally friendly way	1	2	3	4	5
The amount of kilojoules/calories in it	1	2	3	4	5
How easy or difficult it is to prepare	1	2	3	4	5
Degree to which it contains natural ingredients	1	2	3	4	5
Degree to which it has been prepared with extreme care and safety	1	2	3	4	5
Degree to which it will help me lose weight	1	2	3	4	5
Degree to which it looks good	1	2	3	4	5
The amount of vitamins and minerals in it	1	2	3	4	5
Whether it can be cooked very simply	1	2	3	4	5
How long it takes to prepare	1	2	3	4	5
How similar it is to the food I ate when I was a child	1	2	3	4	5
How much it will help me relax	1	2	3	4	5
Whether I am certain it does not contain harmful bacteria and viruses	1	2	3	4	5
How many artificial additives it contains	1	2	3	4	5
Whether it can be bought in shops close to where I live or work	1	2	3	4	5

Addendum C

Cover letter and consent form for store observation and food basket

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Natural and Agricultural Sciences

23rd October 2017

TO WHOM IT MAY CONCERN

STORE OBSERVATION CHECK LIST AND COST DETERMINATION OF SELECTED FOOD ITEMS AS PART OF A RESEARCH PROJECT ON THE EATING PRACTICES OF ADULTS IN TSHWANE

As part of a research project on the food practices of adults in the Tshwane Metropolitan Area, we would like to find out what type of food products at what price are on offer to consumers in the retail sector in the various areas of the Tshwane Metropole. The research project obtained ethical clearance from the Ethics Committee of the Faculty of Natural and Agricultural Sciences of the University of Pretoria. The ethics clearance number is EC 160318-009.

Please allow Ms Talika Hattingh to conduct the observation by completing the attached observation checklist and price list. It is not required of her to interact with the consumers in store. She only needs to record what is on offer and to record the price of selected items on the list.

Thanking you in advance for your assistance and co-operation.

Yours sincerely

Dr Annemarie Viljoen

Principal Investigator

Department of Consumer Science
Old Agriculture Building, University of Pretoria,
Private Bag X20, Hatfield 0028, South Africa
Tel +27 (0)12 420 2531
Fax +27 (0)12 420 2855
consumer.science@up.ac.za, www.up.ac.za

Fakulteit Natuur- en Landbouwetenskappe
Lefapha la Disaense tsa Tlhago le Temo

FOOD STORE SURVEY

For official use only

Name of store:

Address:

GPS Coordinates:

Researchers:

Floor layout of store

On the grid below, indicate the following by using the following codes:

Mark entrance and traffic flow on the grid
X = Entrance to store
←, →, ↑ = general flow (mark all that apply)

Mark different sections on the grid
1= Fresh produce (Fruit and vegetable section)
2 = Dairy Section (Milk, butter, margarine, cheese)
3 = Meat Section
4 = Bread Section
5 = Alcohol / Liquor Section

A							
B							
C							
D							
1	2	3	4	5	6	7	8

How many cash registers or checkout stands are in the store?

Product observation

A. FRESH FRUIT SECTION

Does the store offer fresh fruits?	Y	N
Where is the fresh fruit section of the store? Record on grid		
Does the store offer the following fresh fruit?	Y	N
Citrus fruit (oranges, lemons, naartjies)	Y	N
Orange-coloured fruit (yellow peaches, mangoes, pawpaw, spanspek, plums)	Y	N
Other fruit (apples, bananas, grapes, pears litchis)	Y	N
What is the price of a 1kg of bananas?		
Does the store offer tinned/canned fruit?	Y	N
Where is the tinned/canned fruit section of the store? Record on grid.		
List all the tinned fruit sold in the store		

B. VEGETABLE SECTION

Does the store offer fresh vegetables?	Y	N
Where is the fresh vegetables section in the store? Record on grid		
Does the store offer the following fresh vegetables?		
White roots and tubers (potatoes, white sweet potatoes)	Y	N
Orange-fleshed vegetables (pumpkin, carrots, butternut, orange-fleshed sweet potatoes)	Y	N
Dark green leafy vegetables (spinach, kale, indigenous green leafy vegetables)	Y	N
Other vegetables (tomatoes, onions, green beans, cabbage, gem squash, peas beetroot, baby marrow)	Y	N
What is the price of a 1kg carrots?		
Does the store offer frozen vegetables?	Y	N
Where is the frozen vegetable section in the store? Record on grid		
Does the store offer the following frozen vegetables?		
Frozen white roots and tubers (potatoes, sweet potatoes)	Y	N
Frozen orange-fleshed vegetables (pumpkin, butternut, carrots)	Y	N
Frozen green leafy vegetables (spinach)	Y	N
Frozen other vegetables (broccoli, green beans, mixed vegetables)	Y	N
Does the store offer tinned/boxed vegetables?	Y	N
Frozen white roots and tubers (potatoes, sweet potatoes)	Y	N
Where is the frozen vegetable section in the store? Record on grid		
List all tinned/boxed vegetables sold in the store		

