

**Explication of urban South African adults' food practices in relation to their food  
knowledge**

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**DISSERTATION**

**Master's in Consumer Science (General)**

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**Explication of urban South African adults' food practices in relation to their food  
knowledge**

**by**

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Dissertation submitted in partial fulfilment of the requirement for the degree

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Supervisor: Dr AT Viljoen

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## Dedication

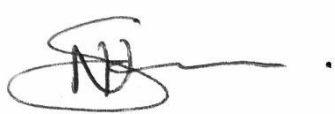
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I humbly dedicate this research project to my lovely parents who have always been there for me and have loved me unconditionally. I also dedicate it to my fellow church members, and I pray that the Lord may richly bless them for their prayers throughout my study. Lastly, I dedicate it to my siblings; they are my best friends and the reason why I keep pursuing more exceptional achievements.

## Declaration

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I **Nomcebo Fortunate Tsambokhulu**, hereby declare that the submitted **dissertation** is my own work in design and execution for a **Master's degree in Consumer Science** at the **University of Pretoria**. It has not been previously submitted for a degree at this university or any other tertiary institution, and all reference material has been acknowledged.



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**NOMCEBO F TSAMBOKHULU**

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**DATE**



## Acknowledgements

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The completion of this dissertation would not have been successful without strength and motivation from The Almighty God. He has blessed and seen me through the most difficult days of my life, and I thank him for giving me supervisors who guided me through this research work. It is with great honour that I extend my greatest gratitude to the following:

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## **Abstract**

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**Title:**                    **Explication of urban South African adults' food practices in relation to their food knowledge**

by

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**Degree:**             **Master's in Consumer Science (General)**

The food practices and food knowledge component of the food literacy of urban South African adults are explored and described, and how compliant their food practices are with the Food Based Dietary Guidelines for South Africa is explicated. Globally, changes in urban consumers' food practices indicate an increase in the consumption of convenient, energy-dense foods which has led to an increase in overweight and obesity. Exploring urban South African adults' food practices will help to identify their usual food choices. Moreover, since food knowledge has been premised to help guide an individual to adopt healthy food practices, there is a need to explore their food knowledge. Since there is limited information available on the food practices and food knowledge of South African urban adults, this study will fill a gap in the literature.

This quantitative, explorative, descriptive, and cross-sectional study used two sets of electronic survey questionnaires to collect data. The first questionnaire consisted of a food literacy scale, including its six dimensions: procurement, financial aspects, consumption, nutrition, food safety and the social aspects of food. The second questionnaire gathered information on the food practices of the study group that included their eating patterns, the diversity of food intake, the number of servings consumed, and the frequency of consumption for selected food groups. A total of 904 urban South African adults completed the questionnaires. The Statistical Package for Social Sciences (SPSS) was used to analyse the data. Descriptive statistics (percentages, means and frequencies), summarised as tables and figures, were used to interpret and present the data.

The study group consumed three meals a day with snacking in-between meals. Eating away from home was done 1-2 times a month at a restaurant, and others enjoyed some meals at their workplace. The study group consumed a diversified diet and attained a Dietary Diversity Score of 6.02 out of nine food groups. Foods such as fast foods, some selected snacks and beverages were seldom or never consumed. The respondents were knowledgeable about all six dimensions of food literacy, and they possessed good declarative and procedural food knowledge since an overall mean score of 80 out of 107 scale items was attained. It was further explained that the food knowledge of the study group contributes positively to their food practices. The study group was knowledgeable of food knowledge scale items measuring aspects relating to their food choice and intake. Most of the food consumption practices of the study group complied with the Food Based Dietary Guidelines for South Africa. An exception was noted for food groups such as starchy food, legumes and nuts, and fruits and vegetables, since only one to two servings of these were consumed a day. The results can be useful to consumer and nutrition facilitators and educators as it can be used to plan and implement food knowledge educational intervention strategies that will help to motivate consumers to make healthy food choices and adhere to good food practices.

**Keywords:**

Food practices, Food literacy, Food knowledge, Declarative knowledge, Procedural knowledge, South African urban adults.

## **ABSTRAK**

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**Titel:** Verduideliking van stedelike Suid-Afrikaanse volwassenes se voedselpraktyke in verhouding tot hul voedselkennis deur

**Outeur:** Nomcebo Tsambokhulu

**Studieleier:** Dr AT Viljoen

**Medestudieleier:** Dr HJ Fisher

**Departement:** Verbruikers- en voedselwetenskappe

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Die voedselpraktyke en voedselkenniskomponent van voedselgeletterdheid van stedelike Suid-Afrikaanse volwassenes word ondersoek en beskryf, en hoe uiteenlopend hul voedselpraktyke is aan die Voedselgebaseerde Dieetriglyne vir Suid-Afrika, word uiteengesit. Wêreldwye veranderinge in voedselpraktyke wat verband hou met 'n toename in die verbruik van gerieflike energiedigte voedsel wat lei tot die opkoms van oorgewig en vetsug, is onder stedelike verbruikers opgemerk. Die verkenning van stedelike Suid-Afrikaanse volwassenes se voedselpraktyke sal help om hul gewone voedselkeuses te identifiseer. Daarbenewens is daar 'n behoefte om hul voedselkennis te verken, aangesien voedselkennis die basis het om 'n individu te help om gesonde voedselpraktyke te gebruik. Daar is beperkte inligting beskikbaar oor die voedselpraktyke en voedselkennis van stedelike volwassenes in Suid-Afrika; hierdie studie vul 'n leemte in die literatuur.

Hierdie kwantitatiewe, verkennende, beskrywende en deursnee-studie het twee stelle elektroniese opname-vraelyste gebruik om data te versamel. Die eerste vraelys bestaan uit 'n skaal vir voedselgeletterdheid, wat die ses dimensies insluit: verkryging, finansiële aspekte, verbruik, voeding, voedselveiligheid en die sosiale aspekte van voedsel. Die tweede vraelys het inligting versamel oor die voedingspraktyke van die studiegroep wat hul eetpatrone, die verskeidenheid voedselinname, die hoeveelheid porsies wat verbruik is en die frekwensie van verbruik vir geselekteerde voedselgroepe, ingesluit het. Altesaam 904 stedelike Suid-Afrikaanse

volwassenes het die vraelyste voltooi. Die Statistiese pakket vir sosiale wetenskappe (SPSS) is gebruik om die data te ontleed. Beskrywende statistieke (persentasies, gemiddeldes en frekwensies) wat as tabelle en figure saamgevat is, is gebruik om die data te interpreteer en aan te bied.

Die studiegroep het drie maaltye per dag geëet met tussendeur maaltye. Uiteet van die huis is 1-2 keer per maand in 'n restaurant gedoen, en ander het 'n paar maaltye by hul werk geniet. Die studiegroep het 'n gediversifiseerde dieet gebruik. 'N Dieetdiversiteitspunt van 6.02 uit nege voedselgroepe is behaal. Voedsel soos kitskos, geselekteerde versnaperinge en drankies word selde of nooit geëet nie. Die respondente het kennis gedra van al die ses dimensies van voedselgeletterdheid en beskik oor goeie verklarende en prosedurele voedselkennis aangesien 'n algehele gemiddelde telling van 80 uit 107 skaalitems behaal is. Daar is verder verduidelik dat die voedselkennis van die studiegroep positief bydra tot hul voedselpraktyke. Die studiegroep het kennis van skaalitems vir voedselkennis, wat aspekte met betrekking tot hul voedselkeuse en inname meet. Die meeste voedselpraktyke van die studiegroep het aan die voedselriglyne vir Suid-Afrika voldoen. 'N Uitsondering is opgemerk vir voedselgroepe soos styselryke kos, peulgewasse en neute, en vrugte en groente, aangesien slegs een tot twee porsies hiervan per dag verbruik is. Die resultate kan nuttig wees vir fasiliteerders en opvoeders vir verbruikers en voedingsmiddels, aangesien dit gebruik kan word om opvoedkundige intervensie-strategieë vir voedselkennis te beplan en te implementeer, wat sal help om verbruikers te motiveer om gesonde voedselkeuses te maak en om goeie voedselpraktyke na te kom.

**Sleutelwoorde:**

Voedselpraktyke, Voedselgeletterdheid, Voedselkennis, Verklarende kennis, Prosedurele kennis, Stedelike Volwassenes in Suid-Afrika

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# Chapter 1

## THE STUDY IN PERSPECTIVE

---

### 1.1 INTRODUCTION AND BACKGROUND

The urban environment is an environment characterised by modernisation, industrialisation, globalisation, and a wide range of technological advancements (Kudryavtseva, 2020; Chukwu & Unya, 2019). Today the urban environment accounts for more than half of the world's population; 394 of the world's cities have a population of more than 1 million residents (Heilig, 2012). Urbanisation (the process of the growth in the number of individuals who move from rural to urban areas) globally is increasing at a fast rate; it is estimated that by 2030, 83% of the developed world, and 53% of the developing world will live in urban areas (McGrane, 2016). It is estimated that by 2050, 75% of the world's population will have urbanised, with most of the urban growth in Africa and Asia (UN-HABITAT, 2015). The rapid increase of urbanisation is causing a threat to the natural resources such as trees and land which can be used for agricultural practices. As more individuals move into cities, the development of infrastructure to provide space, houses and places of employment for those individuals will also increase (Gross, 2016). However, although urbanisation might seem like a threat to the natural environment, it also provides positive change in terms of human development (entrepreneurship, and accumulation of assets). The urban environment provides opportunities for a better life such as social networks for business developments, as well as employment and financial opportunities (Mokoele & Sebola, 2018; Mariama, 2017).

A common trend noticed among urban dwellers is their busy lifestyle as they are more engaged with work and business commitments, school, and other daily responsibilities and commitments (Venn & Strazdins, 2017; Djupegot, Nenseth, Bere, Bjørnará, Helland, Øverby, Torstveit & Stea, 2017; Jabs & Devine, 2006). Due to their busy lifestyle, the knowledge and relationship urban consumers have with food that will ensure their health and well-being, have changed. Consumers are no longer involved in food production, processing, and preparation as they used to before (Goldstein, 2014). These changes have been attributed to influences such as urbanisation, modernisation, globalisation, technological and economic advancements which are increasingly making a wide variety of food available and accessible to consumers. These influences together with the increased need for food that will save time in either the preparation or the consumption thereof, further leads to an increased demand for fast or convenience type of foods by urban dwellers (Brunner, Van der Horst & Siegrist, 2010). Food in the urban environment is usually

obtainable from large supermarkets, butcheries, fruit and vegetable markets, food wholesalers, as well as street vendors (Skinner, 2016). Consumers living in urban areas therefore rely on the urban food environment to provide them with a variety of food products, which is usually constantly available and accessible because of the diverse food sources found in urban areas (Holdsworth & Landais, 2019). Concurrent with higher populations of consumers living in urban areas, a change in food consumption practices has occurred (Wiskerke, 2015). This change in consumption practices is referred to as the nutrition transition. Nutrition transition means that consumers have transitioned from the consumption of whole grain and nutrient-dense foods to the consumption of energy-dense foods high in fats, salt, sugar, and animal protein (Hawkes, Harris & Gillespie, 2017; Popkin, 2017; Popkin, 2015; Belahsen, 2014). Although most urban residents consume a diversified diet, they also frequently consume refined and processed foods which are low in fibre (Popkin, 2017; Wiskerke, 2015). South Africa as a country is regarded to be in the fourth stage of the nutrition transition sequence. This fourth stage is characterised by changes in diet and activity patterns leading to the emergence of overweight and obesity, which is linked with the development of non-communicable diseases such as heart disease, diabetes, cancer, and chronic respiratory disease. Moreover, this fourth stage is also characterised by the variety of environmental exposures as well as technological advancements that affect consumers' physical behaviours (Popkin, Adair & Ng, 2012). These include easy mobility to places of interest such as shopping malls, work, school, and other areas, and more consumers doing office jobs, thus promoting a sedentary lifestyle which increases the statistics of overweight and obese adults (Gitau, Micklesfield, Pettifor & Norris, 2014a).

Being overweight or obese is one of the major health risk concerns globally; it is estimated that by 2030 more than 1.3 billion people worldwide would be affected by this health risk (Okop, Mukumbang, Mathole, Levitt & Puoane, 2016). Phillips, Comeau, Pisa, Stein and Norris (2016), calculated that 13% of the world's adults will be obese and an additional 39% will be overweight. The 2016 South African Demographic and Health Survey reports that 68% of South African women and 31% of South African men are overweight or obese (South African Demographic and Health Survey 2016, 2019:298). These statistics suggest that the food practices of adults are of concern as recent studies indicate that more energy-dense foods high in salt, fats, animal protein, and sugar are consumed by South Africans (South African Demographic and Health Survey 2016, 2019:301-302; Spies, Delobelle, Sanders, Puoane, Hoelzel & Swart, 2016).

The urban environment is a social environment which is closely associated with globalisation, and acculturation, and these have contributed largely towards the food practices of urban dwellers (Kremer & DeLiberty, 2011). According to Foley (2005), food practices emerge from both history and social structures, representing aspects of individual identity and social relations. This means

that food practices are learnt, and they are embedded in an individual through the process of socialisation. Socialisation is the process whereby culturally valued norms of behaviour are taught and passed down from one generation to the next (Fieldhouse, 2013:3). Food practices, therefore, include all food-related behaviours that are typical to an individual or group and how the chosen foods are used (Viljoen, 2009:23). Food practices also includes the cultural, social and economic factors that influence the production, procurement, preparation, serving and consumption of food (Darnton, 2013). Since food practices are learnt, and the process of learning is continuous throughout the individual's lifespan, food practices are therefore bound to change as individuals move through the various life stages or become exposed to other food environments or when they encounter new food cultures or more diverse food options (Anderson, 2014:164). For an individual to make healthy food choices in an environment where diverse food options are found, food literacy has emerged as a possible measure that can help to indicate consumers' knowledge about food and all other aspects involving food and nutrition. Furthermore, food literacy also addresses and redefines the relationship consumers have with food (Colatruglio & Slater, 2014). Food literacy refers "to an individual's knowledge, skills and behaviour as demonstrated through the sourcing, consumption as well as the nutritional, economic, safety and social aspects of food" (Fisher, Erasmus & Viljoen, 2019).

Nowadays, as more women are employed outside of the home and pursue demanding careers that may require them to spend a considerable amount of time travelling to and from work, time to prepare food from scratch is limited, causing women to prepare fewer home cooked meals (Stroebe & van Schalkwyk, 2012:159,160). This is believed to have largely contributed to modern urban consumers' lack of food-related knowledge and food preparation skills (Wijayarathne, Reid, Westberg, Worsley & Mavondo, 2018). Food preparation skills and knowledge about where food comes from, and how to use certain food products, seem to be lacking among many consumers (Burton, Riddell & Worsley, 2018; Fordyce-Voorham, 2009). The decline in food preparation skills has thus increased the consumption of food away from home and of ready-to-eat or instant meals (Slater, Falkenberg, Rutherford & Colatruglio, 2018). The lack of the necessary knowledge and skills to prepare healthy meals from scratch using fresh food produce has become a matter of concern as it leads to consumers becoming increasingly dependent on highly processed convenience foods that are often high in energy, fats, sugars and/or salt (Wijayarathne *et al.*, 2018). Some consumers consume food only for survival, which is acquired when and where needed. For others it is acquired for convenience without giving much thought or concern to its origin and nutritional value, whereas there are also consumers for whom food is a significant source of emotional gratification, pleasure, reward or celebration (Wijayarathne *et al.*, 2018; Bublitz, Peracchio, Andreasen, Kees, Kidwell, Miller, Motley, Peter, Rajagopal & Scott, 2011). In addition, some consumers nowadays also experience external influences such as work or school stress,



not getting enough sleep, and psycho-social stress, all of which further contribute towards their unhealthy food choices. Only a small population of consumers manage to make healthy food choices in different contexts and situations; such consumers are considered to be food literate (Poelman, Dijkstra, Sponselee, Kamphuis, Battjes-Fries, Gillebaart & Seidell, 2018).

Although food literacy as a research topic has recently received much attention in the scientific and professional literature, there is still no common understanding and consensus about the conceptualization and definition of this concept (Palumbo, 2016; Velardo, 2015; Fordyce-Voorham, 2015; Colatruglio & Slater, 2014; Goldstein, 2014). Food literacy researchers, however, prefer and use Vidgen and Gallegos' (2014) definition of food literacy, according to which food literacy includes components of knowledge, skills, and behaviour. This implies that consumers who are food literate will not only possess some knowledge regarding food and nutrition, but they will also have the skills to select and prepare healthy food. Moreover, a food literate individual will be empowered to change their food behaviour and will thus over time show resilience towards unhealthy food habits. As mentioned earlier, food literacy has emerged as a possible measure that can help indicate an individual's food related knowledge, skills, and behaviour (Wijayarathne *et al.*, 2018).

Food knowledge as a component of food literacy can help guide an individual to be competent in selecting, preparing, and consuming food in a healthy manner (Colatruglio & Slater, 2014). Various factors influence an individual's food knowledge. These include age, gender, level of education, and to some extent their socio-economic status. As a person gets older, their food related knowledge advances. Regarding gender and level of education, women are regarded to possess more food related knowledge than men. Consumers who are more educated and those who received home economics education in school usually have more food knowledge than those with a lower educational level and those with no home economics education. It is further perceived that consumers of low socio-economic status possess less food knowledge compared to those of a middle or high socio-economic status (Leyvraz, Mizéhoun-Adissoda, Houinato, Moussa Baldé, Damasceno, Viswanathan, Amyunzu-Nyamongo, Owuor, Chiolero & Bovet, 2018; Omari, Quorantsen & Omari, 2017; Parrish, Worsley, Yeatman & Sadegholvad, 2016; Worsley, Wang, Yeatman, Byrne & Wijayarathne, 2016). However, current reports on the high prevalence of overweight and obesity among adults due to a sedentary lifestyle, coupled with the consumption of convenient, processed foods low in whole grains and dietary fibre, indicate that regardless of their knowledge, consumers are no longer motivated by their knowledge and skills to adopt healthy food behaviours (Wijayarathne *et al.*, 2018). The measurement of food literacy can assist to indicate how knowledgeable consumers are about food, and it can also assist to indicate gaps in their food knowledge (Poelman *et al.*, 2018). The information after the measurement of food

literacy can be used to develop education and training interventions for aspects which consumers lack knowledge on. The education and training interventions can also be used to encourage consumers to eat a diversified diet regardless of their environmental context.

Consuming a diversified diet is encouraged for all consumers, regardless of age, gender, food environment, and socio-economic status. Dietary diversity refers to the consumption of a variety of foods from different food groups. Dietary diversity is encouraged because there is no single food that provides all the nutrients that an individual requires. Moreover, dietary diversity can help to mitigate diet-related diseases such as overweight and obesity and non-communicable diseases (Faber, Wenhold & Laurie, 2017; Habte & Krawinkel, 2016; Drimie, Faber, Vearey & Nunez, 2013). Dietary diversity is a key requisite for obtaining individual nutritional adequacy and its importance is confirmed in the Food Based Dietary Guidelines for South Africa. The Food Based Dietary Guidelines for South Africa are science-based short guidelines that were formulated to help guide South Africans towards the consumption of local healthy foods that meet their nutritional requirements (Vorster, Badham & Venter, 2013a). Exploring and describing the food practices and food knowledge of urban South African adults will thus help to identify how diverse their diet is, and how food literate they are regarding different aspects related to food. Furthermore, exploring the urban South African adults' food practices and food knowledge will further give an indication of how compliant their food practices are with the Food Based Dietary Guidelines for South Africa.

## **1.2 PROBLEM STATEMENT**

Globally a substantial number of individuals are considered to be malnourished, either through the over-consumption of foods (excessive intake of foods high in energy but low in micronutrients) or through the under-consumption of food due to poverty and food insecurity (Cullen, Hatch, Martin, Higgins & Sheppard, 2015). High rates of overweight and obesity among urban dwellers arise through the over-consumption of food (Chooi, Ding & Magkos, 2019; Hanson, Munthali, Lundeen, Norris & Stein, 2017; Poulidou & Elliott, 2010), through the shift away from the consumption of traditional whole grain foods and fresh food produce towards the consumption of more processed and convenience types of foods which are more energy-dense. Moreover, lifestyle changes observed in urban dwellers include a sedentary lifestyle due to the rise in office-related jobs as well as the technological advancements associated with the urban environment (Popkin *et al.*, 2012). This shift in food consumption practices, as well as an increasingly sedentary lifestyle, has thus led to the emergence of overweight and obesity among a substantial number of consumers in urban areas (Popkin, 2017).

Although consumers appear to be concerned about their health and wellness, they seem to lack knowledge about how the food they choose and consume will affect their health and well-being. Consumers seem to lack the necessary food-related knowledge, skills, attitudes, and values to select and prepare healthy food (Wijayarathne *et al.*, 2018). Research has proven that consumers with the necessary food preparation skills to cook their own meals are more likely to select and consume healthy food. Food preparation and cooking skills are acquired through food knowledge. Food knowledge, therefore, is the prerequisite for the adoption of healthy food practices (Slater *et al.*, 2018; Wijayarathne *et al.*, 2018; Worsley *et al.*, 2016; Hartmann, Dohle & Siegrist, 2013).

However, due to the urban lifestyle of being engaged with work, school, and other social activities, time for food preparation and cooking meals from scratch has decreased. Because urban consumers are time constrained, they increasingly rely on convenient food options (Djupegot *et al.*, 2017; Venn & Strazdins, 2017; Jabs & Devine, 2006). This need for convenience among urban consumers has caused a decline in food knowledge (Wijayarathne *et al.*, 2018). Urban consumers seem to be concerned about other life engagements (work, meeting deadlines, making money) and are less concerned about aspects related to food, health and nutrition education as they rely on the food industry to cater for their food needs (Goldstein, 2014; Bublitz *et al.*, 2011). A new approach to food is, therefore, required to educate consumers to ensure food literate and well-nourished populations (Colatruglio & Slater, 2014).

The South African Demographic Health Survey 2016 reported that 68% of adult South African women and 38% of adult South African men in urban areas are overweight or obese (South African Demographic and Health Survey 2016, 2019:299). Non-communicable diseases (diabetes, cancer, stroke, and cardiovascular diseases) which are caused by diet-related practices accounted for an estimated 51% of all deaths in South Africa in 2016 (World Health Organisation, 2016). These statistics do not only indicate a major concern regarding the food practices and food knowledge of South African adults, but also that South Africans are not complying with the Food Based Dietary Guidelines for South Africa. It is, therefore, essential to know how food literate South African consumers are, and how they apply their food knowledge (including aspects of access, choice, use and understanding of a food product) to their food practices.

Since knowledge about the food literacy of urban South African adults and how it contributes to their food practices is limited, this study aims to explore the food knowledge component of South African adults' food literacy and how this informs their food practices. The main research question for this study will thus focus on what the food practices and food knowledge of South African urban adults are, and how compliant their food practices are with the Food Based Dietary Guidelines for South Africa. This study forms part of the second phase of a larger research project

that aimed to develop a South African food literacy scale (National Research Foundation grant no. 93743). This Master's study, however, only focused on the food knowledge component of the food literacy scale.

### **1.3 JUSTIFICATION OF THE STUDY**

This study contributes to filling the gap regarding the information on the food knowledge of urban South African adults and how it contributes to their food practices. There is a lack of data on the food practices and food knowledge of South Africans in literature. Most studies with information on these concepts are outdated or are reporting on a specific issue or South African group (Hill, Mchiza, Puoane & Steyn, 2019; Kupolati, MacIntyre & Gericke, 2019; Mchiza, Steyn, Hill, Kruger, Schönfeldt, Nel & Wentzel-Viljoen, 2015; Oldewage-Theron, Egal & Moroka, 2015; Peltzer, 2004a; Walsh, Dannhauser & Joubert, 2003; Peltzer, 2002; Steyn, Senekal, Brits & Nel, 2000). This posed a challenge on the information on food practices and food knowledge of urban South African adults as related to this study. The study also provides insight into how compliant the food practices of the study group are with the Food Based Dietary Guidelines for South Africa, which is another aspect that has not been explored among South Africans. This study will, therefore, provide valuable information to consumer facilitators and nutrition educators on the food practices and food knowledge of urban South African adults, and how well their food practices comply with the Food Based Dietary Guidelines for South Africa.

The high prevalence of obesity and overweight among especially urban South African adults, as reported in the South African Demographic and Health Survey 2016, indicates that South Africans are not fully complying with the Food Based Dietary Guidelines for South Africa. The health survey also reported that although residents from urban areas eat a diversified diet including fruits and vegetables, they also consume large quantities of energy-dense foods high in salt, sugar, fat, and processed meat (South African Demographic and Health Survey 2016, 2019:298-302). Results from this study will, therefore, assist in determining if consumer facilitators and nutrition educators need to implement any intervention programs that will help guide adult South African consumers to resist or reduce the consumption of unhealthy foods. Since food knowledge is perceived to help guide and motivate consumers towards adopting healthy food practices, these intervention programmes can focus on food knowledge education and could motivate consumers to strive to comply with all the Food Based Dietary Guidelines for South Africa. However, the diversity of food options in the urban environment, can constrain the adoption of healthy food practices (Herforth & Ahmed, 2015; Caspi, Sorensen, Subramanian & Kawachi, 2012; Hearst, Pasch & Laska, 2012). Moreover, the time constraints associated with busy lifestyles cause urban dwellers to seek convenient food options to cater for their busy lifestyles (Venn & Strazdins, 2017; Jabs & Devine,

2006). An understanding of the food practices of urban consumers as well as how knowledgeable they are about the food they consume is thus required.

The following section below gives a review of the research outline of the study.

#### **1.4 RESEARCH AIM AND OBJECTIVES**

The aim of the study is to explore and describe the food practices and the food knowledge component of food literacy of South African urban adults. Furthermore, the study aims to explicate the study group's food practices in relation to their food knowledge and how compliant their food practices are with the Food Based Dietary Guidelines for South Africa. The broad objectives formulated to guide the research were:

1. To explore and describe the food practices of urban adults.
2. To explore and describe the food knowledge component of food literacy of the study group.
3. To explicate the study group's food practices in relation to their food knowledge and how compliant their food practices are with the Food Based Dietary Guidelines for South Africa.

#### **1.5 RESEARCH DESIGN AND METHODOLOGY**

This study is explorative, descriptive, and cross-sectional, employing a quantitative research design. Data was collected electronically using pretested online survey questionnaires. According to the researcher's knowledge, this topic on the explication of urban South African adult's food practices in relation to their food knowledge as well as their compliance to the Food Based Dietary Guidelines for South Africa has not been researched before.

#### **1.6 DATA COLLECTION**

This study formed part of a PhD study that aimed to develop and validate a food literacy measuring instrument for South Africans (Fisher, 2019:91,119,146-163). Two sets of questionnaires were used to collect data. The first questionnaire answered by the respondents dealt with the food literacy of the study group, which was part of the PhD study. The second questionnaire dealt with the food practices of the study group. The services of a research company, Consulta Pty (Ltd), which specialises in consumer-related research, were secured to collect the data. The research company has access to a comprehensive database of South African consumers, from which respondents who were 18 years and older were identified to participate in this study. A link containing the two sets of questionnaires was sent out to respondents, who gave their informed consent to participate in the study. The first questionnaire was the food literacy scale, which was completed by 1 657 respondents. These respondents were

further asked to complete the second questionnaire on their food practices, and 904 respondents (which is the sample size used in this study) did so.

## **1.7 DATA ANALYSIS**

Before data analyses, the raw data received from the study's respondents was cleaned and edited for completeness. After that, the first frequency analysis was performed whereby data was captured in a Microsoft Excel spreadsheet. The Statistical Package for Social Sciences (SPSS) version 24 was used to analyse the data. Descriptive statistics were used (percentages, means, standard deviation, and frequencies), and tables and graphs were used to present the results. This method of data analysis made it easier to describe and discuss the results and to present the results clearly in an understandable manner.

## **1.8 DELIMITATIONS OF THE STUDY**

This study was confined to South African urban adults who were 18 years of age and older and who gave their informed consent to participate in the study. In order to be able to fill out the questionnaires, the respondents had to be in the Consulta Pty (Ltd) database and have access to a computer.

## **1.9 OUTLINE OF THE RESEARCH REPORT**

### **1.9.1 Chapter 1: The study in perspective**

The introductory chapter gives the background for the study, and introduces the problem statement, justification of the study, as well as the aims and objectives of the research study. A brief overview of the research design and methodology is also presented in this chapter. Following is a summary of the chapters that reflect the structure of this dissertation.

### **1.9.2 Chapter 2: Literature review**

Two theoretical models, namely the human ecological model and the food choice process model, are discussed in this chapter. These models provide a holistic approach in relating people (consumers) to their different environments and the processes involved when choosing food. The human ecological model provides a framework for how consumers interact and interrelate with different environments; namely the natural/physical environment, economic and political environment, socio-cultural environment, and the individual environment. Each of these environments explains the constraints and opportunities of food choice as part of food practices. The food choice process model also provides a framework that explains food choice from an



individual's perspective. This model illustrates the different influences that guide individual food choice. Following that is a discussion of food literacy and the food knowledge component of the food literacy concept. Other aspects, such as adulthood as a life stage, the urban environment, and the urban food environment, are discussed. The South African adults' food practices, as well as the Food Based Dietary Guidelines for South Africa and dietary diversity, are included and discussed in order to contextualise their use in this study.

### **1.9.3 Chapter 3: Research methodology**

The research methodology is presented and described in this chapter, providing information on the research design, and the research aim and objectives. The conceptual framework with the main concepts used in the study and the operationalisation and development of the measuring instrument are explained. The study area and population, the sample and sampling method, data collection, data analysis and data quality as a means to combat possible errors in this research process are also dealt with in this chapter. Ethical considerations to ensure anonymity and confidentiality are explained.

### **1.9.4 Chapter 4: Results and discussion**

The results and discussion are given in this chapter. The demographic profile of the study group is presented first, followed by the food practices of the respondents gleaned from accounts of their usual eating patterns, the diversity of the foods consumed, the number of servings consumed a day, and the frequency of consumption of selected groups of foods as well as beverages, snack, and fast foods. Furthermore, this chapter discusses the study group's results on the food knowledge component of food literacy, i.e. their declarative and procedural component of food literacy. Lastly, the study group's food practices in relation to their food knowledge and how compliant their food practices are with the Food Based Dietary Guidelines for South Africa are explicated.

### **1.9.5 Chapter 5: Conclusion, evaluation, and recommendations of the study**

This is the final chapter of the study, which reports on the conclusions drawn from the reported findings of the study. The research done is evaluated, and the implications of the results found are documented. Recommendations and suggestions for future research are made.

## **1.10 CHAPTER CONCLUSION**

This introductory chapter has presented the research background, the problem statement and justification for the study. It included the research objectives, research methodology,

delimitations of the study, and the outline of the structure of the study. The next chapter is the literature review of the study, in which the theoretical models of the study are discussed. The different environmental factors, both external and internal, that influence the food choice and food practices of consumers, are also addressed. Furthermore, the food literacy concept, food knowledge and the food practices of South African adults are discussed.



## Chapter 2

# LITERATURE REVIEW

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### 2.1 INTRODUCTION

This chapter presents the theoretical models used for this study and gives an overview of the literature on food practices and the concepts related to it. The food literacy concept is also discussed, and the food knowledge component of food literacy is given and discussed in relation to the study. Concepts related to the study such as adulthood as a life stage, the urban environment, and food practices of urban South African adults, Food Based Dietary Guidelines for South Africa, and dietary diversity are also presented and discussed.

### 2.2 SELECTING A THEORETICAL MODEL

Various frameworks, models and approaches are used to explain the food choice process. Researchers have viewed the food choice process from various perspectives, including the biological, ecological, and socio-psychological (Winter & Burholt, 2018; Rodriguez & Maraj Grahame, 2016; Hardcastle, Thøgersen-Ntoumani & Chatzisarantis, 2015; Mercer, Johnstone & Halford, 2015; Gaudin, Receveur, Walz, Girard & Potvin, 2014; Moore, de Silva-Sanigorski & Moore, 2013; Fiese & Jones, 2012). A theoretical framework or model is regarded as the “blueprint” that guides and supports a study (Grant & Osanloo, 2014). A framework aims to map various incongruent concepts coherently, to represent all important elements in relation to each other. In contrast, a model is more integrated and illustrates how the elements operate together (Sobal, Bisogni, Devine & Jastran, 2006:14). This study made use of two theoretical models, namely the human ecological model which was applied in a study by Viljoen (2009:23), and the food choice process model referred to by Sobal and Bisogni (2009).

The human ecological model was used in this study because various scholars in the field of food choice research theorise that the human ecological model provides a comprehensive framework for understanding environmental influences on the food choice process (Sallis, Owen & Fisher, 2015; Story, Kaphingst, Robinson-O'Brien & Glanz, 2008). The food choice process model illustrates how individuals make their food choice decisions. The model also illustrates the concepts underlying the food choice process from an individual or personal perspective (Sobal, Bisogni & Jastran, 2014; Sobal & Bisogni, 2009; Furst, Connors, Bisogni, Sobal & Falk, 1996).

The food choice process model was first developed by a group of researchers from Cornell University in the United States of America in 1996 (Cornell Food Choice Research Group, 2012). Qualitative research techniques were used to collect data from participants. The data collected from participants were then compiled to develop a conceptual model that made it easier to understand the complex and dynamic processes involved when an individual makes their daily food choices (Furst *et al.*, 1996). The use of the food choice process model, together with the human ecological model in this study, will assist in explaining how the South African urban environment influences adults' food practices.

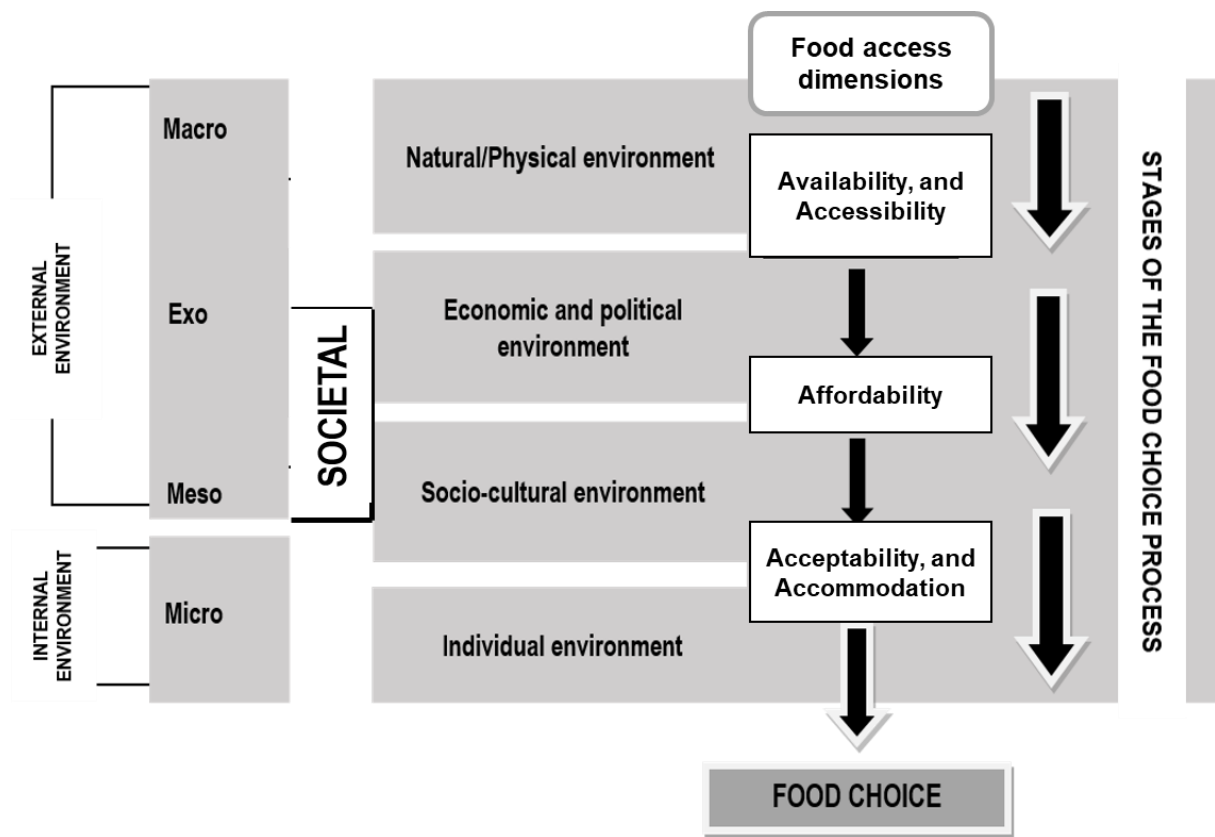
## **2.3 THE FOOD CHOICE PROCESS**

The food choice process is a diverse, interrelated, dynamic and complex process that forms an integral part of food practices (Sobal *et al.*, 2014). The food choice process is explained, employing both the human ecological model and the food choice process model to discuss the dynamics of this process. An illustration of the human ecological model is given first. The different environments of the human ecological model that influence food choice are then discussed. The ecological model gives the different environments which humans interact and interrelate with. These different environments are interrelated and provide simultaneous opportunities and constraints for human food consumption. To further discuss the diversity and complexity of the food choice process, the second model presented is the food choice process model. This model focuses on the individual in explaining the personal influencing factors that guide individuals into making daily food choices as part of their food practices. Food practices, therefore, include all food-related behaviours that are typical to an individual or group and how the chosen foods are used (Viljoen, 2009:23). Food practices also include the cultural, social and economic factors that influence the production, procurement, preparation, serving and consumption of food (Darnton, 2013). The process of food choice, therefore, also forms part of an individuals' food practices, including all the influencing factors (external and internal) that lead to an individuals' final food choice.

### **2.3.1 Human ecological model**

The human ecological model acknowledges the different environments which individuals interact with. These environments are grouped into external and internal environments. The external environment includes the natural/physical (macro-), economic and political (exo), and the socio-cultural (meso-) environments, whereas the internal environment refers to the individual (micro) environment. Apart from the environmental factors, the dimensions of food availability, accessibility, affordability, accommodation, and acceptability also guide food choice decisions.

Fig 2.1 shows the different interrelated environments which individuals interact with and that guide their food choices.



**FIGURE 2. 1: ENVIRONMENTAL LEVELS CONTRIBUTING TO THE FOOD CHOICE PROCESS. Adapted from Viljoen (2009:23)**

### 2.3.1.1 External environment

The external environment includes the natural/physical (macro-), economic and political (exo-), and the socio-cultural (meso-) environments. Each of these environments is discussed below.

#### 2.3.1.1.1 The natural/physical environment

The natural/physical environment includes both the natural and physical environment. The natural environment refers to naturally occurring phenomena such as climate and seasonal changes, soil, water, resources, and plant and animal life. The physical environment refers to the human-built environment, which includes aspects such as; “urban design and its physical elements”, urban land use, location and density of residential areas including commercial, industrial, transportation system and roads (Pomponi & Moncaster, 2017; Rupp, Vásquez & Lamberts, 2015; Bryant, DeWalt, Courtney & Schwartz, 2003:11). The natural/physical environment has a

significant influence on consumers' food choices. This environment contributes to the availability and accessibility of food, either through agricultural practices or from the diversified food outlets and services such as fast-food outlets, restaurants, street vendors, vending machines, supermarkets, convenience stores, and modes of transportation (Mackenbach, Rutter, Compennolle, Glonti, Oppert, Charreire, De Bourdeaudhuij, Brug, Nijpels & Lakerveld, 2014).

The natural/physical environments thus create opportunities and constraints on what consumers can choose to eat (Mercille, Richard, Gauvin, Kestens, Shatenstein, Daniel & Payette, 2016; Mackenbach *et al.*, 2014; Popkin, Duffey & Gordon-Larsen, 2005; Barker, 2004:11; Story, Neumark-Sztainer & French, 2002). Food might be made available and accessible for consumers' everyday consumption. However, constraints such as affordability, which is influenced by the economic environment, and acceptability, which is influenced by the socio-cultural environment may still hinder consumers' food choices.

#### 2.3.1.1.2 *Economic and political environment*

The economic and political environment refers to the ways humans are organised and stratified within groups and communities (Bryant *et al.*, 2003:13). The economic environment determines the cost of goods in the retail environment, including food. The costs of food influence food decision-making and choice. The economic environment, therefore, may constrain or provide consumers with opportunities to consume or choose healthy or unhealthy foods depending on the affordability of the diverse food options together with availability and acceptability of those foods (McGill, Anwar, Orton, Bromley, Lloyd-Williams, O'Flaherty, Taylor-Robinson, Guzman-Castillo, Gillespie & Moreira, 2015; Williams, Abbott, Thornton, Worsley, Ball & Crawford, 2014; Monsivais, Aggarwal & Drewnowski, 2014; Drewnowski, Monsivais, Maillot & Darmon, 2007). Fruits and vegetables, as well as meat and dairy products, are perceived as more expensive in comparison to energy-dense fast/take-out foods (Jones, Tong & Monsivais, 2018b; Daniel, 2016). These energy-dense foods are also perceived to be more filling and tasteful. Consumers therefore tend to consume the more filling and tasteful foods because of their affordability and accessibility (Jones *et al.*, 2018b; Daniel, 2016; Darmon & Drewnowski, 2015; Cannuscio, Hillier, Karpyn & Glanz, 2014a; Story *et al.*, 2008).

Since consumers' economic power determines how much could be spent on food, the cost of a food item is thus a salient determinant of whether to purchase a specific food item. Consumers with a high income have been reported to eat more fruits and vegetables, and they also have a larger variety of food options to choose from and purchase. In comparison, consumers with a low income seem to consume fewer fruits and vegetables and more energy-dense foods because of their affordability (Miller, Yusuf, Chow, Dehghan, Corsi, Lock, Popkin, Rangarajan, Khatib & Lear,

2016; Bertoia, Mukamal, Cahill, Hou, Ludwig, Mozaffarian, Willett, Hu & Rimm, 2015; Jack, Neckerman, Schwartz-Soicher, Lovasi, Quinn, Richards, Bader, Weiss, Konty & Arno, 2013; Morland & Filomena, 2007).

The political environment, on the other hand, governs policy and legislation regarding the distribution, marketing, and sale of food, and this affects food consumption because of the laws and regulations that govern food trade. Multinational food companies' marketing strategies and distribution networks influence what is available to purchase, and the price at which these products are offered (Ronquest-Ross, Vink & Sigge, 2015; Igumbor, Sanders, Puoane, Tsolekile, Schwarz, Purdy, Swart, Durão & Hawkes, 2012; Bryant *et al.*, 2003:13-14). For example, the sugar tax that was implemented in 2018 in South Africa caused a price increase in sugar-sweetened beverages, a change which was designed to lead to a decrease in the consumption of these products (Nel & Musingadi, 2019; Stacey, Mudara, Ng, van Walbeek, Hofman & Edeka, 2019).