C. DAIRY SECTION

Is there a dairy section?	Y	N
Record all that apply of milk, cheese or butter on the grid		
Full cream milk	Y	N
2% fat milk	Y	N
Fat free milk	Y	N
Full cream milk	Y	N
Skim milk	Y	N
Low fat dairy products (cottage cheese, yoghurt, cream cheese)	Y	N
Butter	Y	N
Margarine tubs	Y	N
Margarine bricks	Y	N
What is the lowest price for 500g brick margarine?		
List all dairy products sold in the store		

D. MEAT SECTION

Does the store offer meat?	Y	N
Where is the fresh meat section in the store? Record on grid		
Does the store offer lean ground (minced) meat?	Y	N
What is the price of 1kg lean ground (minced) meat?		
Does the store offer pork?	Y	N
Does the store offer mutton/lamb?	Y	N
Does the store offer chicken portions	Y	N
Does the store offer skinless chicken?	Y	N
Does the store offer fresh fish?	Y	N

E. BREAD SECTION

Does the store offer bread?	Y	N
Where is the bread section of the store? Record on the grid.		
Where is the commercial bread section of the store? Record on grid.		
Where is the fresh baked bread section of the store? Record on grid.		
Does the store offer whole grain bread?	Y	N

F. SOFT DRINKS, BEVERAGES AND JUICES

Does the store offer fruit juice and other soft (fizzy) drinks?	Y	N
Where is the soft drinks, fruit and other juices of the store. Record on grid.		
Does the store offer the following soft drinks?		
Fizzy drinks (Fanta, Coca Cola, Sprite)	Y	N
Cordials and concentrates (Oros, Carribean, Wild Island)	Y	N
Fruit juice (Liqui-fruit, Ceres)	Y	N
Does the store offer the following soft drinks?	Y	N

G.OTHER PRODUCT OBSERVATIONS

Does the store offer tobacco products?	Y	N
Where is the tobacco section in the store? Record on grid		
Does the store offer alcoholic beverages ?	Y	N
Where is the alcoholic beverage section in the store? Record on grid		
Does the store offer chocolates and sweets?	Y	N
Where is the sweets section in the store? Record on grid		
Does the store offer biscuits and cookies?	Y	N
Where is the biscuits and cookies section in the store? Record on grid.		

Did you review every item on the check-list?	Y	N

NAME OF OBSERVER:

DATE OF SURVEY:

FOOD STORE SURVEY

NAME OF STORE:
ADDRESS:
GPS COORDINATES:
RESEARCHER:

FOOD BASKET BASED ON NAMC (28 ITEMS) AND VICTORIA, (AUSTRALIA) HEALTHY FOOD BASKET (44 ITEMS FROM 5 CORE FOOD GROUPS AND 1 NON-CORE FOOD GROUP)

BASKET ITEM	RECORDED PRODUCT SIZE		BRAND NAME OF PRODUCT WITH LOWEST PRICE	PRICE
BREADS & CEREALS				
Corn flakes (500g)				
Loaf of brown bread (700g)				
Loaf of white bread (700g)				
Oats (1 kg)				
Spaghetti / macaroni (500g)				
Super maize meal (5 kg)				
Super maize meal (2.5 kg)				
Special maize meal (2.5 kg)				
Weet Bix (450 g)				
White rice (2kg)				
FRUIT				
Apples (1 kg)				
Bananas (1 kg)				
Grapes (1 kg)				
Oranges (1 kg)				
Pawpaw (1 kg)				
Sultanas (250 g)				
Tinned fruit salad in natural juice (410 g)				
Orange juice 100%, no added sugar (2 L)				
VEGETABLES				
Beetroot, fresh (1 kg)				
Butternut, fresh (1 kg)				
Cabbage, fresh (1 kg)				
Carrots, fresh (1 kg)				
Lettuce (medium whole)				
Onions, fresh (1 kg)				
Potatoes, fresh (1 kg)				
Tomatoes, fresh (1 kg)				
Spinach , fresh (bunch)				
Frozen peas (1 kg)				
Tinned corn kernels (mealies) (410 g)				
Tinned beetroot (410 g)				
Tinned tomatoes (410 g)				
LEGUMES				
Tinned baked beans (410g)				
Dried beans (500g)				
Peanut butter (400g)				

BASKET ITEM	RECORDED PRODUCT SIZE		BRAND NAME OF PRODUCT WITH LOWEST PRICE	PRICE
DAIRY, EGGS				
Fresh milk, full cream (1 L)				
Fresh milk, low fat (2 L)				
Long life milk, full fat (1 L)				
Yoghurt, plain, medium fat (1 kg)				
Yoghurt, low fat, flavoured (1 kg)				
Maas (1 L)				
Cheese, cheddar (1kg)				
Eggs large – min 50g (1.5 doz =18)				
MEAT AND ALTERNATIVES				
Beef mince, fresh regular (1 kg)				
Beef offal fresh (1 kg)				
Boerewors (1 kg)				
Chicken, breast, fillets, fresh (1 kg)				
Chicken portions, Individually Quick Frozen (2 kg)				
Chicken giblets (1 kg)				
Fish tinned (pilchards) (400 g)				
Fish frozen hake (800g)				
Ham fresh (1 kg)				
Mutton chops, forequarter (1 kg)				
Polony (1 kg)				
Tinned, Tuna in brine (170 g)				
Tinned, Tuna in sunflower oil (170 g)				
FATS, OILS				
Canola oil (750 ml)				
Sunflower oil (750 ml)				
Margarine, Brick (500g)				
Margarine, tub margarine polyunsaturated (500 g)				
BEVERAGES				
Instant coffee (250g)				
Ceylon / black tea				
Cordials (Oros, Wild island, Carribean) (1 l)				
Fizzy sweetened beverage (coke, sprite) (330 ml)				
NON CORE FOODS				
Sugar white (2.5 kg)				
Biscuits, (Assortment, tennis) (200 g)				
Chocolate bar (Kit Kat) (45 g)				
Potato crisps / chips (150 g)				

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Natural and Agricultural Sciences
Ethics Committee

E-mail: ethics.nas@up.ac.za

Date: 21/07/2016

ETHICS SUBMISSION: LETTER OF APPROVAL

Dr A Viljoen,
Department of Consumer Science
Faculty of Natural and Agricultural Sciences
University of Pretoria

Reference number: EC160318-009
Project title: Investigation of food environments, food practices and dietary intake of adults in Tshwane

Dear Dr Viljoen,

We are pleased to inform you that your submission conforms to the requirements of the Faculty of Natural and Agricultural Sciences Ethics committee on the condition that the only participation of the subjects is as described in the proposal narrative.

Please note that you are required to submit annual progress reports (no later than two months after the anniversary of this approval) until the project is completed. Completion will be when the data has been analysed and documented in a postgraduate student's thesis or dissertation, or in a paper or a report for publication. The progress report document is accessible of the NAS faculty's website: Research/Ethics Committee.

If you wish to submit an amendment to the application, you can also obtain the amendment form on the NAS faculty's website: Research/Ethics Committee.

The digital archiving of data is a requirement of the University of Pretoria. The data should be accessible in the event of an enquiry or further analysis of the data.

Yours sincerely,

p/p **Chairperson: NAS Ethics Committee**

Enjoy a variety of foods.

Be active

Make starchy foods part of most meals.

Eat plenty of vegetables and fruit every day.

Eat dry beans, split peas, lentils and soya regularly.

Have milk, maas or yoghurt every day.

Fish, chicken, lean meat or eggs can be eaten daily.

Drink lots of clean, safe water.

Use fats sparingly. Choose vegetable oils, rather than hard fats.

Use sugar and foods and drinks high in sugar sparingly.

Use salt and food high in salt sparingly.