### 2.3.1.1.3 *Socio-cultural environment*

The concept 'socio-cultural' encompasses two concepts - social and cultural - which are interdependent and inseparable. Social refers to society and is described as a group of people interacting in a common territory and who have shared beliefs, characteristic relationships, and a common culture (Heron, Penny, Paine, Sheath, Pedersen & Botha, 2001:24). Culture, on the other hand, is a learned behaviour, acquired through socialisation. A definition of culture originally from Taylor (1871:1), and referred to by Fieldhouse (2013:2), states that "culture is that complex whole which includes knowledge, beliefs, art, morals, law, customs, and any other capabilities and habits acquired by men as a member of society". Furthermore, Fieldhouse (2013:2) states that culture is a person's way of life, acquired through social heritage, meaning it is passed on from generation to generation within a specific social group. Food is a cultural as well as a social object. Food is a cultural object because consumption of certain foods that are deemed appropriate for a certain cultural group is taught to succeeding generations, and those learned food behaviours are usually long-lasting (Fieldhouse, 2013:2). The socio-cultural environment, therefore, significantly influences individual food choice and food practices because individuals tend to consume foods that are culturally acceptable to them.

Culture is dynamic, and it changes over time as new or different information and developments emerge, and circumstances change (Cohen, 2014; Fieldhouse, 2013:2; Bryant *et al.*, 2003:12). Further, culture as a concept consists of three components, namely: technology, social organisation, and ideology (Bryant *et al.*, 2003:12). Technology refers to the knowledge, practices, and tools a group of people use to adapt the physical environment to meet their needs.

It includes the tools and techniques a society uses for producing, processing, and preparing food. Social organisation refers to the way a social group organises its members into families, social strata, communities, and other groupings. It also involves ways in which food and other goods are exchanged. Lastly, ideology refers to “the sum of knowledge, attitudes, beliefs, including customs and taboos affecting the behaviour of a given group” (Fieldhouse, 2013:30). Ideology also refers to symbolic meanings and associated values that a group of individuals share regarding specific foods (Bryant *et al.*, 2003:13). Ideology includes values, attitudes, beliefs, and knowledge. Each of these is briefly explained.

**Values:** A value can be defined as a person’s life-guiding principles, and they act as fundamentals in any human action (Hernes & Metzger, 2017). Values are important in self-definition and in food choices, and provide cognitive scripts for food behaviour (Hauser, Jonas & Riemann, 2011; Connors, Bisogni, Sobal & Devine, 2001).

**Attitudes:** An attitude can be defined as a person’s state of mind and or belief about something or someone. Attitudes, therefore, are influenced by a person’s beliefs, and these beliefs are embedded into a person by their culture, and they influence the way a person behaves in a given situation (Petty, 2018:7; Best & Mayerl, 2013). For example, if a person goes to a certain event and they get served food which is against their cultural beliefs, the person will have a negative attitude towards that food. Their negative attitude towards the food will cause them to decline that food and ask to be served something else which supports their cultural beliefs or which they are familiar with. An attitude is made up of three components, namely the cognitive, affective, and conative components. The cognitive component refers to the information or belief a person has about food. The affective component refers to the feelings of like or dislike towards food, while the conative component relates to a certain way of behaviour (Eiser & van der Pligt, 2015:17, 22).

**Beliefs:** “A belief is the acceptance of facts, statements or sets of circumstances. It is a firmly held conviction, strong enough to affect attitudes and values because a belief represents, in one's view, a fundamental truth” (Petty, 2018:7; Best & Mayerl, 2013). Each society has a set of beliefs about food and has fixed conceptions on how it affects the human body. Beliefs individuals have about health-related aspects of food influence their food choices and their acceptability (Anderson, 2014:145). For example, if a person believes that foods high in carbohydrates are not healthy, that person will restrict their consumption of foods high in carbohydrates.

**Knowledge:** “Knowledge can be defined as a combination of experiences, values, and contextual information. Knowledge is learned behaviour and can be embedded in a person’s mind during the course of their life” (Ismail, Yousif & Fraidoon, 2007). Individuals gain knowledge about

values, social, cultural, and psychological meanings and uses of food through the process of socialisation. Socialisation is an on-going process which involves direct teaching and learning of cultural and social norms of behaviour. This process is passed down from generation to generation (Fieldhouse, 2013:3; Macionis, 2013:141). Through the process of socialisation, a person learns life-long eating habits. Learnt eating habits are acquired from childhood through customs and traditions (Fieldhouse, 2013:4). The process of socialisation and learning of culturally acceptable food habits are acquired in an individual's different life stages. Fieldhouse (2013:4) theorises that there are three processes of socialisation and learning of food habits from the time a person is born to the time they reach old age. These include primary socialisation, secondary socialisation, and resocialisation. Primary socialisation is the acquisition of food habits from birth to infancy. The person acquires knowledge about cultural norms and food habits from family members. Secondary socialisation is acquired from childhood to early adulthood. The person acquires knowledge about cultural norms and food habits from friends, school, church, workplace, and the media. Resocialisation is acquired in adulthood or middle-age to old-age. Resocialisation is influenced by a change in a person's life, that is a change of environment and or social status. Resocialisation can also occur at any stage of a person's life cycle. The process of socialisation, therefore, is an important form of passing on knowledge about cultural values and food habits from generation to generation (Fieldhouse, 2013:4,140).

Culture, therefore, exerts significant influence on consumers' everyday food choices, based on the cultural beliefs, values, attitudes, and knowledge that they have towards food (Bryant *et al.*, 2003:12-13). In the next section, the internal or individual environment is explained.

### **2.3.1.2            *The individual environment***

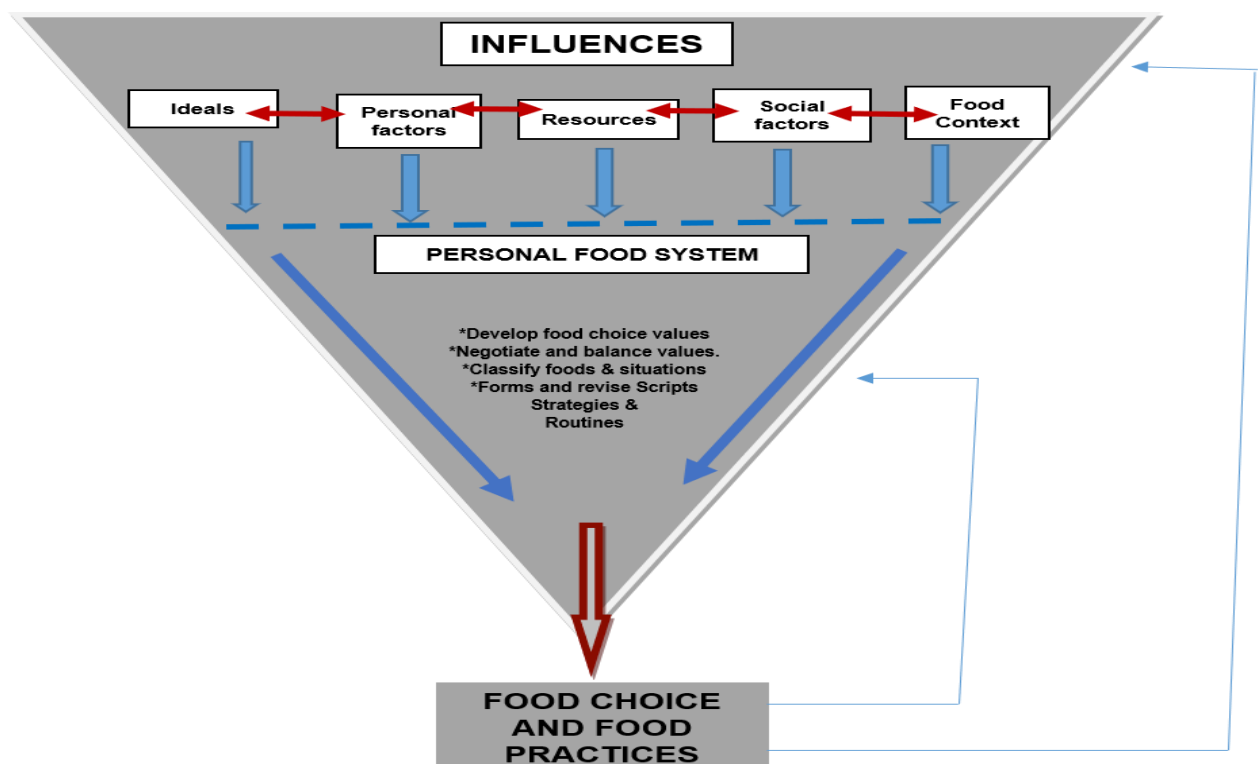
This environment is also referred to as the personal or internal environment. Even though food choice is influenced by external environmental factors, internal factors also play a role. This is because an individual makes personal or individual decisions. Individual food choices are influenced by psychosocial factors such as attitudes, beliefs, knowledge, and values. These factors are influenced by the socio-cultural environment, meaning a person's culture and who they socialise with influence their food choice decisions. Those mentioned above, together with physiological and biological factors (i.e. taste, sensory perceptions of food, health and nutrition, hunger, gender, and food preference) and other factors such as the symbolic and functional meanings of food, lifestyle, time and convenience, all guide individual food choice (Story *et al.*, 2002). Moreover, individual food choices are guided by personal thoughts, feelings and actions related to food and eating, and also what the individual has learnt to adopt as socially and culturally acceptable (Bisogni, Bostic, Sobal & Jastran, 2016:102). Social and cultural interactions



with family, peers, colleagues, and other individuals play a role in personal food choices (Furst *et al.*, 1996).

### 2.3.2 The food choice process model

The internal environment will be discussed by means of the food choice process model as adapted from Sobal & Bisogni (2009). The food choice process model is a comprehensive way of explaining habitual and unconscious, as well as conscious food choices (Sobal *et al.*, 2014; Sobal & Bisogni, 2009; Sobal *et al.*, 2006; Connors *et al.*, 2001; Furst *et al.*, 1996). Figure 2.2 gives a representation of the model.



**FIGURE 2.2: A FOOD CHOICE PROCESS MODEL. Adapted from Sobal and Bisogni (2009)**

For the purpose of this study, only two of the three major components of the food choice process model of Sobal and Bisogni (2009), namely, influences and the personal food system, apply. The food choice process model explains how influences and the personal food system contribute to the process of an individual making a food choice. The major influences include ideals, personal factors, resources, social factors, and food contexts. Influences are portrayed in the upper part of the inverted triangle/funnel. The double-sided arrows between the influences indicate the



interaction that continuously takes place between the influences. Each of the influences on food choice is briefly discussed.

### **2.3.2.1 Influences**

Influences are grouped into five categories, namely ideals, personal factors, resources, social factors and food contexts. These are interlinked with each other, and change over time as new situations occur (Sobal & Bisogni, 2009; Sobal *et al.*, 2006).

#### **2.3.2.1.1 Ideals**

Cultural ideals are learned systems of rules, standards, norms, values, and beliefs, that are shared by a group of people (Sobal & Bisogni, 2009; Sobal *et al.*, 2006:5; Furst *et al.*, 1996). Individual ideals about food cause them to benchmark, compare, judge, and evaluate their food choices and behaviour as “right, normal, inappropriate, and unacceptable” (Furst *et al.*, 1996). Food ideals are linked to individual expectations and conscious assumptions about food that are rooted and derived from cultural and symbolic factors. The process of cultural socialisation builds a person’s ideals about food. Furthermore, this process guides an individual to adapt the food knowledge of that culture (Bisogni *et al.*, 2016). This means that ideals about what constitutes proper food, and appropriate ways of preparing and eating food, are important expectations that drive individual food choices (Sobal & Bisogni, 2009; Sobal *et al.*, 2006:5; Furst *et al.*, 1996). For example, one family might consider a proper lunch meal to be a three-course meal and another family might regard a proper lunch to be a one-course meal where meat is always included as part of the meal.

#### **2.3.2.1.2 Personal factors**

Personal factors are individual characteristics or attributes that influence food choice. These factors include physiological factors (i.e. sensory sensitivity to certain food tastes or genetic predisposition to diseases), psychological characteristics (preferences, personalities, moods, and phobias) and relational factors (identities, gender roles, self-concept). Individual personal factors are the traits that make them unique in their own food choice decisions. These unique traits are sometimes brought about by individual experiences, such as feelings or cravings, food addictions or dieting practices, that may be significant determinants of food choice in specific situations (Sobal *et al.*, 2006:6). For example, someone with a certain self-concept (fat or big) might restrict themselves from eating certain foods, or another person with a non-communicable disease, such as diabetes or hypertension, will refrain from eating certain foods because of their disease.

Personal factors contribute to unique individual food decisions that develop and change over time (Sobal & Bisogni, 2009; Sobal *et al.*, 2006:6).

#### 2.3.2.1.3 *Resources*

Resources refer to the tangible and intangible resources available to individuals when making food choices. Tangible resources can be material capital such as money, equipment, transportation, and storage space. Intangible resources are, for example, human capital, such as time, skills, and knowledge. (Sobal *et al.*, 2006:6). Other types of intangible capital include social capital, such as networks of family or friends providing advice and emotional support, and cultural capital, which includes values, and traditions (Sobal & Bisogni, 2009). The availability of resources can either be an opportunity or constraint to individuals when making food choices. Certain foods could be “out of bounds” because of the unavailability of a specific resource (Bisogni *et al.*, 2016). For example, a person with a limited income may not be able to frequently purchase and consume fruits. Another person may not eat oxtail because they cannot prepare it, lacking the human capital who could have imparted the skills and knowledge to prepare oxtail properly. The busy lifestyle of urban consumers due to social and employment obligations can cause time constraints. This in turn causes consumers to have less time for food procurement and preparation, resulting in an increased reliance on convenience foods, instant meals, or eating out more often (Jabs & Devine, 2006).

#### 2.3.2.1.4 *Social factors*

Social factors relate to the relationships which individuals are engaged in (Sobal *et al.*, 2006:6). Humans are social beings; therefore, their relationships and interaction with other humans can either constrain or provide them with opportunities to facilitate food choice decisions. Management of social factors is crucial and often governs with whom, where, when, how, and what consumers eat. For example, when young couples eat together, one partner might have to adapt and adopt the food choices made by the other partner (Sobal & Bisogni, 2009; Sobal *et al.*, 2006:6) or alternatively one of them has to provide for their own food choice and eat independently even when eating together. Since we eat and interact most frequently with our family members, most often it is during family meals that family members get to socialise and share knowledge and ideas about life issues, including family food traditions. Other social interactions could include the work environment and friends or peers outside the home environment. Often these social-networks provide advice, empathy and feedback about food use and this shared information enhances their own food choices (Bisogni *et al.*, 2016). For example, a person may learn from a friend how to prepare a cheesecake. Another person might learn an

interesting fact about a food item that may cause them to start consuming that food they learnt about.

#### 2.3.2.1.5 *Food context*

Food context refers to the broader physical and social environments in which an individual makes food choices. It includes the physical environment (climate, infrastructure), and the social environment (social institutions such as government policies, economic conditions, mass media). These environments are significant determinants of food availability, food pricing, food distribution and advertising, and food acceptability. For example, the urban environment is a physical environment which provides a variety of food outlets from which a person can make food choices. Furthermore, the urban environment provides different food advertising platforms which can influence a person's food choices. The home and the workplace are two other key contexts where food choices are made (as consumers spend most of their time in either of these places). These social contexts shape food choice decisions and the social meanings attached to food (Sharkey, Johnson, Dean & Horel, 2011; Sobal *et al.*, 2006:7). As urban consumers interact with a wider range of environments, the structural and social processes that influence food choices are becoming more complex.

From the above discussion, it is clear that a broad range of factors is considered and often reconsidered both simultaneously and sequentially during the food choice process. It is further important to remember that these influences are subject to change, not only over time but also between situations, and thus contribute to the dynamic nature of food choice and its complexity.

The next component in the food choice process model deals with the personal food system as shown by Figure 2.2.

#### 2.3.2.2 *Personal food system*

The personal food system includes aspects such as the development of food choice values, negotiating and balancing values, classifying foods and situations, formation and revision of scripts, strategies, and routines. The personal food system thus relates to the cognitive processes that guide an individual during the food choice process. This system is dynamic, and it assists individuals to interpret, negotiate, plan, and balance a diversity of food choice values. The personal food system thus involves individual thoughts, attachments, meanings, feelings, and relationships with food. Mindful food choices are, therefore, constructed through weighing, negotiating and balancing of values, so that the final decision may serve the individual's needs

and preferences (Sobal & Bisogni, 2009; Sobal *et al.*, 2006:7; Furst *et al.*, 1996). Each of the personal food system factors is discussed below.

#### 2.3.2.2.1 *Development of food choice values*

Food choice values are the considerations that individuals take into account and regard as important in selecting foods. These values are personally developed interpretations, feelings, and meanings related to food and eating, and they also involve the emotional attachment that individuals have towards food. Food choice values are dynamic and can change over time, as new values are constructed in order to accommodate a new or altered specific situation or context. However, certain values are salient to most individuals. These values are taste, convenience, cost, health and managing relationships (Sobal & Bisogni, 2009; Sobal *et al.*, 2006:7; Furst *et al.*, 1996). A discussion of each of these food choice values follows.

**Taste:** Taste as a food choice value is an important sensory attribute when making food choice decisions. This food choice value varies from person to person, and at times it could serve as a limiting factor in food choice because, for most individuals, this food choice value is less negotiable than other values. Although other sensory considerations in the food choice process such as texture, appearance, aroma, and flavour, are also important, taste is the prominent value because it provides pleasure, enjoyment, and emotional fulfilment (Sobal & Bisogni, 2009; Sobal *et al.*, 2006:7; Furst *et al.*, 1996).

**Convenience:** Convenience is a food choice value that refers to the time and effort considerations that individuals employ in constructing food choices (Sobal *et al.*, 2006:6). Time is often regarded as a resource that requires careful management, to be wisely spent or saved. Certain social changes in society, such as the increased participation of women in the workforce, has led to reduced time available for food selection and preparation (Musotsi, Abukutsa-Onyango & Makokha, 2017; Ducrot, Méjean, Aroumougame, Ibanez, Allès, Kesse-Guyot, Hercberg & Péneau, 2017; Velardo, 2015; Sliwa, Must, Peréa & Economos, 2015; Connors *et al.*, 2001). This social change resulted in the scarcity of time, particularly among urban adults, causing them to select foods that are easily accessible and that need minimum time to prepare (less than an hour) (Rudd, 2019; Venn & Strazdins, 2017; Djupegot *et al.*, 2017; Halkier, 2017; Jabs & Devine, 2006). Although convenience is based on personal judgement regarding the cost of spending time and effort in relation to the benefits derived from preparing a specific food item, Sobal *et al.* (2006:8) related the consideration of convenience to the cooking or food preparation skills of the individual.

**Cost:** Cost is a food choice value that is regarded as an important consideration in the food choice process because it involves the individual's monetary ability to purchase certain food products.

Although the desired food product might accommodate other food choice values like taste, convenience, and health, unaffordability would be a barrier to choosing the food product. In urban settings, most food is purchased rather than self-produced. Therefore, when selecting foods to purchase, most individuals judge the value of the food in relation to its cost. This implies that the value of cost also includes the concept of worth (Sobal *et al.*, 2006:9). For example, the value of an expensive food product has a different perception of worth for consumers with a high income as opposed to those with a low income. High-income consumers may not be affected by price increases, whereas low-income consumers may continue to purchase the food product because they believe that it is essential to their health and well-being or that it has worth as it contributes to their well-being or satisfaction (Sobal & Bisogni, 2009; Sobal *et al.*, 2006:9; Furst *et al.*, 1996).

**Health:** Health is a food choice value that is considered in relation to physical well-being (Sobal *et al.*, 2006:9). Physical well-being relates to both long-term and short-term consequences. Short-term consequences could include the immediate physical response to food such as digestive discomfort, or allergic reactions, while long-term consequences could include considerations such as growth, weight control, or management of chronic disease. Individual perceptions about healthy foods differ, and some individuals may avoid certain foods that do not meet their view of healthy foods (Sobal & Bisogni, 2009; Sobal *et al.*, 2006:9; Furst *et al.*, 1996). An example is given by Furst *et al.* (1996) where individuals become wary of specific food components, such as starches, that are regarded as not good for the body. Another example would be in the case of someone who may have had a certain disease scare (e.g. cancer), where the person will try to educate themselves about cancer-related foods or fatty foods and thus try to avoid those foods because they are not regarded as healthy in their perspective.

**Managing relationships:** Managing relationships is a food choice value that relates to the feelings, preferences, and needs of people in relation to food with which they engage within their immediate social setting. This relates to the interest and well-being of others when providing, sharing or receiving food by considering their likes and dislikes, their personal and cultural ideals and their eating patterns. In a family setting, food is central to relationships. Thus, the household food manager is usually attentive to the personal needs, preferences, likes and dislikes, nutritional needs and eating patterns of an individual or family members in the household setting. This also applies to social events and functions where the host supplies food to others (Sobal & Bisogni, 2009; Sobal *et al.*, 2006:9; Furst *et al.*, 1996).

Individuals vary in terms of the food choice values they develop and consider when choosing food. Other values that are considered could, for example, include quality, variety, symbolism, safety, and waste. Furthermore, values are dynamic, as they could change during the individual's

life course and according to the context or situation in which the choice is made. Thus, individuals often negotiate and balance their food choice values in relation to their circumstances.

#### 2.3.2.2.2 *Negotiation and balancing values*

Value negotiations are conscious, mindful considerations that individuals use to weigh values that are important to them in contexts or situations where they have to reach a decision about something (Sobal & Bisogni, 2009). An individual may have to consider numerous values in the food choice process, some of which may conflict with others. To balance conflicting values, the element of negotiation must be introduced. In balancing values, individuals prioritise and consider firstly those that are of high value to them in a specific situation. Sobal *et al.*, (2009) explain this by giving the example of a diabetic person who regards health as a dominant value when choosing foods. For this person, food choice values like taste, cost, convenience, and health have to be negotiated and balanced to reach a food choice decision appropriate to their situation. For example, the person may choose a plain yoghurt as opposed to a sweetened yoghurt (Sobal & Bisogni, 2009; Furst *et al.*, 1996).

#### 2.3.2.2.3 *Classification of foods and situations*

Individuals classify food to simplify their food choice decisions (Sobal & Bisogni, 2009). In a complex world, humans classify foods into various categories and eating situations to help them navigate their food choices such as healthy or unhealthy food (whole natural foods or processed foods), culturally acceptable or not, tasteful or bland, affordable or expensive, or according to their personally constructed food values (Sobal *et al.*, 2006:10). Individuals might live in the same environment but classify foods differently. For example, fresh apples may be seen by some household members as healthy and a convenient snack, but expensive and not satisfying. These different classifications of apples have to be evaluated as a composite whole in the process of considering apples as a possible food option (Sobal *et al.*, 2006:11).

#### 2.3.2.2.4 *Formation and revision of scripts, strategies, and routines*

Scripts, strategies, and routines are other tools an individual can use to simplify their food choice decisions. An explanation of the formation and revision of scripts, strategies, and routines follows.

**Food choice scripts** (also referred to as schemas) refer to the behavioural plan and knowledge that guide the way individuals act in a specific situation. Scripts can also be referred to as an individual's procedural food knowledge, which is generally subjective (Sobal *et al.*, 2006:11). Scripts are formed from routinised or habitual behaviour, providing individuals with a sense of predictability and familiarity. However, they are also flexible, depending on the event or situation.

In each event or situation, there is a typical order of behaviour, which means that the formation of scripts will determine the appropriate or inappropriate behaviour for that specific event or situation. Individuals form specific scripts for events like birthdays, holidays or Christmas, romantic dates, evening meals, snack times, and situations or environments in which individuals eat, either alone or with others. The scripts that are formed can be revised and made flexible or appropriate for each event (Nyberg, Olsson, Örtman, Pajalic, Andersson, Blücher, Lindborg, Wendin & Westergren, 2016; Martijn, Pasch & Roefs, 2016; Marx, Hoffmann & Musher-Eizenman, 2016; Musher-Eizenman, Marx & Taylor, 2015; Sobal & Bisogni, 2009). For example, for a birthday celebration, a cake may be an appropriate dessert as opposed to a fruit salad, or the eating of energy-dense foods such as fries, fried chicken, pies, and a variety of salads may be appropriate menu items for a Christmas lunch as opposed to an everyday lunch event.

Scripts are formed in congruence with strategies, providing predictability and comfort when making food choices. Scripts include expectations about a situation and the plan for implementing that situation, as well as the sequence of behaviour that will enact in that situation (Sobal *et al.*, 2006:11). As explained, scripts are formed from routinised behaviour. For example, a person knows the appropriate foods to eat at breakfast or lunchtime at work, or evening meals with family, because they have experienced these before and thus formed a familiar or predictable way of dealing with such events in the future.

**Strategies** are behavioural plans and rules that individuals develop for their food choices in recurring situations. Strategies eliminate and simplify the cognitive effort and time required to negotiate every food choice. Once a food choice strategy is repeated, it becomes a routine, and the person becomes less mindful about that eating situation because the routine becomes embedded in their mind (Sobal *et al.*, 2006:11). Heuristics are also used by individuals in recurring situations to make food choices. Heuristics refer to mental shortcuts that simplify the cognitive load of making a decision (Gigerenzer & Gaissmaier, 2011). Individuals use different types of strategies to speed up food choice decisions, such as focusing on only one value, routinisation, elimination, limitation, substitution, addition and modification (Sobal & Bisogni, 2009; Sobal *et al.*, 2006:12). To clarify these, each strategy is explained with an example in Table 2.1.



**TABLE 2.1: STRATEGIES FOR SIMPLIFYING FOOD CHOICES. Adapted from Sobal *et al.*, (2006:12)**

STRATEGY	EXAMPLE
<b>Focusing on only one value:</b> helps an individual to eliminate other values that are not significant, making the one chosen value the deciding factor when making food choices.	Focusing on cost above all other values. Eating cheap food whenever possible.
<b>Routinisation:</b> standardising or ritualising food choice decisions. Routinisation converts recurring food choices into habits, thus making the food choice process automatic that requires less mental effort and negotiation.	Eat cereal every day for breakfast.
<b>Elimination:</b> certain foods, food categories, eating locations or partners are avoided or excluded.	Never eat at restaurants, or never eat desserts.
<b>Limitation:</b> restricting the use of certain foods or ways of eating to simplify food choice decisions.	Drink only two cups of coffee a day.
<b>Substitution:</b> replacing foods or ways of eating to accommodate conflicting values by replacing one option with another that is more satisfactory.	Choose brown rice instead of white rice.
<b>Addition:</b> including other food components to satisfy specific values.	Eat a salad with every evening meal.
<b>Modification:</b> changing, adjusting, or transform food or ways of eating to make them more acceptable.	Remove fat from meats and poultry.

**Routines** are strategies for conserving physical and cognitive resources. Routines simplify daily activities by making things predictable and expected. Routines maintained by an individual relating to work, family, eating, and other demands of their lives, provide organisation, efficiency, comfort, security, and identity (Jastran, Bisogni, Sobal, Blake & Devine, 2009; Zisberg, Young, Schepp & Zysberg, 2007; Connors *et al.*, 2001). Routines are shaped by environmental and cultural contexts (Gallimore & Lopez, 2002). Therefore, routines related to eating reflect what individuals have learnt as appropriate and expected in their cultural and environmental contexts. Routines are dynamic as they adapt to changing contexts and situations. This dynamic quality allows the routine to be “resilient and consistent, yet always evolving as the situations in life change” (Jastran *et al.*, 2009). Formed scripts and strategies that work well become routines for food choice, because they provide structure, predictability, and comfort for daily life schedules, which makes it easier to deal with and adapt to other demands of daily life (Jastran *et al.*, 2009; Sobal & Bisogni, 2009). For example, the time, type of food, and setting or context in which one eats breakfast during weekdays could follow a specific routine. For instance, by choosing to eat cereal with milk for breakfast every day makes the food choice easier and predictable, and the process of preparing breakfast every morning quick and convenient.

A personal food system allows individuals to consider values and employ other cognitive processes when constructing their food choices. Personal food systems may be particularly important in societies where a variety of food choices are available, and few rules exist to guide



how and what consumers eat (Sobal *et al.*, 2006:14). Although the food choice process is habitual, meaning that most food choices are unconscious, some food choice decisions require conscious decision-making. Because of rapid urbanisation and modernisation, the food choice process can therefore be daunting at times due to its dynamic, complex, changing, and situational nature. In addition, people must also be aware of increasing global health concerns.

Although the food choice process model is a comprehensive way of detailing and illustrating individual food choice decisions, this model may not be applicable to other cultures, historical eras, and places where multiple food options are unavailable (i.e. famines) as it was developed in the United States of America (Sobal *et al.*, 2006:14). However, it is regarded as appropriate for this study because the urban environment provides diversified food options with no restrictions/rules to prevent consumers from accessing their choices. To help redefine the relationship consumers have with food, food literacy has emerged as a possible concept to enhance the health and well-being of consumers. Food literacy as a concept encompasses components and indicators that assess the food literacy of a person. Food literacy and the food choice process, therefore, are interrelated because in theory an individual with relatively high food literacy should be able to adopt positive food choices regardless of their food environment (Bisogni *et al.*, 2016).

## 2.4 FOOD LITERACY

Food literacy has recently gained prominence as a concept that is being investigated by food educators, public health and food and nutrition researchers. The term “food literacy” first appeared in literature around 1990, then died down to re-emerge again in the late 1990s and early 2000s. From 2005 till now, the term has appeared in many food and health-related studies (Fordyce-Voorham, 2015). A consensus definition of the concept was developed from a study involving food experts and young people by Vidgen and Gallegos (2014). They defined food literacy as the “framework that empowers individuals, households, communities or nations to protect diet quality through change and strengthen dietary resilience over time”. This understanding assumes that a food literate individual adopts healthy food choices and can manoeuvre their food context in a way that promotes health and well-being. The food literacy concept also comprises a collection of inter-related components, namely knowledge, skills and behaviours, which an individual requires to plan, manage, select, prepare and eat food to meet needs and determine intake (Vidgen & Gallegos, 2014).

Other studies have also conceptualised food literacy in simpler terms, such as Cullen *et al.* (2015) who define food literacy “as the ability of an individual to understand food in a way that they develop a positive relationship with it, including food skills and practices across the lifespan in

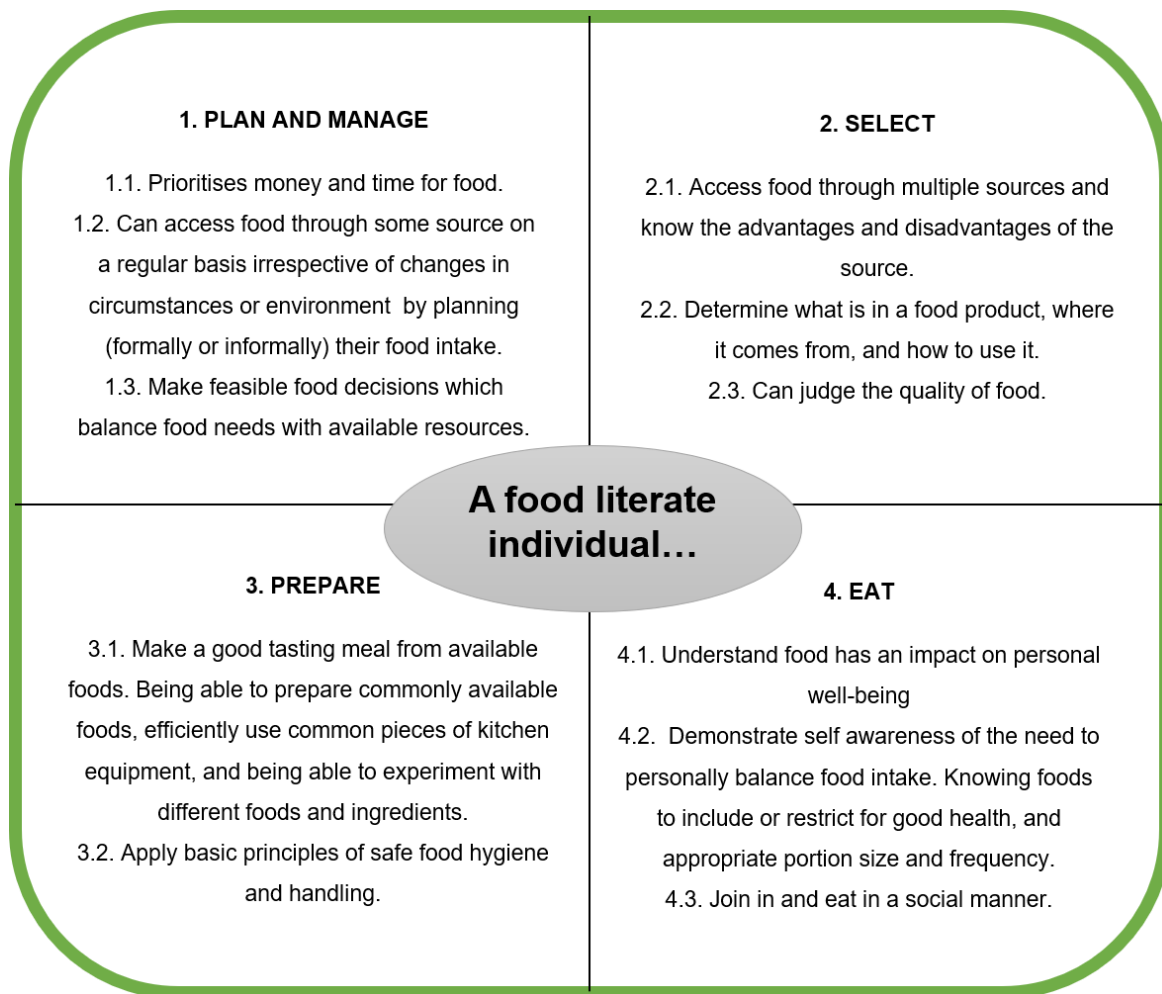
order to navigate, engage, and participate within a complex food system”. A recent publication by Fisher *et al.* (2019) also developed a South African definition of food literacy, in which six dimensions of food literacy were identified. In this publication, food literacy is defined as “an individual’s knowledge, skills and behaviour as demonstrated through the sourcing, consumption as well as the nutritional, economic, safety and social aspects of food”. These definitions give a simplified general overview of the basic components of the food literacy concept. For an individual to carefully navigate the food system in a way that is healthful, adequate basic knowledge about food and nutrition is required, making knowledge the dominant component of food literacy. Adequate knowledge leads to adequate skills and behaviour, which will assist a person to avoid unhealthy food choices.

Food knowledge relates to “the possession of food-related information” (Sumner, 2013), whereas skills include techniques and the application of those techniques in food management processes such as food selection, meal planning, preparation, cooking, and storage of food (Vidgen & Gallegos, 2012). Fordyce- Voorham (2016:170) also defines skills “as the process of purchasing, preparing and cooking food ingredients using available resources to produce well-balanced and tasty meals appropriate to the age and needs of the individuals consuming them”. Furthermore, skills also encompass confidence in being able to improvise and problem solve. Lastly, behaviour includes eating patterns and frequency of food intake, and attitudes towards food in terms of selection, preparation, storage and serving. The three components of knowledge, skills and behaviour are thus all encompassed in food literacy, meaning that the personal food system of a food literate individual will most likely include adequate food knowledge, skills, and behaviour to make food choices that will help them to sustain their health and well-being. According to Vidgen and Gallegos (2012 and 2014), a food literate individual comprehends the food literacy components, and can plan and manage, select, prepare, and eat food in a healthful manner. Each of the aforementioned is explained below.

- 1. Planning and management:** This describes an individual making time for food in their life, having a plan for eating situations and having the skills to make sure the plan is feasible and likely to produce positive outcomes. Planning and management give certainty to food intake and helps an individual to minimise the impact of restricted resources on food choice. For example, planning and management can help young adults starting life on their own after leaving the family setting where food was planned and managed by someone else (mother). It can also assist in navigating the complex food system to select and consume healthy foods routinely. Planning and management includes aspects such as prioritising money and time for food, planning for food intake, and making feasible food decisions which balance food needs with available resources (Vidgen & Gallegos, 2014).

2. **Selection:** This refers to the skills needed to choose different kinds of food items, either from a supermarket or a foodservice outlet. In food selection, it is important to know where food comes from so that wise decisions can be made. The selection encompasses aspects such as accessing food through multiple sources and knowing the advantages and disadvantages of these sources. This includes having knowledge of the local food supply and the ability to make informed decisions about where to access food to best meet their needs. Selection further includes determining or knowing what is in a food product, where it comes from, how to store it and use it. Lastly, the selection of food involves the ability to judge the quality of food in order to make a selection that will meet food needs (Vidgen, 2016:53; Vidgen & Gallegos, 2014).
  
3. **Preparation:** This refers to the ability to prepare food using different cooking methods and techniques. Food preparation is an essential life skill since it involves an individual's ability to prepare tasty meals from whatever food is available. Food preparation includes being able to prepare commonly available foods, efficiently use kitchen equipment and having a sufficient selection of skills to adapt recipes to experiment with food and ingredients. Preparation also includes being able to apply basic principles of safe food hygiene and handling to prevent food poisoning or any food risks (Vidgen, 2016:55; Vidgen & Gallegos, 2014).
  
4. **Eating:** This includes both the act of eating and the consequences of eating, including nutritional status. Eating also includes having basic nutritional knowledge about food, understanding the effects of healthy eating, and understanding what healthy eating means. Eating includes understanding that food has an impact on personal well-being. In addition it guides an individual to know which foods to include, restrict, limit, modify, and substitute for good health, together with appropriate knowledge about portion size and the frequency of consumption. Lastly, the individual will engage in the social activity of sharing food. Eating brings people together and encourages socialisation. It gives an individual a sense of belonging and social inclusion (Vidgen, 2016:59; Vidgen & Gallegos, 2014).

The conceptual model (see Figure 2.3) illustrates the above explained indicators of a food literate individual which were adapted from Vidgen and Gallegos (2014) and Vidgen and Gallegos (2012).



**FIGURE 2.3: INDICATORS OF A FOOD LITERATE INDIVIDUAL (Vidgen & Gallegos, 2014; Vidgen & Gallegos, 2012)**

Fisher *et al.* (2019) identified six dimensions of food literacy. The definitions of these dimensions are discussed below in order to indicate their relation to the indicators of a food literate individual (plan and manage, select, prepare, eat) discussed by Vidgen and Gallegos (2012) and Vidgen and Gallegos (2014).

- 1. Procurement (sourcing)** – consumers are competent in acquiring (obtaining, buying, purchasing) food from the available accessible food source wisely.
- 2. Financial (economics)** – consumers are competent in terms of their own financial ability in acquiring (buying, purchasing) from the available, accessible food source wisely and without wastage.

3. **Consumption** – consumers are competent to make informed choices to plan, prepare and eat meals, incorporating competencies such as the storage and cooking of food, interpreting and adapting recipes, and using equipment.
4. **Nutrition** – consumers are competent in addressing health and well-being by incorporating competencies such as the selection, preparation and consumption of health-promoting foods and practices.
5. **Food safety** – consumers are competent in food safety when handling, preparing, and storing food in a manner that will prevent foodborne illnesses.
6. **Social aspects of food** – consumers are competent to consider their cultural, ethnicity, trends, entertainment and status in food choice.

The six dimensions of food literacy defined above are closely related to the indicators of a food literate individual (planning and management, selection, preparation, and eating) discussed by Vidgen and Gallegos (2012) and Vidgen and Gallegos (2014). This confirms that food literacy is a multi-dimensional concept.

Food knowledge is an important component of food literacy. Sumner (2013) states that food literacy is more than just food knowledge, it also involves the motivation to apply that knowledge to food practices to foster nutrition goals and food well-being consistently. Block, Grier, Childers, Davis, Ebert, Kumanyika, Lacznia, Machin, Motley and Peracchio (2011) similarly conceptualise food knowledge to encompass three components that can help an individual attain food literacy. These components are also discussed by Sumner (2013), and they include:

1. **Conceptual or declarative knowledge:** Refers to gathered knowledge about food, food sources, nutrition facts, and other knowledge acquisition and activities involving food and nutrition.
2. **Procedural knowledge:** This is the application of knowledge to food decision making, including food shopping and preparation skills. It involves the development of food scripts which are a food-related sequence of events, actions, or routines that occur in a particular context.
3. **The ability, opportunity, and motivation to apply or use that knowledge:** This involves the identification, comprehension, interpretation, communication, and application of information about food in various contexts.

These three components provide an individual with ways in which they can manoeuvre through the food choice process regardless of the environmental situation. Although food literacy is a broad concept that entails components of knowledge, skills, and behaviour, for this study, the focus is on the food knowledge component of food literacy. Although consumers are familiar with numerous diverse kinds of foods, their factual knowledge about those foods has declined. They no longer possess the appropriate skills and behaviours related to food (Colatruglio & Slater, 2014; Jaffe & Gertler, 2006). The literature on health, supported by food and nutrition reports, indicate an alarming prevalence of overweight and obesity and the rise of non-communicable diseases (Ofori-Asenso, Agyeman, Laar & Boateng, 2016; Spires *et al.*, 2016; Williams, Mesidor, Winters, Dubbert & Wyatt, 2015). From this high prevalence of non-communicable diseases, it may be evident that food knowledge, as well as the food consumption practices of modern consumers, need attention (Spires *et al.*, 2016; Peltzer, 2004b).

To help address and re-define an individual as well as a group's food knowledge, the concept of food literacy has emerged as a possible way to research and address related problem areas and solutions. In the study by Colatruglio and Slater (2014), they discuss that food literacy can empower individuals and communities to make healthful decisions in complex food environments, and it can also provide essential basic competencies about food and nutrition. Therefore, measuring the level of a consumer's food literacy is of importance (Poelman *et al.*, 2018). Through determining and understanding a consumer's level of food literacy, education programmes addressing their food literacy shortcomings can be implemented. The education programmes can help motivate consumers to adopt healthy lifestyles and how to live well within their current food environment to preserve it for future generations (Begley, Paynter, Butcher & Dhaliwal, 2019; Colatruglio & Slater, 2014; Kimura, 2011). Food knowledge as a component of food literacy can help guide consumers to be conscious of the types of food they eat and the consequences of those foods (Colatruglio & Slater, 2014). Determining the level of a consumer's food knowledge, as a component of food literacy, can increase their awareness on how to reach sustainable food well-being. In the next section, the food knowledge component of food literacy is discussed.

#### **2.4.1 Food knowledge**

Knowledge is a broad concept that has been classified into different types and definitions. Some classifications of knowledge addressed in literature include tacit (cognitive tacit and technical tacit), explicit, subjective, objective declarative, procedural, causal, conditional, relational, and rational knowledge (Kinchin, Möllits & Reiska, 2019; Lehrer, 2018:15; Su, Zhang, Moore, Chen, Ma & Hu, 2016; Alavi & Leidner, 2001:113). One definition that explains the acquisition and storage of knowledge is by Alavi and Leidner (2001:109), in which they define knowledge as "information possessed in the mind of individuals (which may or may not be new, unique, useful,



or accurate) related to facts, procedures, concepts, interpretations, observations, and judgments”. Although knowledge is classified into different types, all the information acquired is stored in one’s memory. Therefore, a person must be of sound mind to be able to retrieve whatever information they have about something. In this study, knowledge is defined as having the ability to recognise something as information and being able to distinguish between what is true and what is false, or having some form of competency and or being acquainted with something or someone (Lehrer, 2018:3). For a person to have knowledge about something, they must be able to recognise and acquire some form of information that will make them competent in doing certain things. For example, if a person knows that vitamin A is a nutrient found in some vegetables, it means the person was able to recognise this as information that can help them to be competent about nutritional information relating to vegetables. The person will, therefore, be able to recognise what is true and what is false about the nutrition of vegetables. Knowledge as a general concept, therefore, provides an individual with information on different aspects of life, such as knowledge about driving, cooking, politics, economy, health, and nutrition.

As mentioned above, different types of knowledge are discussed in the literature. This study focuses on the concepts of declarative and procedural knowledge, as they are the types of knowledge used in most food literacy and nutrition studies (Hoffman, 2017; Fordyce-Voorham & Wai Ling Lai-Yeung, 2016; Velardo, 2015; Bucher, Müller & Siegrist, 2015). Declarative knowledge means having theoretical knowledge about something (having knowledge about food and all the important aspects involving food and nutrition). On the other hand, procedural knowledge means having practical knowledge or knowing how to do something (process or practical knowledge that involves the application of food skills) (Fordyce-Voorham & Wai Ling Lai-Yeung, 2016; Velardo, 2015). However, possession of declarative and procedural knowledge about food-related facts is not enough. A person should not only know about food but should also be able to apply that knowledge by putting it into practice.

#### **2.4.1.1            *How food knowledge is acquired***

In order to understand the food consumption practices of consumers, it is also important to determine the knowledge they have about food. Determining the knowledge consumers have about food should help clarify their relationship with food (Lee, Jin & Kim, 2018; Omari *et al.*, 2017; Yegiyani & Bailey, 2016; Oldewage-Theron *et al.*, 2015), i.e. whether they have a healthy relationship with food (by consuming a variety of foods according to the recommended guidelines), or an unhealthy relationship with food (for instance that they consume energy-dense foods and do not follow recommended guidelines for food consumption). Food is one of the important basic needs for human survival, and from the beginning of time, has been the central glue that brought people together (Worsley *et al.*, 2016; Anderson, 2014:127). Although food is

vital for human development, consumers seem to adopt unhealthy food practices quite easily, as is evident from the high prevalence of overweight and obesity globally, and in South Africa (Phillips, Comeau, Pisa, Stein & Norris, 2016; Spires *et al.*, 2016). Food knowledge is, therefore, required to help educate, motivate, and remind consumers about all the aspects involving food, especially those that promote health and well-being (Fordyce-Voorham & Wai Ling Lai-Yeung, 2016; Worsley *et al.*, 2016). An individual acquires knowledge about food and food habits through the process of socialisation, where a person is taught cultural norms, traditions, and values related to food from infancy throughout their lifespan. However, as a person gets older and encounters new experiences like moving away from home to a new environment, their knowledge and food habits change. Factors such as media, friends or peers, work colleagues, campaigns, school and or higher education, contribute towards the change and acquiring of new knowledge about food and food habits (Fieldhouse, 2013:4). For example, in some cultural societies, maize meal is a staple food; therefore, most of those people's meals include maize meal porridge. For an individual from such a cultural background, their consumption of maize meal porridge might change when they move away from home to a new and culturally different environment and they adopt the food habits of the new environment.

#### **2.4.1.2 Factors that influence food knowledge**

Food knowledge serves as a primary guide to what food is, and where and how to source it. Food knowledge also guides individuals towards making informed food choices (Rozin, 2007:24; Bryant *et al.*, 2003:93; Story *et al.*, 2002). Food knowledge provides consumers with information about where food comes from, cooking skills, the nutritional content of a food product, as well as other health and nutrition-related information (Burton *et al.*, 2018; Jones, Meckna & Koszewski, 2018a; Wunderlich, Gatto & Smoller, 2018; Colatruglio & Slater, 2014). Knowledge about food can be acquired from different sources. Some of these sources include the mass media (magazines, radio, television, newspapers, billboards), books, health and nutrition education programmes or campaigns, health services (clinics, hospitals), food labels and food packages (Charlton, Brewitt & Bourne, 2004). Food knowledge, therefore, varies from individual to individual due to different influencing factors in their lives.

Although there is little recent information on what influences an individual's food knowledge, it is premised that education, family history, personal interests, age, gender, cultural beliefs or a combination of these factors contribute towards a person's food knowledge (Worsley *et al.*, 2016). Individuals with high levels of education are reported to have more food knowledge than those with low levels of education. Consumers with home economics education are also reported to possess adequate food knowledge and cooking skills (Ronto, Ball, Pendergast & Harris, 2017; Parrish *et al.*, 2016; Fordyce-Voorham & Wai Ling Lai-Yeung, 2016; Worsley *et al.*, 2016).



Regarding gender, females are traditionally more involved with food and cooking practices than males, and it is therefore assumed that more females than males would possess more food knowledge (Burton *et al.*, 2018). Personal interests, family history, and cultural beliefs can also influence an individual's food knowledge. For example, if a person was raised in an environment where health and nutrition were practised, that person may develop a personal interest in health and nutrition related to food. What an individual learnt from their family regarding food becomes embedded in the person and they would often refer to the knowledge acquired from their family in adulthood. For example, individuals who grew up in a household where they were taught that a green salad should be served with every main meal, would likely continue with that practice in their own households. Likewise, if they were taught that their culture does not allow them to eat goat meat, the person is likely to refrain from eating goat meat even in adulthood and will teach the same cultural prohibition to their children. In some families, parents teach their children about nutrition and healthy eating practices. Some parents even restrict consumption of unhealthy foods in their homes in order to educate their children about healthy eating (Yee, Lwin & Ho, 2017; Sharif, Zahari, Nor & Muhammad, 2016; Russell, Worsley & Campbell, 2015). The age of a person can also be a contributing factor to their food knowledge. Individuals between the ages of 35 and 50 have more food knowledge than young individuals (Worsley, Wang & Ridley, 2015a). These different factors that could influence a person's food knowledge make it challenging for researchers to measure food knowledge (Devlin & Belski, 2015).

#### **2.4.1.3            *The importance of food knowledge***

Food knowledge is one of the important contributing factors to food practices. It has been shown in literature that individuals who have knowledge about food are more likely to consume a variety of foods and include fruits and vegetables in their daily diet. Studies revealed that individuals with cooking skills are more likely to consume healthy foods (Worsley *et al.*, 2016; Worsley *et al.*, 2015a). Food knowledge, therefore, could help to decrease or eliminate the current high prevalence of overweight and obesity as well as non-communicable diseases (Yahia, Brown, Rapley & Chung, 2016; Geaney, Kelly, Di Marrazzo, Harrington, Fitzgerald, Greiner & Perry, 2016; Spronk, Kullen, Burdon & O'Connor, 2014). This can be possible because food knowledge provides consumers with the necessary information to help guide their food choices. A person with adequate food knowledge will be able to judge or recognise what is true or what is a false claim about a food product. The person will also be able to restrict or decrease the consumption of energy-dense foods as they will be knowledgeable regarding the negative consequences of high energy intake on their health (Said, Hadi, Manggabarani, Tampubolon, Maryanti & Fergusel, 2020; Nawaz, Khalid & Ahmed, 2016). Food knowledge can also enhance consumers' ability to

read and interpret nutritional labels, guiding them when choosing healthful foods (Ukegbu, 2016; Miller & Cassady, 2015; Grunert, Wills & Fernández-Celemín, 2010).

Food knowledge is a positive contributing factor towards the consumption of healthy foods such as fruits and vegetables, as well as the inclusion of a variety of foods (Farragher, Wang & Worsley, 2016; Worsley *et al.*, 2016). However, other studies report that this in itself is not enough to motivate consumers to consume the recommended amounts of healthy foods (for example, the inadequate consumption of five servings of fruits and vegetables daily) (Appleton, Krumpal, Smith, Rooney, McKinley & Woodside, 2018; Farragher *et al.*, 2016; Alaunyte, Perry & Aubrey, 2015). The process of consuming healthy food daily is complex, as several other factors also come into play. These factors include environmental influences (food consumption practices of consumers in rural areas might be different from consumers in urban areas, because the urban environment has a larger variety of food outlets and food options to choose from as opposed to rural areas) (Cockx, Colen & De Weerd, 2018; Sedibe, Pisa, Feeley, Pedro, Kahn & Norris, 2018; Miller *et al.*, 2016; Reed, Yates, Houfek, Briner, Schmid & Pullen, 2016). Other factors that influence consumption of healthy food include taste, and socio-economic factors (consumers of high socio-economic status can afford to consume a variety of desired food options, whilst consumers of low socio-economic status can only consume what is affordable, accessible, and available to them) (Backholer, Spencer, Gearon, Magliano, McNaughton, Shaw & Peeters, 2016; Bocquier, Vieux, Lioret, Dubuisson, Caillavet & Darmon, 2015; Kell, Judd, Pearson, Shikany & Fernández, 2015; Jack *et al.*, 2013). Individual factors such as motivation, self-worth and support from friends and family members also improve individual behaviour regarding the consumption of healthy food (Kaufer-Horwitz, Villa, Pedraza, Domínguez-García, Vázquez-Velázquez, Méndez & García-García, 2015).

In the above section, knowledge as a broad concept and food knowledge as one of the main constructs of this study were discussed. The discussion on food knowledge also mentioned that the types of food knowledge include declarative and procedural food knowledge. These types of knowledge are used in this study because they have most often been used in other studies on food literacy, health, and nutrition. Declarative knowledge is theoretical knowledge (knowing about food and nutritional-related facts) which cannot influence behaviour on its own, whilst on the other hand procedural knowledge includes practical knowledge that indicates an individual's food skills and food behaviour (Kaufer-Horwitz *et al.*, 2015; Dickson-Spillmann & Siegrist, 2011). According to Jones, Lamp, Neelon, Nicholson, Schneider, Swanson and Zidenberg-Cherr (2015) the possession of both declarative and procedural knowledge is important in order for an individual to make healthy food choices. It is thus important to address declarative and procedural knowledge together to understand consumers' theoretical food knowledge as well as the

importance of their practical or skill-based food knowledge. Determining consumers' declarative and procedural food knowledge is important because a person may have knowledge about food but may not know how to convert that knowledge into practice. A brief general explanation, therefore, of declarative and procedural knowledge follows.

#### 2.4.2 Declarative and procedural knowledge.

**Declarative knowledge** is information or theoretical knowledge such as facts or events that are stored in one's memory. Unlike procedural knowledge, declarative knowledge can be instantly verbalised, and a person can recall declarative knowledge from memory by cues or questions. To retrieve the correct information, declarative knowledge must be learnt or studied information based on facts (Ullman, 2016; Su *et al.*, 2016). For example, it may be hard for a person who has never studied or learnt about food and nutrition to retrieve information about the nutritional content of fruits and vegetables.

**Procedural knowledge** is the knowledge of how to do things. This knowledge is expressed through physical (playing soccer/sports) and cognitive skills (presenting skills/public speaking or playing chess). Procedural knowledge is hard to express verbally but can be properly expressed through means of performance or behaviour, e.g. cooking skills, menu presenting skills, food choices. Since this type of knowledge is more skill and action-based, it can be argued that it is independent of declarative knowledge (Ullman, 2016; Su *et al.*, 2016; Dickson-Spillmann & Siegrist, 2011; Lynn & Akgun, 2000).

Since urban South African adults are the focus of this study, the following section of the literature review will discuss adulthood as a life stage first.

### 2.5 ADULTHOOD AS A LIFE STAGE

An individual's life follows different life stages. Erikson and Erikson (1998:100) theorises that a person's life cycle has eight psychosocial development stages. These eight stages include infancy, early childhood, play age, school age, adolescence, young adult, adulthood, and maturity. This study focuses on the last three stages of development, namely the young adult stage, adulthood, and maturity. These three stages represent the adulthood life stages of an individual. According to Robinson (2012:2,3), adulthood is the development stage in which an individual has reached a state of maturity and independence. At this stage, an individual is responsible for their own behaviours, decisions, and is held accountable for whatever they do. In a socio-cultural context, adulthood is based on specific criteria that have been adopted and are prescribed by the culture in which the individual grew up. For example, in some societies at the

age of 18 years a person is considered old enough to leave their parental home and start life on their own. The person is old enough to consensually engage in a range of activities. They can get married, get a job, become a legal voter, or travel the world on their own if they want to. In other societies, a different age may be considered as the required criterion for adulthood (Piumatti, Garro, Pipitone, Di Vita & Rabaglietti, 2016). A discussion of the three adulthood life stages (young adult stage, adulthood, and maturity) according to Erikson and Erikson (1998) follows.

- 1. Young adult (ages 18 to 40 years):** Most 18-year olds have graduated from high school and are about to or have enrolled for tertiary education. The young adult is preparing to or has moved out of their parents' home. Nowadays, however, the transition from dependence in childhood to independence in adulthood is a longer and more complex process than it used to be previously. In recent times the lack of employment opportunities for young adults and the increased costs of education and independent living have prolonged the pathway to independence at this stage of adulthood (Wood, Crapnell, Lau, Bennett, Lotstein, Ferris & Kuo, 2018; Zambianchi, 2016; Syed, 2015). The young adult stage is the stage of greatest energy, abundance, contradiction, and stress. This adulthood stage is the season for forming and pursuing youthful aspirations, establishing a niche in society, and raising a family. This can be a time of rich satisfaction in terms of love, sexuality, family life, occupational advancement, creativity, and realisation of major life goals (Wood *et al.*, 2018; Zambianchi, 2016; Levinson, 1986). The young adult stage is also when a person could experience psychosocial crisis such as intimacy versus isolation. The young adult either forms long term intimate relationships (marriage or close friendships), or develops feelings of isolation, loneliness, and angst due to failure of forming committed relationships (Erikson & Erikson, 1998:109). At this stage of adult development, the young adult is more concerned about their physical appearance. The young adult might engage in weight loss or weight maintenance activities, thus eating certain foods that will give them a positive reflection of their weight. Weight loss activities such as dieting, fasting, and banting are some of the weight loss or weight maintenance activities the young adult might engage in to maintain a socially acceptable physical appearance (Elran-Barak & Segel-Karpas, 2020; Kärkkäinen, Mustelin, Raevuori, Kaprio & Keski-Rahkonen, 2018; Slof-Op't Landt, van Furth, van Beijsterveldt, Bartels, Willemsen, de Geus, Ligthart & Boomsma, 2017).
- 2. Adulthood (ages 41 to 65):** At this stage of adulthood, the person becomes more compassionate and sensible and does not easily give in to external demands. The adult puts more priority on their family responsibilities and household needs (Laska, Pelletier, Larson & Story, 2012; Levinson, 1986). At this stage, the adult cares more about making an impact on the people around them by being a role model, being productive at work, at

home, and in society. Being successful in these achievements develops a feeling of generativity. In contrast, the failure of being impactful and positively leading the next generation develops a feeling of stagnation and dissatisfaction (Erikson & Erikson, 1998:110). At this stage, the person develops new eating behaviours, and develops an interest in nutrition for the sake of their children. The adult also faces time scarcity due to being involved in many daily commitments involving longer working hours, home management duties, and social interactions (Laska *et al.*, 2012).

- 3. Maturity (ages 66 and older):** This is the late stage of adult development, when a person adjusts to retirement, and their strength as well as health decreases. The person also takes up new social roles as senior citizens or great grandparents, in terms of wisdom and life advice (Levinson, 1986). According to Erikson and Erikson (1998:112), at this adulthood stage, conflicts such as ego integrity vs despair are encountered by the adult. The adult at this stage reviews their life and their accomplishments to assess if they had lived a successful life and achieved their goals. A positive review leads to a feeling of integrity, and a negative review develops a feeling of despair.

The period of adulthood is marked by broad shifts in lifestyle patterns which include being independent as well as taking up daily responsibilities and commitments (work and family responsibilities) (Wood *et al.*, 2018; Syed, 2015). The daily commitments of the adult, therefore, makes it hard for them to commit time for meal planning and preparation since they spend most of their day outside their homes (either at work or school) (Harris, 2017; Pelletier & Laska, 2012). Due to this situation, food options which are more suitable to their busy lifestyles are chosen. In the next section, the urban environment, urban food environment, and food practices of urban South African adults are discussed to help give a better understanding of what shapes the food practices of urban adults and how chosen foods are used.

## 2.6 THE URBAN ENVIRONMENT

Globally, the rate of urbanisation is increasing. It is predicted that by 2030 approximately two-thirds of the world's population will be living in urbanised environments (McGranahan, Schensul & Singh, 2016; Patel & Burke, 2009). According to the literature, Africa is one of the continents with higher rates of urbanisation (zu Selhausen, 2017; Adams & Opoku, 2016), and on the African continent, South Africa is regarded as one of the countries with the highest rate of urbanisation (zu Selhausen, 2017). South Africa's population was 58,8 million in 2019 (Stats SA, 2019), of which over 65% currently live in urban areas (Solène, Ivan & Céline, 2018; Turok & Borel-Saladin, 2014). The increased number of individuals moving to urban areas could be attributed to people seeking better employment opportunities, better education, and easy access to better health care

services (Mokoele & Sebola, 2018). However, in addition to these improvements in their circumstances, the urban environment could also stimulate less desirable behavioural changes in individuals (for example, the consumption of energy-dense foods coupled with a sedentary lifestyle, and high rates of drugs abuse) (Janssen, Davies, Richardson & Stevenson, 2018; Dodman, Leck, Rusca & Colenbrander, 2017; Turok & Borel-Saladin, 2014; Popkin *et al.*, 2005). These behavioural changes may result in the emergence of non-communicable diseases such as cancer, diabetes, cardiovascular diseases, and hypertension (Arndt, Davies & Thurlow, 2018).

The modern urban environment is characterised by tall buildings, tarred roads, shopping malls, streets, and suburban houses. Innovation and technological advances are the hallmarks of the urban environment, to provide its residents with easy mobile access to shopping malls, work, and school; clean drinking water; safe housing with electricity, and diverse financial and social services (Adams & Opoku, 2016:283; Parris, 2016:18). The urban environment is dynamic and requires earning power or a constant source of income for a person to be able to enjoy the various opportunities it provides (Ma, Dong, Chen & Zhang, 2018). These various opportunities include diverse shopping and leisure places with a variety of food options to choose from. Consumers in urban areas, therefore, usually depend on their environment to provide them with food options (Dubowitz, Zenk, Ghosh-Dastidar, Cohen, Beckman, Hunter, Steiner & Collins, 2015) causing their food practices to shift from consumption of traditional locally or home-grown foods to the consumption of processed, convenient and fast foods (Holdsworth & Landais, 2019; Popkin, 2017). Foods that did not feature in the traditional eating patterns of South Africans are now easily accessible, available, and affordable due to urbanisation, globalisation and modernisation (Ronquest-Ross *et al.*, 2015; Popkin, 2006). The food practices of urban South African adult consumers are constantly changing as they rely on the urban food environment for food options that meet their daily individual and group needs. The next section will address the South African urban food environment with a view to understand consumption behaviours of urbanites as well as the environment in which they perform their food choices.

### **2.6.1 The urban food environment**

Food environments encompass the joint physical, economic, policy and socio-cultural environments that influence people's food and beverage choices as well as their nutritional status (Claasen, Van Der Hoeven & Covic, 2016). The South African food environment has changed since the mid-1990s, possibly driven by urbanisation and globalisation which contributes towards the influx of trade on food and beverage industries, as well as the growing prevalence of supermarkets and fast food chains (Claasen *et al.*, 2016; Igumbor *et al.*, 2012; Puoane & Tsolekile, 2008). Processed, packaged, and ready-to-eat foods are now more available, affordable, and acceptable to all sectors of the South African population. This change has



contributed towards a change in the dietary patterns of consumers which may have contributed to an increase in overweight, obesity and non-communicable diseases (Claasen *et al.*, 2016; Igumbor *et al.*, 2012).

The urban food environment also encompasses different food access dimensions which influence the food choices of urban consumers. The food access dimensions of the urban food environment determine the number, type, location and accessibility to food retail outlets; and they also determine what consumers encounter in and around these food outlets and at home (Caspi *et al.*, 2012). The food access dimensions encompassed by the urban food environment thus include accessibility, availability, affordability, acceptability and accommodation of food (Cannuscio *et al.*, 2014a; Cannuscio, Tappe, Hillier, Bittenheim, Karpyn & Glanz, 2014b). Availability refers “to the adequacy of the supply of healthy food near people’s homes” (Andress & Fitch, 2016). For example, the presence in close proximity of certain types of food outlets selling healthy food produce (supermarkets, fruit and vegetable markets or stores, restaurants, and a number of other places to buy food produce) (Andress & Fitch, 2016). Accessibility refers to the geographic location of food services or food outlets and the ease with which the consumer could reach these locations. It also refers to travel time, transportation opportunities and the distances required to travel to the various food purchasing locations. Affordability “refers to food prices and consumers’ perceptions of worth relative to the cost of the food item” (Caspi *et al.*, 2012). The likelihood of a food item being purchased by an individual is usually determined by its price. Acceptability refers to a person’s attitude towards a specific food item. It also refers to an individual’s personal food standards and or preferences and whether their local food outlet meets these standards. Lastly, accommodation refers to how well local food outlets respond to consumers’ needs. The local food outlets need to provide and accommodate the different needs of consumer groups that reside in an area (Andress & Fitch, 2016). For example, food stores in well-developed urban areas provide credit card facilities and these stores usually have longer operating hours to provide for the needs of consumers working long hours, whilst in rural areas such services may not be provided.

The urban food environment provides urban consumers with a variety of food retail outlets. These include big supermarkets, convenience stores, bakeries, butchers, restaurants, street vendors, and fast food outlets. The diversity of these food outlets influence the food choices of consumers as both healthy and unhealthy food options are available in abundance (Cummins, 2014; Ball, Timperio & Crawford, 2009; Smoyer-Tomic, Spence, Raine, Amrhein, Cameron, Yasenovskiy, Cutumisu, Hemphill & Healy, 2008; Powell, Slater, Mirtcheva, Bao & Chaloupka, 2007). Due to the fast-paced and busy lifestyles of urban consumers, there is a high demand for convenient food products that require less time to prepare (Jabs & Devine, 2006). The demand for convenient food options therefore determines where individuals will buy their food, including the type of food

and the location of the store from which they will buy the food (Cannuscio *et al.*, 2014a). The socio-economic status of an individual also influences the type of food and location where food will be bought from, since consumers tend to purchase food from stores or food outlets which are in close proximity to their residential area (Cannuscio *et al.*, 2014b; Jack *et al.*, 2013). Some consumers may prefer to purchase more affordable food that may not provide them with health benefits due to the high cost of living in an urban environment (Abdullah, Mokhtar, Bakar & Al-Kubaisy, 2015). The next section will discuss the South African urban food environment in more detail.

### **2.6.1.1            *The South African urban food environment***

South African urban consumers make use of a variety of places for their daily food choices and purchases. These places consist of both formal and informal food outlets (Claasen *et al.*, 2016). Formal food outlets are large or medium-sized food retail businesses, which are either privately or corporately owned. They include corporate organisations such as supermarkets, convenience stores, as well as fast food franchises. Formal food outlets are typically built with traditional brick and mortar, and serve consumers in their local food environment (Pereira, Cuneo & Twine, 2014; Roos, Ruthven, Lombard & McLachlan, 2013). Informal food outlets are small privately owned businesses that do not operate in corporate structures, and they sell a limited range of food, toiletries and household items (Nielsen, 2016; Stroebel & van Schalkwyk, 2012:154). Informal food outlets provide a service to residents in their immediate surroundings. Hence, they are typically operated from temporary structures such as a tabletop, or permanent structures such as a room next to a house. These retail outlets include spaza stores, street vendors and food markets (Nielsen, 2016; Skinner, 2016; Drimie *et al.*, 2013; Roos *et al.*, 2013). “A spaza shop is usually attached to the owner’s house, but can be in a garage, an outside room, a shipping container or it could be a street vendor” (Stroebel & van Schalkwyk, 2012:154). Street vendors operate from temporary structures such as a table, a stand or kiosk, located directly on the pavement or street (Steyn & Labadarios, 2011). Street vendors usually sell fruit, vegetables, sweets, cold drinks, and cooked lunches, and they sell their products in busy areas. These areas include train and bus stations, business or industrial areas, where there are limited food options for those working in the factories or warehouses nearby (Gamielien & Van Niekerk, 2017; Steyn, Mchiza, Hill, Davids, Venter, Hinrichsen, Opperman, Rumbelow & Jacobs, 2014; Steyn, Labadarios & Nel, 2011). The informal food outlets are commonly visited by South Africans who are mostly of the black population group (Claasen *et al.*, 2016; Drimie *et al.*, 2013). The informal food outlets meet consumers’ everyday food needs such as bread, and other convenience products packaged in smaller sizes at more affordable prices. Additionally, informal food outlets such as the spaza shops sell food on credit and are usually open for longer hours. However, informal food outlets



have a smaller selection of healthy foods (Battersby, 2017; Cannuscio *et al.*, 2014a). Spaza shops are common in the informal food sector and they are typically available in townships and poor neighbourhoods (Claasen *et al.*, 2016; Stroebel & van Schalkwyk, 2012:154).

The formal food outlets are typically where most South African consumers residing in urban areas purchase their groceries and food products. South African consumers buy food and non-food items from the four big chain supermarkets, namely, Shoprite-Checkers, Pick n Pay, Spar, and Woolworths. (Stroebel & van Schalkwyk, 2012:152; Crush & Frayne, 2011). These leading supermarkets provide their consumers with monthly sales, and affordable prices for a wide range of food products ranging from fresh to processed items. Further, supermarkets provide consumers with easy access to healthy foods in comparison to convenience stores and local markets that offer limited access (Rischke, Kimenju, Klasen & Qaim, 2015). Supermarkets in South Africa are currently estimated to account for 75% of all grocery sales, with the remainder largely accounted for by the informal food outlets (Battersby, 2017; Agyenim-Boateng, Benson-Armer & Russo, 2015). Fast food outlets and convenience stores are also freely available in South Africa. Fast food outlets normally provide consumers with food items which are energy-dense, generally high in refined sugars and salt, and low in fibre and micronutrients (McKay & Subramoney, 2017; Feeley, Kahn, Twine & Norris, 2011). A study by Igumbor *et al.* (2012) reported that in 2010 there were over 8 500 fast food outlets in South Africa. Fast food consumption among South Africans has increased and this increase is attributed to factors such as globalisation, urbanisation, a growing black middle class and more women in the labour force (Blick, Abidoye & Kirsten, 2018; Wingrove & Urban, 2017). Convenience stores are smaller food outlets, often found at petrol stations. Examples of convenience stores in South Africa are small express shops as well as tuck shops at petrol stations. Due to limited shelf space a limited selection of ready-to-eat foods, staple groceries, and non-food items such as magazines, cigarettes, beverages, and few toiletries are offered by convenience stores.

The next section will discuss what is known about the food practices of urban South African adults.

## **2.7 FOOD PRACTICES OF URBAN SOUTH AFRICAN ADULTS**

The South African population consists of different population groups, namely White, Black African, Indian/Asian, Coloured, and Other/Unspecified (Stats SA, 2014). The food practices of these population groups might differ due to cultural differences. Recent national research studies on the food practices of the South African groups, especially urban adults, are limited. The available information is outdated and mostly focused on a specific population group or South African province. This lack of information posed a challenge to discussing the food practices of urban

South African adults as a collective group. However, a study conducted by Shisana, Labadarios, Rehle, Simbayi, Zuma, Dhansay, Reddy, Parker, Hoosain and Naidoo (2014), provides a comprehensive insight into the nutrition and dietary diversity of South Africans. This study reports that over 40% South Africans in rural and informal urban areas are nutritionally deficient, with low dietary diversity, and also food insecure. On the contrary, for high earners in urban areas, food diversity was high, and frequently foods consumed were high in fat, sugar, and contributed to obesity and other health problems such as diabetes, cardiovascular diseases, and hypertension (Shisana *et al.*, 2014:77).

Food practices as a concept is multidimensional, and incorporates aspects such as food choice, food production, procurement, preparation, consumption and eating patterns, as well as how chosen foods are used (Spaargaren, Oosterveer & Loeber, 2012; Viljoen, 2009). These aspects are discussed below in order to provide a brief overview of the food practices of South African urban adults.

### **2.7.1 Production, procurement, and preparation of food**

Increased globalisation and urbanisation have caused consumers' dependency on their food environment to deepen (Stroebel & van Schalkwyk, 2012:159). The food practices of urban consumers are heavily influenced by the urban food system, including how food is produced, processed, and distributed for consumption (Wunderlich *et al.*, 2018; Smit, 2016; Wiskerke, 2015). Urban consumers rely on the urban food system to purchase most, if not all, their food items. Research has shown that on average, households spend almost 40-50% of their disposable income on food (Smit, 2016; Chevalier, 2015). South Africans mainly do their food purchases at month end, when supermarkets and wholesalers offer specials that make buying in bulk sensible (Chevalier, 2015; Tschirley, Reardon, Dolislager & Snyder, 2015). These month end specials and offers are advertised by food retailers via media such as radio, magazines, and television (Holdsworth & Landais, 2019; Kroll, 2017). However, a high percentage of the food specials advertised by retailers is processed, and convenience or fast food which is usually energy dense and enticing to consumers (Kroll, 2017; Chevalier, 2015; Charlton *et al.*, 2004). Campaigns to buy one and get one free make it difficult for consumers to resist. Moreover, the purchasing of more refined, convenient options such as bread, pasta and rice over complex carbohydrates has been observed among urban dwellers (Ronquest-Ross *et al.*, 2015).

The increased production and procurement of more convenient processed and packaged foods is attributed to more women entering the labour force (Stroebel & van Schalkwyk, 2012:159). In addition, most adults in urban areas experience time constraints, which means that they have less time to shop and cook, instead preferring to buy ready-to-eat food (Pelletier & Laska, 2012;

Stroebeel & van Schalkwyk, 2012:160). South Africans increasingly prefer convenient options that will make their lives easy (Nielsen, 2018). The report by Nielsen (2018) states that when South Africans were asked “which products do they wish were on the market but are less available”, 40% wanted products that would make their life easier, 36% wanted more products that are convenient to use, 25% wanted products that were specifically made to suit small families and households, and 20% wanted more products that are tailored to a specific need. Nielsen (2018) also reports that more South Africans are opting for easy quick-service food options, since meals such as lunch and supper are likely to be enjoyed away from home. Nielsen (2018) further estimates that 50% of South Africans eat away from home on a monthly basis, 18% do so weekly, and 13% less often eat away from home. This demand for convenience and ready-to-eat food services is associated with a more westernised lifestyle (Stroebeel & van Schalkwyk, 2012:160).

A study by Vogel (2018) found that black adults purchase their food products from both formal and informal food outlets. Most of their food products are purchased from local supermarkets, while vegetables and fruits are mostly procured from street vendors. Black adults in townships visit spaza shops daily as they are located within their neighbourhoods, and fast food outlets are visited on special occasions. Convenience shops are the least frequently visited, and supermarkets are visited less than 3 times a month which can indicate that they are usually visited at month end for bulk buying. Fresh fruit and vegetable markets are visited 1-2 times a week. Taxis or public transport is the most commonly used transport for buying household items from supermarkets (Vogel, 2018:48-56). On the contrary, adults from the white population group use their own vehicles as mode of transport for shopping. White urban adults buy their household food items from formal food shopping outlets such as supermarkets (visited more than once a week), fresh fruit and vegetable stores (1-2 times per week), butcheries (on special occasions and/or 3 times a month), and fast food outlets (special occasions). White adults never visit street vendors and spaza shops (De Kock, 2019:86-90).

## **2.7.2 Consumption and eating patterns of urban adults**

A study by Shisana *et al.* (2014) determined that the dietary diversity and nutrition of rural and urban South African adults differ. The meals of urban consumers are more diversified, and nutritional concerns such as malnutrition and/or food insecurity are less prevalent in urban areas (Shisana *et al.*, 2014:155-167). As mentioned earlier, studies into the food practices of South African adults usually report on a specific group and/or specific South African province. Current studies with usable information report on urban black adults in Tshwane (Vogel, 2018; Dlamini, 2016), white urban adults in Tshwane (De Kock, 2019), and white South African students (Viljoen, van der Spuy & du Rand, 2018). The study by Dlamini (2016:55-68), measured the eating patterns of the respondents during weekdays and weekends. Results from this study indicated that most

of the participants eat two to three meals a day both on weekdays and weekends. The meal patterns included breakfast which consisted of bread, breakfast cereals (cornflakes, Weet-Bix), and milk. In-between breakfast and lunch, a fruit or fruit salad was a popular snack. Lunch consisted mostly of bread and chicken with a savoury snack or fruit. For lunch, foods such as vegetables, meat (pork, beef, mutton), salads, maize meal porridge or rice were least consumed because they require meal planning and preparation. Bread was sought after because it is a quick and easy option. The last meal of the day was supper, and foods consumed included rice, chicken, vegetables, and tea. Beverages consumed included fruit juice and soft drinks. Dlamini (2016) also indicated that during weekends some of the respondents usually skipped breakfast as opposed to weekdays, and they frequently consumed fast foods or take-away foods. In the households of most urban black adults, fast foods, and snacks available included salty snacks (potato chips), chocolates and sweets, soft and carbonated drinks, fried chips, and take-away food (KFC or Nando's). The results from Vogel's (2018:78-83) study on the composition of black adults' meal patterns did not differ from those of Dlamini (2016). Regarding the meal composition and frequency of consumption, both Vogel (2018:83) and Dlamini (2016:68) found that foods consumed 1-2 times a week included potatoes and white sweet potatoes, dark green leafy vegetables, organ meat, other vegetables and fruits, and legumes. Foods consumed more than once or twice a week include meat (red meat and chicken) and eggs, and foods consumed daily include other vegetables and fruits, breakfast cereals, milk, fats and oils, sweets and sweet foods, spices, and tea. Eating away from home was enjoyed 1-2 times a month. This leads one to conclude that apart from occasional meals outside of the home, all other meals were prepared at home.

As reported by Dlamini (2016:66), black urban adults usually consume traditional foods on special occasions, and they have a positive attitude towards traditional foods as they regard them to be healthy and taste good. Concerns regarding traditional foods is that it takes longer to cook. Therefore, starchy foods mainly consumed include white and brown bread, rice, and pasta, as opposed to traditional starchy foods such as samp and maize meal porridge (pap). Margarine was the most frequently used bread spread by urban black adults, although other spreads such as jam and peanut butter were also used. Processed meat frequently consumed by urban black adults included boerewors, while Russians and Vienna sausages, ham, polony, and bacon are usually consumed less than 3 times per month. The food practices of urban black adults indicate an increase in the consumption of Western-oriented foods such as rice, and breakfast cereals instead of traditional whole grain foods. The consumption of eggs and milk have also increased among South Africans.

The white population group also eats two to three meals a day with snacking in-between meals, and eating away from home was enjoyed 1-2 times a month at a restaurant (De Kock, 2019:65-66; Viljoen *et al.*, 2018). In the study by Viljoen *et al.* (2018) of white South African students eating habits, participants indicated that they usually eat or drink at specific times during the weekday. These times included breakfast (between 6h00 and 9h00), mid-morning (between 9h00 and 12h00), lunch (between 12h00 and 15h00), mid-afternoon (between 15h00 and 17h00), and supper (between 17h00 and 20h00) and after supper (after 20h00). The breakfast foods consumed included breakfast cereals and bread, a few others also included eggs, bacon, and dairy products such as milk and yoghurt. A bread-based lunch was consumed, and other food items consumed for lunch by a few respondents included chicken, meat, French fries, pies, and vegetables and fruits. Supper, the main meal of the day, consisted of meat or chicken, vegetables, pasta or potatoes, and salads, with tea and coffee enjoyed after supper. Snacks mainly consumed around midday were fruits and potato crisps. Fast foods and convenience or ready-prepared meals also formed part of meals enjoyed by white students 1-2 times a week. However, home-cooked meals were enjoyed by the majority almost daily. Weekend meal patterns differed from those on weekdays, consisting of a bigger breakfast, while more snack and take-away foods were consumed on Saturdays, and on Sundays a home-cooked midday meal was enjoyed (Viljoen *et al.*, 2018). The weekday meal composition of white adults in the Eastern suburbs of Tshwane from the study by De Kock (2019:67,79), consisted of red meat, chicken, fish, eggs, boerewors, full cream milk, fruits and vegetables. These were generally consumed daily, although not in the recommended amounts. Fats and oils frequently consumed included butter, and tub margarine with vegetable oil. Rice, pasta, and potatoes were frequently consumed starchy foods. Food items seldom consumed included legumes and nuts, fast foods, and salty or sweet snack foods. The study by De Kock (2019:73-76) went further to indicate the number of servings for food groups such as starchy foods, orange-fleshed vegetables and fruits, other vegetables and fruits, fats and oils, meat, poultry, fish, milk and dairy products. Only 1-2 servings a day of these groups were enjoyed by the respondents.

Certain similarities are noticed regarding the food practices of both black and white adults. Both groups enjoyed a bread-based breakfast and lunch, frequently consumed rice, pasta and potatoes, meat, chicken, and less frequently consumed vegetables and fruits in the recommended amounts. The snacks consumed are also the same for both groups, and the beverages (tea or coffee) are also frequently enjoyed. Traditional whole grain foods as well as legumes and nuts were foods not frequently consumed by the respondents of both groups. This, therefore, confirms a Western-oriented eating pattern.

To help guide South African consumers on what foods to eat that are locally available and within their reach, the Food Based Dietary Guidelines for South Africa were formulated. The Food Based Dietary Guidelines for South Africa aim to guide consumers to consume and or adopt healthy food practices that meet all their energy and nutrient requirements (Vorster *et al.*, 2013a). The next section provides a brief discussion on the Food Based Dietary Guidelines for South Africa, followed by dietary diversity.

### **2.7.3 Food Based Dietary Guidelines for South Africa**

The Food Based Dietary Guidelines for South Africa are short, science-based dietary policy recommendations based on the local South African foods and eating patterns, and aim to guide consumers to consume and or adopt healthy food practices that meet all their energy and nutrient requirements (Vorster *et al.*, 2013a). The guidelines were aimed at individuals aged seven years and older. The Food Based Dietary Guidelines for South Africa were initiated in 1997 by the Nutrition Society of South Africa (NSSA) in partnership with several other health and nutrition stakeholders such as the National Department of Health, the Medical Research Council (MRC), and agencies of the United Nations as well as food production organisations in South Africa. The first version of the guidelines were published in 2001 in the South African Journal of Clinical Nutrition, and they were formally adopted by the Department of Health in 2003. A guideline on sugar intake was added later because high sugar consumption was causing dental cavities in children.

In 2011, the Food Based Dietary Guidelines for South Africa were revised and a new set of guidelines, slightly different from the first set, were developed. The formulation of the second set of guidelines was motivated by the perception that “people eat foods and not nutrients”. Nutrition scientists therefore found it necessary to replace nutrient-based recommendations with Food Based Dietary Guidelines, which are recommendations based on local food and eating patterns. Vorster *et al.* (2013a), states that the Food Based Dietary Guidelines for South Africa are a translation of evidence-based nutrient recommendations into food or dietary patterns that should guide the general population to consume a healthy, optimal diet. The Food Based Dietary Guidelines were formulated in such a way that the broader South African population can understand, relate, and could apply these guidelines. Changes made to the new set of guidelines included a guideline on milk, a change on the fat intake guideline to focus on the quality of fat, the removal of the guideline on alcohol consumption, and minor changes to the wording of the first set of guidelines. The final revised set of Food Based Dietary Guidelines for South Africa thus included ten guidelines (see Addendum D). The purpose and importance of the Food Based Dietary Guidelines for South Africa are to ensure that the public adopts the consumption of adequate diets that meet all their nutrient needs. Furthermore, the purpose of the guidelines is to



ensure that diets consumed by individuals help to prevent the development of deficiencies and non-communicable diseases (Vorster *et al.*, 2013a).

South African studies that have investigated the general population's adherence to the guidelines are limited. Studies that have been done tested the acceptance and understanding of the Food Based Dietary Guidelines for South Africa by a certain population group (Napier, Oldewage-Theron & Grobbelaar, 2018). Another study by Harris, Malczyk, Jaffer and Steyn (2019) investigated how well adolescents complied with the guidelines on fat, sugar and sodium, in which they concluded that the adolescents did not meet any of the guidelines. Du Plooy, Schönfeldt and Hall (2018), also conducted a study in which they explored the role of traditional foods, such as maas, in the Food Based Dietary Guidelines. Their study concluded that maas is often consumed by South Africans because they consider it to be healthy. South African literature, therefore, lacks information on consumers' compliance with the collective Food Based Dietary Guidelines for South Africa (Labadarios, Steyn & Nel, 2011).

The consumption of a variety of foods is recorded as the first guideline in the Food Based Dietary Guidelines for South Africa. This is because the daily consumption of a variety of foods is critical to ensure that all individual nutritional needs are met. A brief discussion on dietary diversity follows.

#### **2.7.4 Dietary diversity**

"Dietary diversity is a qualitative measure of food consumption that reflects a household's access to a variety of foods and is also a quick and easy tool that determines the nutritional adequacy of individuals" (Kennedy, Ballard & Dop, 2011:5). A questionnaire consisting of different food groups is used to collect dietary information from either an individual or household to determine dietary diversity, depending on the purpose and objectives of the study. The food groups included in the dietary diversity questionnaire include starchy foods (cereals, white roots and tubers), Vitamin A-rich fruits and vegetables, dark green leafy vegetables, other fruits and vegetables, meat, poultry or fish (organ meat, flesh meat, and seafood), legumes, nuts and seeds, eggs, milk and dairy products, fats and oils, sweets, spices, condiments, and beverages. The individual or household are asked to indicate whether they consumed any foods from each food group the previous day (Kennedy *et al.*, 2011:8).

In order to determine how diverse an individual or group's diet is, a Dietary Diversity Score (DDS) must be determined. The dietary diversity score is determined by counting the number of food items consumed by an individual from each of the given food groups. Food items from each group are counted once. The total count of food items is then summed, and the mean attained is used

as the dietary diversity score (Casale, Espi & Norris, 2019; Habte & Krawinkel, 2016; Salehi-Abargouei, Akbari, Bellissimo & Azadbakht, 2016). However, not all food groups are used to calculate the dietary diversity score. Food groups such as sweets, spices, condiments, and beverages are not included when calculating the dietary diversity score since they do not make a significant contribution to an individual's nutritional adequacy. Calculating an individual's dietary diversity score is therefore confined to 9 food groups (Kennedy *et al.*, 2011:23-24). It should, however, be noted that researchers could use different numbers of food groups to calculate the dietary diversity score depending on the aim and objectives of their research (Horsey, Swanepoel, Underhill, Aliakbari & Burkhart, 2019; Caswell, Talegawkar, Siamusantu, West Jr & Palmer, 2018; de Bruin & Gresse, 2018; Faber *et al.*, 2017; Habte & Krawinkel, 2016; Waid, Ali, Akter & Thilsted, 2016). The consumption of a variety of foods is advised because no one food item can provide all the nutrients required by an individual or group (Labadarios *et al.*, 2011).

For a person's diet to be nutritionally adequate, a dietary diversity score of not less than 4.0 (which is the cut off level) out of the 9 food groups should be attained. This means that a person should strive to consume foods from at least 4 or more of the 9 essential food groups. The dietary diversity score of South Africans reported in the study by Shisana *et al.* (2014:167) was 4.02, which was just above the cut off level. Labadarios *et al.* (2015) therefore concluded that the overall majority of South Africans do not consume a diverse diet, and that they do not fully comply with the first Food Based Dietary Guidelines for South Africa which recommends that individuals should enjoy a variety of foods, as determined by several studies (Martin-Prével, Allemand, Wiesmann, Arimond, Ballard, Deitchler, Dop, Kennedy, Lee & Moursi, 2015).

## **2.8 CONCLUDING SUMMARY**

This chapter discussed the human ecological model and the food choice process model, which were used as theoretical models for the study. These models provided a holistic approach to explain the food choice process as part of consumers' food practices. The external and internal environments and how they influence an individual's food choice process were explained. The concept of food literacy, as well as its components, were explained with emphasis on the food knowledge component of food literacy. Declarative and procedural knowledge in relation to the study, which focuses on the food practices and food knowledge of South African urban adults, were also explained. Adulthood as a life stage, the urban environment, the urban food environment, the food practices of urban South African adults as well as the Food Based Dietary Guidelines for South Africa, and dietary diversity were discussed. The next chapter addresses the research methodology employed in the study.



## Chapter 3

# RESEARCH METHODOLOGY

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### 3.1 INTRODUCTION

This chapter presents the research methodology followed in this study. The chapter includes the research design employed to answer the research questions, and also states the aim of the study, the conceptual framework, the conceptualisation of the main concepts, and operationalisation. The development of the measuring instrument, the unit of analysis, the sample and the sampling technique used are included. The data collection method and data analysis are explained, followed by the steps that were taken to ensure data quality. Lastly, the ethical considerations applicable to the study are discussed.

### 3.2 RESEARCH DESIGN

The research design refers to the plan and the detailed procedures followed to collect, analyse, and interpret the data collected as part of the study. These procedures ensure that the research aim and objectives are achieved (Creswell, 2013:31). A quantitative research approach was followed in this explorative, descriptive, and cross-sectional study. This approach was chosen because the study seeks to determine and describe the food practices and food knowledge of urban adults in South Africa and their compliance with the Food Based Dietary Guidelines for South Africa.

Explorative research provides insight into a new situation or phenomenon that has not yet been comprehensively researched, thus leading the researcher to an appreciation of the situation at hand (De Vos, Fouché, Delpont & Strydom, 2011:95). In this study, the researcher seeks to gain insight into the study groups' food practices in relation to their food knowledge, and their compliance with the Food Based Dietary Guidelines for South Africa.

Descriptive research describes the characteristics of an existing phenomenon and is applicable when a researcher is trying to understand current events and their relationship to other factors (De Vos *et al.*, 2011:96). This study is descriptive because the researcher wanted to gain insight into and describe urban adults' food practices and food knowledge, since the level of South Africans' food knowledge is not known. A cross-sectional study is used to collect data from a sampled population at a specific point in time (De Vos *et al.*, 2011:102). This study explored the

food practices and food knowledge of urban South African adults at a given point in time, during 2018.

The following aim and objectives were formulated for this study.

### **3.3 RESEARCH AIM AND OBJECTIVES**

The aim of the study was to explore and describe the food practices and the food knowledge component of urban South African adults' food literacy. The study further aimed to explicate the study group's food practices in relation to their food knowledge, and how compliant their food practices are with the Food Based Dietary Guidelines for South Africa.

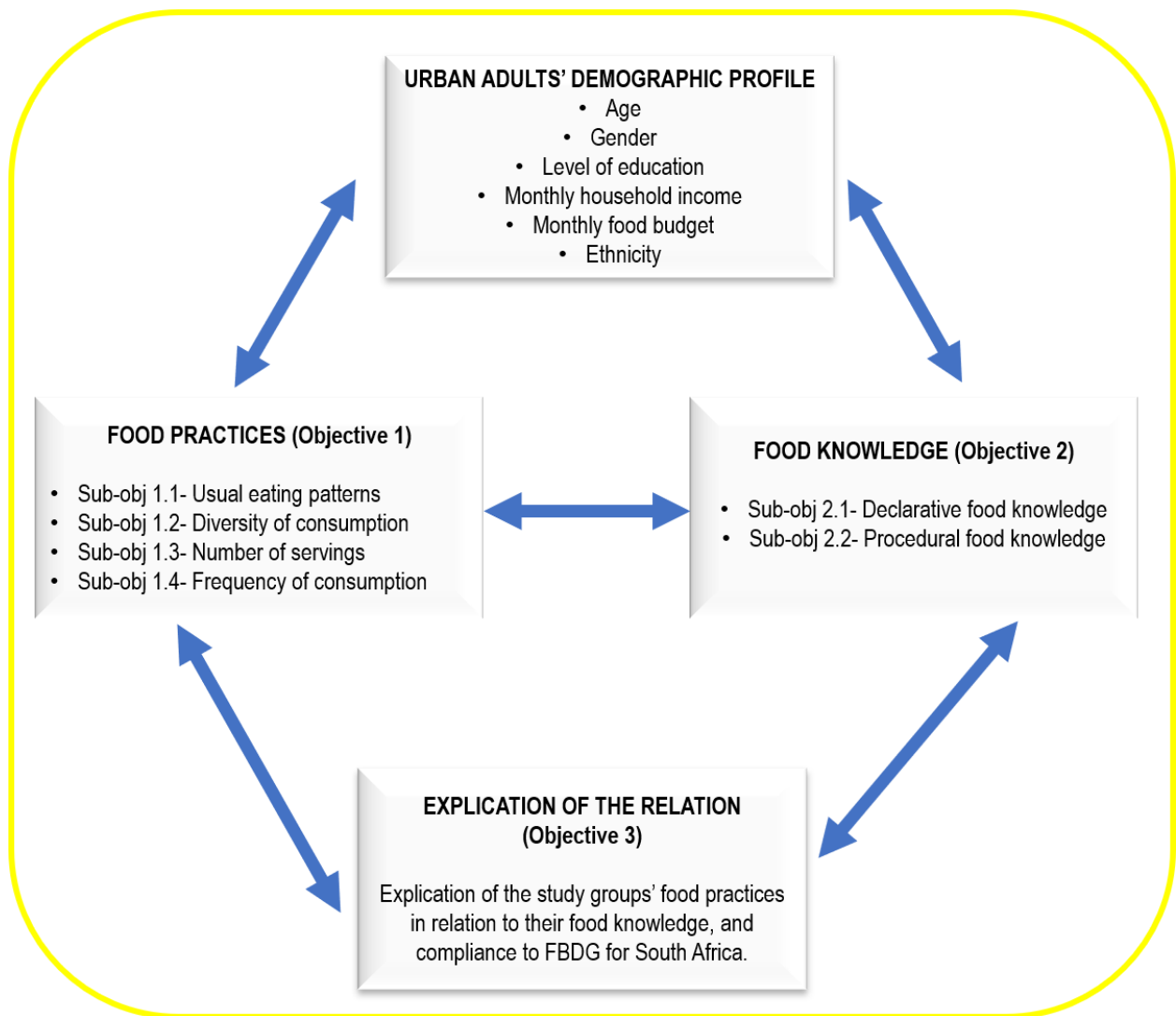
The study was guided by the following objectives and sub-objectives:

1. To explore and describe the food practices of South African urban adults (henceforth referred to as the study group).
  - 1.1. To determine and describe the study group's eating patterns (meal patterns and meal composition).
  - 1.2. To determine and describe the diversity of foods consumed by the study group.
  - 1.3. To determine the number of servings of different foods consumed per day by the study group.
  - 1.4. To determine and describe the frequency of consumption of selected groups of food by the study group (including the frequency of consumption of beverages, snack, and fast foods).
2. To explore and describe the study group's food knowledge component of food literacy.
  - 2.1. To explore and describe the study group's declarative food knowledge.
  - 2.2. To explore and describe the study group's procedural food knowledge.
3. To explicate the study group's food practices in relation to their food knowledge and how compliant their food practices are with the Food Based Dietary Guidelines for South Africa.

The next section presents the conceptual framework developed for this study.

### **3.4 CONCEPTUAL FRAMEWORK**

The conceptual framework illustrates how the various concepts and objectives relate to each other. In this study, the researcher explored and described the food practices of urban South African adults in relation to their food knowledge, and thereafter explicated the relation between these two constructs. Figure 3.1 provides an illustration of how the constructs are interrelated.



**FIGURE 3.1: CONCEPTUAL FRAMEWORK**

The relation between urban adults' food practices and their food knowledge is investigated. The demographic profile of the study group at the head of the framework indicates the importance of getting demographic information about the study group. The double-sided arrows indicate the interrelation of the demographic profile of the study group in guiding the researcher to profile and discuss the results of objective 1 and 2. The food practices of the study group are investigated in the first objective of the study, while the second objective investigated their food knowledge. The double-sided arrow in the middle between objective 1 and 2 indicate the focus of this study which is the relationship between these two objectives. These two objectives inter-relate with objective 3, which sought to explicate the study group's food practices in relation to their food knowledge. The explication of these concepts assists in assessing how compliant the study group's food practices are with the Food Based Dietary Guidelines for South Africa. This conceptual framework

shows that there is an interconnection between the three objectives of this study, as illustrated by the double-sided arrows between each of the objectives.

### 3.5 CONCEPTUALISATION OF THE MAIN CONCEPT

In this section, the conceptualisation of the main constructs and concepts are given.

**Beverages** represent liquids consumed by individuals to hydrate, refresh, stimulate, and or nourish their body. Beverages include water, tea, coffee, soft drinks, and fruit juices (Duffey, Huybrechts, Mouratidou, Libuda, Kersting, De Vriendt, Gottrand, Widhalm, Dallongeville & Hallström, 2012).

**Declarative food knowledge** is information or theoretical knowledge such as facts or events, which are stored in one's memory (Dickson-Spillmann & Siegrist, 2011). Declarative food knowledge refers to having theoretical knowledge about food and all the important aspects involving food and nutrition (Fordyce-Voorham & Wai Ling Lai-Yeung, 2016), such as knowing what a healthy meal is, and the nutritional content of a food item. For example, having knowledge of the fibre content in an apple or having knowledge of the number of kilojoules in a cup of full cream milk.

**Dietary diversity** is the consumption of a number of different food groups consumed a day or at a specific period of time. It also gives an indication of the nutritional adequacy of an individual or household's food intake (Kennedy *et al.*, 2011).

**Eating patterns** include the meal patterns and meal composition of an individual. Eating patterns represent the total number of meals and snacks or beverages consumed a day, the type of food or beverages consumed, as well as the eating frequency and occasions of those specific meals and snacks or beverages (Netto, Earthman, Farias, Masquio, Clemente, Peixoto, Bettini, von Der Heyde & Dâmaso, 2017; Leech, Worsley, Timperio & McNaughton, 2015).

**Fast food** is defined as "... food purchased in self-service or take-away eating places that require minimal table service" (Mackenbach, Lakerveld, Generaal, Gibson-Smith, Penninx & Beulens, 2018). It consists of pre-prepared or pre-cooked meals that are kept ready for a customer to purchase. The use of pre-prepared food is of such a nature that it can be quickly heated or cooked and served to the customer in a packaged format for take-away in a short period, usually within 15 minutes (Mackenbach *et al.*, 2018; Isganaitis & Lustig, 2005). A few examples of fast foods include fish and chips, hamburgers, pizza, fried chicken, sandwiches, onion rings, hot dogs, fried chips, and salads.

**Food Based Dietary Guidelines for South Africa** are science-based, dietary recommendations that were formulated based on the local South African foods and eating patterns. The Food Based Dietary Guidelines for South Africa aim to guide consumers to consume and or adopt healthy food practices that meet all the energy and nutrient requirements of an individual (Vorster *et al.*, 2013a).

**Food choice** is the process in which the individual makes decisions about what foods and beverages to select and consume, considering what, how, when, where, and with whom to eat (Sobal *et al.*, 2006:1). Food choice is guided by five food access dimensions, namely, the availability, affordability, accessibility, accommodation and acceptability of the food item (Story *et al.*, 2008).

**Food consumption practices** refer to the way an individual or group consumes their food, including when, how, with whom, and what the individual eats. Food consumption practices can also be considered as an individual's embedded social and cultural practices associated with food consumption (Burger Chakraborty, Sahakian, Rani, Shenoy & Erkman, 2016).

**Food knowledge** serves as a primary guide to what food is, and where and how to source it. Food knowledge also guides individuals towards making informed and good food choices (Rozin, 2007:24; Bryant *et al.*, 2003:93; Story *et al.*, 2002). Food knowledge, as part of food literacy, also includes declarative and procedural knowledge.

**Food literacy** refers “to an individual's knowledge, skills and behaviour as demonstrated through the sourcing, consumption as well as the nutritional, economic, safety and social aspects of food” (Fisher *et al.*, 2019).

**Food practices** imply how the chosen food is used and includes all food-related behaviour that is typical to an individual or group (Viljoen, 2009:15). Food-related behaviour also consists of the cultural, social and economic practices that influence the production, procurement and consumption of food (Darnton, 2013).

**Frequency of consumption** refers to how often an individual consumes or intends to consume a selected food item during a specific period, which could be a day, week, month, season or a year (Engle-Stone & Brown, 2015).

**Knowledge** means having the ability to recognise something as information and being able to distinguish between what is true and what is false. It also means having some form of competency and or being acquainted with something or someone (Lehrer, 2018:3). For example, knowledge

refers to having the competence to inform or direct someone to bake a cake, or being acquainted with organising and planning for a dinner party.

**Meal composition** refers to the components of food items served or consumed at an eating occasion or event. It also refers to what the meal consists of or the variety of foods that make up a meal (Raulio, 2011; Meiselman, 2008).

**Meal patterns** are the number, composition and distribution of meals, snacks, and in-between meals consumed through the course of a day (Leech *et al.*, 2015).

**Procedural food knowledge** is knowledge of how to do things. This knowledge is expressed through physical skills (planning and cooking a meal) and cognitive skills (food presentation skills/menu development skills) (Dickson-Spillmann & Siegrist, 2011). Procedural knowledge involves the application of food skills or behaviour (Fordyce-Voorham & Wai Ling Lai-Yeung, 2016), for example, knowing how to make an apple pie or how to plan a balanced menu.

**Snack food** are small portions of food usually eaten in-between meals. Snacks are consumed to lessen the feeling of hunger and to provide quick energy. Snacks come in a variety of forms such as packaged snack foods or drinks and other processed foods, or can be made from fresh food items at home (Banna, Richards & Brown, 2017). A few examples of snacks include peanuts, biscuits or crackers, sweets and or chocolate bars, salads, fruits (dried or fresh), and smoothies.

### 3.6 OPERATIONALISATION

Operationalisation indicates how the concepts or variables were measured. The dimensions, indicators, and the measuring instrument used to measure each concept are summarised in Table 3.1. The relevant sections and question numbers of the survey questionnaires that were applicable to the measurement are also indicated.

**TABLE 3.1: OPERATIONALISATION**

OBJECTIVES & SUB-OBJECTIVES	CONCEPTS	DIMENSIONS	INDICATORS	MEASURING INSTRUMENT (QUESTIONNAIRE)
<b>Objective 1:</b> To explore and describe the food practices of South African urban adults (henceforth referred to as the study group).				<b>Questionnaire 2: Food Practice questionnaire</b>
1.1 To determine and describe the eating patterns (meal patterns and meal composition) of the study group	Eating patterns	Meal patterns  Meal composition	Number of meals consumed and places where meals are usually consumed  Variety of food items consumed in a meal	Section C: C1-C8
1.2 To determine and describe the diversity of the foods consumed by the study group	Diversity of consumption	Variety of foods consumed.	-Starchy staples -Fruits -Vegetables -Meat, poultry, or fish -Milk and dairy products -Eggs -Fats and oils	Section C: C9
1.3 To determine the number of servings of different foods consumed per day by the study group	Number of servings	Number of servings per day	-Starchy foods -Vegetables -Fruits -Meat, poultry, or fish -Milk and dairy products -Beverages	Section C: C10
1.4 To determine and describe the frequency of consumption of food by the study group (including frequency of consumption of beverages, snack, and fast foods)	Frequency of consumption	Type of food consumed  Number of times	-Protein-rich foods -Milk and dairy products -Fruits & vegetables -Fats and oils -Breads and cereals -Legumes and nuts -Beverages -Snack foods -Fast foods  Daily, 3-4 times per week, 1-2 times per week, seldom, never	Section C: C11 (FFQ)

**TABLE 3.1 CONTINUED: OPERATIONALISATION**

OBJECTIVES & SUB-OBJECTIVES	CONCEPTS	DIMENSIONS	INDICATORS	MEASURING INSTRUMENT (QUESTIONNAIRE)
<b>Objective 2:</b> To explore and describe the food knowledge component of food literacy of the study group.				<b>Questionnaire 1: Food literacy scale</b>
2.1 To explore and describe the declarative knowledge of the study group.	Declarative knowledge	Theoretical knowledge of food and nutrition	Six dimensions of food literacy: -Procurement (sourcing) -Financial (economics) -Consumption -Nutrition -Food safety -Social	Section B: All six dimensions of food literacy
2.2 To explore and describe the procedural knowledge of the study group.	Procedural knowledge	Application of food knowledge in decision making and food-related skills	Five dimensions of food literacy: -Procurement (sourcing) -Financial (economics) -Consumption -Food safety -Social aspects of food	Section B: Five dimensions of food literacy
<b>Objective 3:</b> To explicate the study group's food practices in relation to their food knowledge and how compliant the study group's food practices are with the Food Based Dietary Guidelines for South Africa.				
	Food practices Food knowledge	-	Food practices in relation to Knowledge	Descriptive statistics



## 3.7 MEASURING INSTRUMENT

### 3.7.1 Background and development of the measuring instrument

For this study, two sets of online survey questionnaires were developed. This Master's study formed part of a PhD study that aimed to develop and validate a food literacy measuring instrument for South Africans. This study specifically tied in with the second step of the first phase of the PhD study, when the scale item development and purification process were conducted. During this phase of the PhD study, the food literacy scale consisted of 151 scale items representing the six dimensions of food literacy, namely procurement (sourcing), financial (economics), consumption, nutrition, food safety, and social aspects of food. This Master's study employed the 151 food literacy scale items to measure the respondents' food knowledge. The 151-item food literacy scale was presented first as a separate questionnaire to the respondents. The rationale for presenting the food literacy questionnaire first, followed by the food practices questionnaire, was to ensure that a large enough sample would complete the first part of the survey for the PhD study. A concern was that if both questionnaires were presented together, the required response rate for the validation of the food literacy scale would not have been achieved due to respondents becoming fatigued or perceiving the survey as too long and time-consuming to complete. To measure respondents' food practices, an existing questionnaire was presented after (Viljoen *et al.*, 2018).

### 3.7.2 Composition of survey questionnaires

In the next sections, the composition of each of the questionnaires is given to explain how the concepts of food knowledge and food practices were measured.

#### 3.7.2.1 Food literacy scale (Questionnaire 1)

Questionnaire 1 consisted of two sections (see Addendum C, section A and B). Section A related to the demographic profile of the study group, and section B related to the specific food literacy dimensions.

**Section A: Demographic information** This section aimed to gain information on the respondents' demographic profile. It consisted mostly of closed-ended questions, and two optional open-ended questions. Information was requested on the age, gender, level of education and the population group of the respondents. The two optional questions were on the monthly household income and monthly household food budget.

**Section B: Food literacy scale** This section of the first questionnaire contained 151 scale items that represented the six dimensions of food literacy, namely procurement (sourcing), financial (economics), consumption, nutrition, food safety, and social aspects of food. Although this study focuses only on the food knowledge component of the food literacy scale, respondents had to complete the entire scale (151 items) for the PhD study.

Only 107 scale items (out of the total of 151) that apply specifically to food knowledge were used in this Master's study. These 107 scale items were represented by 63 items that measured declarative food knowledge and 44 items that measured procedural food knowledge. Respondents were requested to answer either "yes" or "no" to each of the scale items presented to them.

### **3.7.2.2 Questionnaire on food practices (Questionnaire 2)**

This questionnaire determined the food practices of the study group, and it included both open and closed-ended questions (see Addendum C, section C).

**Usual eating patterns:** The respondents were asked questions about their usual eating patterns, the number of meals consumed a day, the type of meals consumed (breakfast, lunch, supper, and snacks), how often they ate meals at home and away from home, and where most of their meals were consumed.

**Diversity of consumption:** The question on diversity of food consumed was linked to a list of food and beverages. The respondents were presented with the list of food groups and had to indicate if they consumed foods from the list the previous day. This included thirteen food groups, of which nine are considered essential and were thus used to determine the Dietary Diversity Score of the study group. An existing standardised measure for determining Dietary Diversity Score by Kennedy *et al.* (2011), was used to gather information on the foods consumed the previous day by the study group. The respondents' responses also indicated their meal composition.

**Number of servings:** Questions on the number of servings of food consumed a day were also included. A serving guide was given to determine an approximate serving size or quantity consumed per day.

**Non-quantitative food frequency questionnaire:** Lastly, a non-quantitative food frequency questionnaire measured the frequency of consumption for selected food groups. The food frequency questionnaire was used to cross-check and confirm the meal composition of the study

group. The respondents had to indicate how frequently they consumed foods from selected food groups including beverages, fast foods, and snack foods, choosing between daily, 3-4 times a week, 1-2 times a week, seldom or never.

### **3.8 PRE-TESTING THE QUESTIONNAIRE**

The questionnaire was pre-tested to ensure readability and comprehension of the measuring instrument and to eliminate possible shortcomings prior to the initial study (Kumar, 2014:191). The questionnaire was completed electronically by 20 adults with characteristics similar to the study group. They had to be South Africans and had to have access to a computer. After pre-testing the questionnaire, the researcher knew how long it took to complete the questionnaire. Based on feedback received from the participants, certain questions were rephrased to improve clarity, and changes were made to layout and question sequence to ensure the questionnaire flowed logically (De Vos *et al.*, 2011:237). The questionnaire was also evaluated by Consumer Science subject experts from the Department of Consumer and Food Sciences of the University of Pretoria.

### **3.9 STUDY POPULATION AND UNIT OF ANALYSIS**

The unit of analysis for this study was South African adults who were 18 years and older and are permanent residents of the country. The respondents had to be 18 years and older because at this age most individuals begin a life of independence, when they either enrol at a tertiary education institution or start working and leave home to start living on their own. At the age of 18 years, a person starts making their own decisions regarding their food choices and are responsible for the outcome of these food choice decisions. Moreover, at the age of 18 years, it is assumed that a person should have obtained some knowledge of food, health, and nutritional well-being. The services of a company called Consulta Research (Pty) Ltd, which specialises in market-related research, were secured to assist with the data collection. Consulta provides research assistance to a wide range of businesses, helping them to get to know their consumers so that they can provide in their consumer needs. The services of this research company were procured because they have a comprehensive database of South African consumers, which made it possible and convenient for the researcher to access a wide range of respondents to participate in the study. In order to participate in this study, the respondents had to be computer literate, and/or possess an electronic device to access and answer the online questionnaires. Respondents who consented to participate in the study and complied with other criteria such as population group, and urban residency were included in the study.

### **3.10 SAMPLE AND SAMPLING TECHNIQUE**

Convenience sampling was applied as the sampling technique in this study. Convenience sampling is a non-probability sampling technique and was chosen because of time and financial limitations. The sampling technique chosen must be practical and applicable to the topic being researched. Convenience sampling was regarded as appropriate to use in this explorative and descriptive research (Babbie, 2016:192). The research company also assisted with obtaining a large sample for this study since they have a wide database of South African consumers. Since the respondents had to answer two questionnaires, as discussed above in heading 3.7.1, the first questionnaire on the food literacy scale was completed by 1 657 respondents. The 1 657 respondents were further asked to complete the second questionnaire on their food practices, and 904 respondents did so. The final sample size of the study was thus 904 respondents.

### **3.11 DATA COLLECTION**

An electronic online survey questionnaire was used as the data collecting method in this quantitative study. This study formed part of a larger project, which was a PhD study that aimed to develop a South African food literacy measurement scale (mentioned earlier in the background and development of the measuring instrument). Consulta Research (Pty) Ltd assisted with the data collection process, which could include various interview channels such as face-to-face, telephonic, email and web-based interviews. The email and web-based interview channel were used for this study. The research company invited consumers on the Consulta database who met the criteria set for the study, to participate. The criteria for the study required South African adults who represented the different population groups, who were in the Consulta database, and were 18 years and older. Potential respondents were further instructed to follow a link with information about the study (see Addendum A). After reading and understanding the given information, the potential respondents had the option to participate in the study or not. By opening the link and choosing to participate in the survey, the respondents were informed that it would be assumed they understood what the study entails, and they were giving their informed consent to be part of the study.

The questionnaire was presented in two parts. It comprised the food literacy scale, which consisted of 151 scale items and after that, the questionnaire on food practices. Upon completing the food literacy questionnaire, the respondents were encouraged to further partake in answering questions on their food practices. However, they had the option not to continue answering the second questionnaire. An incentive was offered to those who continued with the second questionnaire on their food practices, in the form of being eligible to enter a lucky draw. Twenty

gift vouchers to the value of R450 each was offered as an incentive. Data collection was done between June and July 2018.

### **3.12 DATA ANALYSIS**

The first step after receiving the raw data set from Consulta Research (Pty) Ltd was to ensure that the data was cleaned and edited for completeness. After the first step, the first frequency analysis was performed (Kumar, 2014:296). Data was captured in a Microsoft Excel spreadsheet, and the Statistical Package for Social Sciences (SPSS) version 24 was used to analyse the data. Descriptive statistics (percentages, means and frequencies) summarised as tables and graphs were used to interpret and present the data (Leedy & Ormrod, 2015:159; Creswell, 2013:209) received from respondents about their demographic information, food practices and food knowledge.

### **3.13 ENSURING DATA QUALITY AND COMBATTING ERROR**

The two imperative aspects to ensure the quality of a study are through reliability and validity measures (Creswell, 2013:227). The study observed the following measures to combat errors and ensure reliability and validity.

#### **3.13.1 Reliability**

Reliability refers to the stability and consistency of a measuring instrument when tested and retested, and the measurement must consistently yield the same results in each test (Bryman, 2015:156). This study clearly defined all constructs according to relevant theory to ensure reliability. Multiple indicators that measured each aspect of a variable were included in the operationalisation (see Table 3.1). The questionnaire was pre-tested to assess the ease of completing the questions, the time it took to complete the questionnaire, and to ensure that the wording of the questions was clear and produced the desired responses.

#### **3.13.2 Validity**

Validity refers to the authenticity and accuracy of a measuring instrument and whether the instrument measures what it is supposed to measure (De Vos *et al.*, 2011:160). The following dimensions of validity applied to this study, namely construct, content, and face validity.

- **Construct validity** is the extent to which an instrument measures a variable that cannot be directly observed (Leedy & Ormrod, 2015:115). Construct validity is meant to validate the concept behind the measure through the construction of underlying dimensions that show a logical relationship between variables (De Vos *et al.*, 2011:162). Construct validity was thus assured by conducting an extensive review of the literature on the theory related to the variables of the study. This was done by reading various other reported studies dealing with eating patterns, food choice, food literacy, declarative and procedural food knowledge, as well as the urban food environment.
- **Content validity** refers to the adequacy of an instrument, and whether the instrument measures the concepts that are meant to be measured. It ensures that the content of a concept is covered by the instrument (Creswell, 2013:206; De Vos *et al.*, 2011:161). To ensure content validity, an extensive review of the literature for aspects concerning this study was done. The questionnaire was also evaluated by Consumer Science subject specialists.
- **Face validity** is the superficial appearance or face value of a measuring instrument, and whether it is appropriate for the population and intended purpose (De Vos *et al.*, 2011:161). The questionnaire was compiled based on the aim, objectives and guided by the conceptual framework of this study, using standardised questionnaires that measured similar concepts as those identified for this study.

### 3.14 ETHICAL CONSIDERATIONS

The study adhered to the guidelines for ethical conduct when dealing with human subjects in research, as determined by the University of Pretoria. Procedures followed to ensure adherence to the institution's ethical considerations included that respondents had freedom of choice to participate in the study and had to be provided with information about the study. The respondents were informed that after reading the information provided and choosing to open the link provided meant they understood the terms and conditions of answering the questionnaire. By doing so, it was assumed that the respondents gave their informed consent to participate in the study. Privacy was also assured by informing respondents that the data collected would be handled in a confidential and anonymous manner. Instructions on how to complete the questionnaire were given, and the respondents had the right to withdraw from answering the questionnaire at any time they wished to. For the study to be approved, a research proposal was submitted to the Ethics Committee of the Faculty of Natural and Agricultural Sciences of the University of Pretoria, which assigned the ethics approval reference number EC160318-09.

As per the University of Pretoria guidelines against plagiarism, the researcher made sure to articulately confirm proper referencing of every written and presented work to guarantee honesty and professional competence. A proper reference list is provided at the end of this research report, accompanied by a plagiarism declaration.

### **3.15 CHAPTER SUMMARY**

The methodology followed, and the research design used in this study were presented in this chapter. The chapter included the research design, the research aim and objectives, conceptual framework, conceptualisation, and operationalisation of the main concepts. The measuring instrument, study population, sample and sampling technique, data collection and data analysis were described in detail. To ensure quality of the study, reliability and validity were ensured, and ethics consideration were also addressed. In the next chapter, the results of the study are presented and discussed.

## Chapter 4

# RESULTS AND DISCUSSION

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### 4.1 INTRODUCTION

This chapter presents the results and discussion of the study, based on the objectives and sub-objectives identified to achieve the study's aim and objectives. The results presented and discussed in this chapter provides an explication of the food practices of South African urban adults in relation to their food knowledge. The demographic profile of the study group is presented and discussed first, followed by the presentation and discussion of each objective and sub-objective.

### 4.2 SAMPLE AND DEMOGRAPHIC PROFILE OF THE RESPONDENTS

A total of 904 South African urban adults participated in this study. The 904 respondents who participated in this study completed both questionnaires, namely Questionnaire 1 (the food literacy scale), and Questionnaire 2 (the food practices questionnaire) as described in Chapter 3 (see 3.11).

Demographic information was obtained through both closed and open-ended questions (see Addendum C, section A). The demographic profile of the study group includes age, gender, level of education, population group, as well as monthly household income, and monthly food budget which were obtained through two optional questions. Table 4.1 gives this information.

**TABLE 4.1: DEMOGRAPHIC PROFILE OF THE STUDY GROUP (N=904)**

CHARACTERISTICS	FREQUENCY (n)	PERCENTAGE (%)
<b>Age</b>		
Generation Z (18-22 years)	175	19.4
Generation Y (23-41 years)	303	33.5
Generation X (42-53 years)	172	19.0
Baby boomers (54-72 years)	228	25.2
Senior or mature generation (73-87 years)	26	2.9
<b>Gender</b>		
Male	387	42.8
Female	517	57.2



**TABLE 4.1 CONTINUED: DEMOGRAPHIC PROFILE OF THE STUDY GROUP (N=904)**

CHARACTERISTICS	FREQUENCY (n)	PERCENTAGE (%)
<b>Level of education (n=897)</b>		
Lower than grade 12	11	1.2
Grade 12	186	20.6
Undergraduate students	158	17.5
Grade 12 plus diploma/degree	365	40.4
Postgraduate degree	177	19.6
<b>Population group (n=888)</b>		
African	99	11.0
Asian	5	0.6
Coloured	24	2.7
Indian	67	7.4
White	692	76.5
Other	1	0.1
<b>Monthly household income (n=574)</b>		
R1 - R25 000 (Low & emerging middle class)	244	27.0
R25 001 - R40 000 (Realised middle class)	114	12.6
R40 001 - R100 000 (Emerging affluent)	185	20.5
≥R100 001 (Affluent)	31	3.4
<b>Monthly household food budget (n=682)</b>		
R25 - R1500	74	8.2
R1501 - R3500	208	23.0
R3501 - R6000	239	26.4
R6001 - R10 000	113	12.5
>R10 000	48	5.3

**Age:** The age range of respondents who participated in this study, was between 18 to 87 years. A good representation of the five generational age groups - another way of grouping adults - as described by (Bezerra, Bahamonde, Marchioni, Chor, de Oliveira Cardoso, Aquino, de Almeida, Molina, da Fonseca & de Matos, 2018; Wiedmer, 2015) was obtained. The five generational age groups included generation Z (18-22 years of age), generation Y (23-41 years of age), generation X (42-53 years of age), Baby Boomers (54-72 years of age), and the Senior or Mature generation (73-87 years of age). A third of the respondents (33.5%, n= 303) were represented by generation Y, also referred to as the Millennials. The Baby Boomers were represented by 25.2%, (n= 228) of the study group, followed by generation Z which constituted 19.4% (n=175), and generation X which also constituted 19.0% (n=172) of the study group. The Senior or Mature generation formed 2.9% (n=26) of the study group. The mean and standard deviation for age is presented in Table 4.2. The mean age of the study group was 40.61 years, with a standard deviation (SD) of 17.242.

**TABLE 4.2: MEANS PROCEDURE FOR AGE**

N	MINIMUM AGE	MAXIMUM AGE	MEAN	SD
904	18	87	40.61	17.242

**Gender:** More than half of the total sample (57.2%, n= 517) were females and 42.8% (n= 387) were males. This gender response difference has also been noted in other food and nutrition-related studies in which female respondents are usually the majority in comparison to male respondents, and this study followed the same trend (Krause, Beer-Borst, Sommerhalder, Hayoz & Abel, 2018; McKinnon, Giskes & Turrell, 2014). Keusch (2015) also found that females are usually more likely to participate in web or online surveys than males.

**Level of education:** The majority of the respondents (60.0%, n=542) completed grade 12 and obtained a first diploma/degree qualification, of which 19.6% (n=177) have obtained a postgraduate degree. Respondents who were still pursuing undergraduate studies constituted 17.5% (n=158) of the study group. Those who completed only grade 12 were 20.6% (n=186), with eleven respondents who had an educational level lower than grade 12. From these results, it can be deduced that the majority of the respondents were educated, as those with a grade 12 certificate plus a tertiary education constituted 77.5% (n=700) of the respondents.

**Population group:** The majority of the respondents belonged to the White (76.5%, n=692) population group, followed by 11.0% (n=99) from the African group. The Indian group constituted 7.4% (n=67) of the study group, followed by 2.7% (n=24) who were Coloureds. There were five respondents who identified themselves as Asians, and 17 respondents identified themselves as "Other".

**Monthly household income and food budget:** There were two optional open-ended questions on the monthly household income and monthly household food budget. The information provided on the monthly household income was re-grouped into four categories as used in the Bureau for Market Research's Annual Report (Mkhwanazi, 2016). These categories were the low and emerging middle class (earning between R1 - R25 000), the realised middle class (earning between R25 001 - R40 000), the emerging affluent (earning between R40 001 - R100 000), and affluent ( $\geq$  R100 001). These categories represent the monthly household income respondents earned per month. Respondents in the low and emerging middle class represented 27% (n=244) of the study group, followed by 20.5% (n=185) who were in the emerging affluent group. Respondents who were in the realised middle class were 12.6% (n=114), and lastly, the affluent class were 3.4% (n=31).

Of the respondents who indicated their monthly household food budget, 26.4% (n=239) spend between R 3 501 - R 6 000 a month on food, followed by 23.0% (n=208) who spend between R 1 501 - R 3 500. Respondents who spend between R 6 001 - R 10 000 on food were 12.5% (n=113), and 8.2% (n=74) spend between R25 - R 1 500. Lastly, 5.3% (n=48) of respondents spend more than R 10 000 of their income on the monthly household food budget. As these

questions were not compulsory, 36.5% (n=330) respondents chose not to indicate their monthly household income and 24.6% (n=222) of the respondents did not indicate their monthly household food budget.

The next section presents the results and discussion of the first objective of the study, which determined the food practices of the study group.

### **4.3 FOOD PRACTICES OF THE STUDY GROUP**

The food practices of respondents in this study were explored in the second questionnaire completed by the respondents during data collection. This questionnaire covered aspects regarding their eating patterns, diversity of food consumed, the number of servings of selected food groups, and the frequency of consumption (see Addendum C, section C). A detailed description of the questionnaire is given in chapter 3, section 3.7.2.2.

#### **4.3.1 Eating patterns of the study group**

The results on the first sub-objective on the food practices deal with the eating patterns of the study group. The construct of eating patterns relates to the meal patterns and meal composition favoured by an individual. Meal patterns refer to the consistent pattern and distribution of food throughout the day, either for a specific meal or between-meal snack (Leech *et al.*, 2015). On the other hand, meal composition refers to the food items served or consumed at an eating occasion or event. It also refers to what the meal or snack consists of or the variety of foods that make up a meal or snack (Raulio, 2011; Meiselman, 2008).

##### **4.3.1.1 *The meal patterns of the study group***

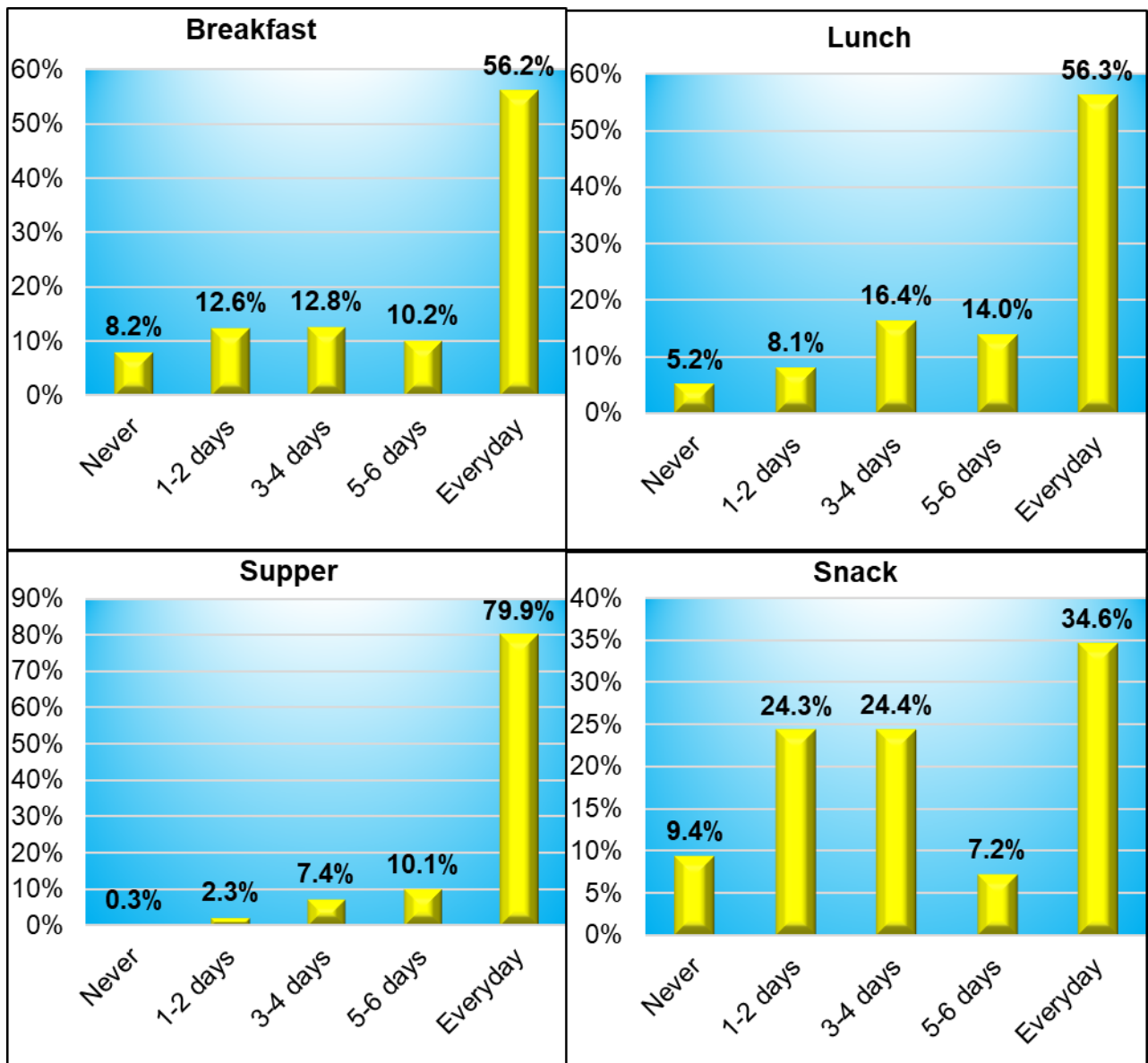
To determine the meal patterns of the respondents, they were asked questions on the number of meals they consumed a day, the number of days they consumed breakfast, lunch, and supper and snacked between meals in the past week, and the number of meals they consumed at home and away from home. The location where they eat their meals when eating away from home was also determined. Table 4.3 provides the results on the number of meals consumed a day.

**TABLE 4.3: NUMBER OF MEALS CONSUMED A DAY (N=904)**

NUMBER OF MEALS A DAY	FREQUENCY (N)	PERCENTAGE (%)
1	28	3.1
2	221	24.4
3	502	55.5
≥4	153	17.0

The majority of the respondents eat three meals a day (55.5%, n=502), followed by 24.4% (n=221) who eat two meals a day, and 17% (n=153) who eat four or more meals a day. The remaining 3.1% (n=28) of respondents reported only eating one meal a day. These results concur with other recent studies. A study by Kant (2018) on American adults also reported that 55% of adults from their total population ate three meals a day. Another study by Viljoen *et al.* (2018), on a group of white South African students, also reported that the majority of their study group (58.8%) consumed three meals a day.

Apart from the number of meals eaten a day, respondents were asked to indicate how often during the past week they consumed breakfast, lunch, supper and or snack foods. Figure 4.1 presents these results.



**FIGURE 4.1: MEAL PATTERNS (N=904)**