Floor layout of store

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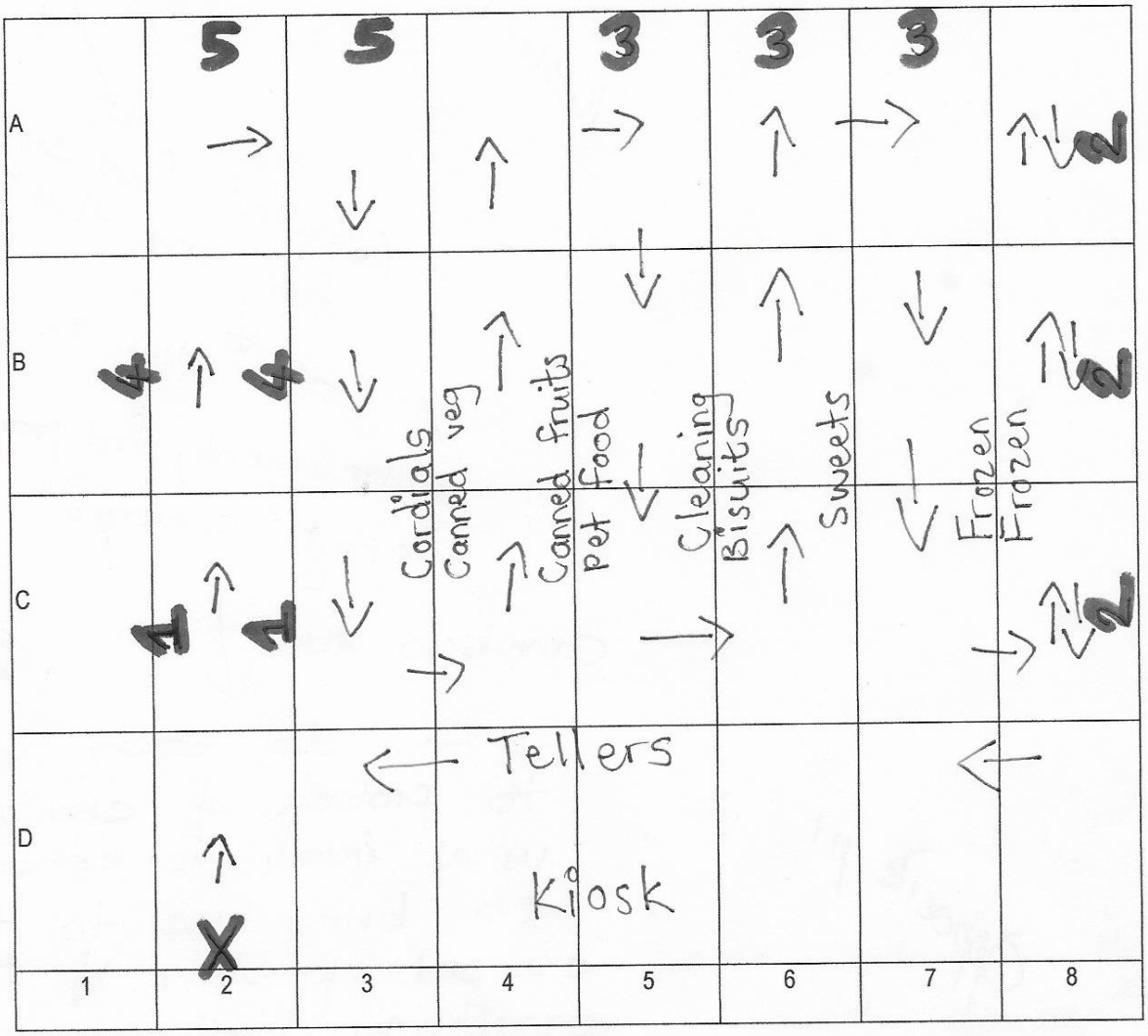

Addendum I

Language editor declaration

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BCom (UNISA)

SA Translators' Institute (SATI)

Membership number: 1002605

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Reference number: **LS1**
Date: 2019/06/11

To whom it may concern,

LANGUAGE EDITING

This letter serves as proof that the following document was submitted for language editing in June 2019.

Author: Lené Smit

Document type: Dissertation

Title: ***ACCESS DIMENSIONS TO THE LOCAL URBAN FOOD ENVIRONMENT OF ADULTS RESIDING IN THE EASTERN SUBURBS OF TSHWANE***

I applied all reasonable effort to identify errors and made recommendations about spelling, grammar, style and punctuation.

I attempted to be consistent regarding language usage and presentation.

The bibliography was also checked and corrections were made where necessary.

I confirmed the content as far as possible, but cannot be held responsible for this as all facts could not be confirmed. This remains the responsibility of the author.

Thank you very much.

Kind regards.

Rentia Mynhardt

An extract from the Turnitin report on the Master's dissertation of Lene Smit (17 September 2019).

The results of the Turnitin 'Originality Report'.

Masters

ORIGINALITY REPORT

16%	16%	5%	%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS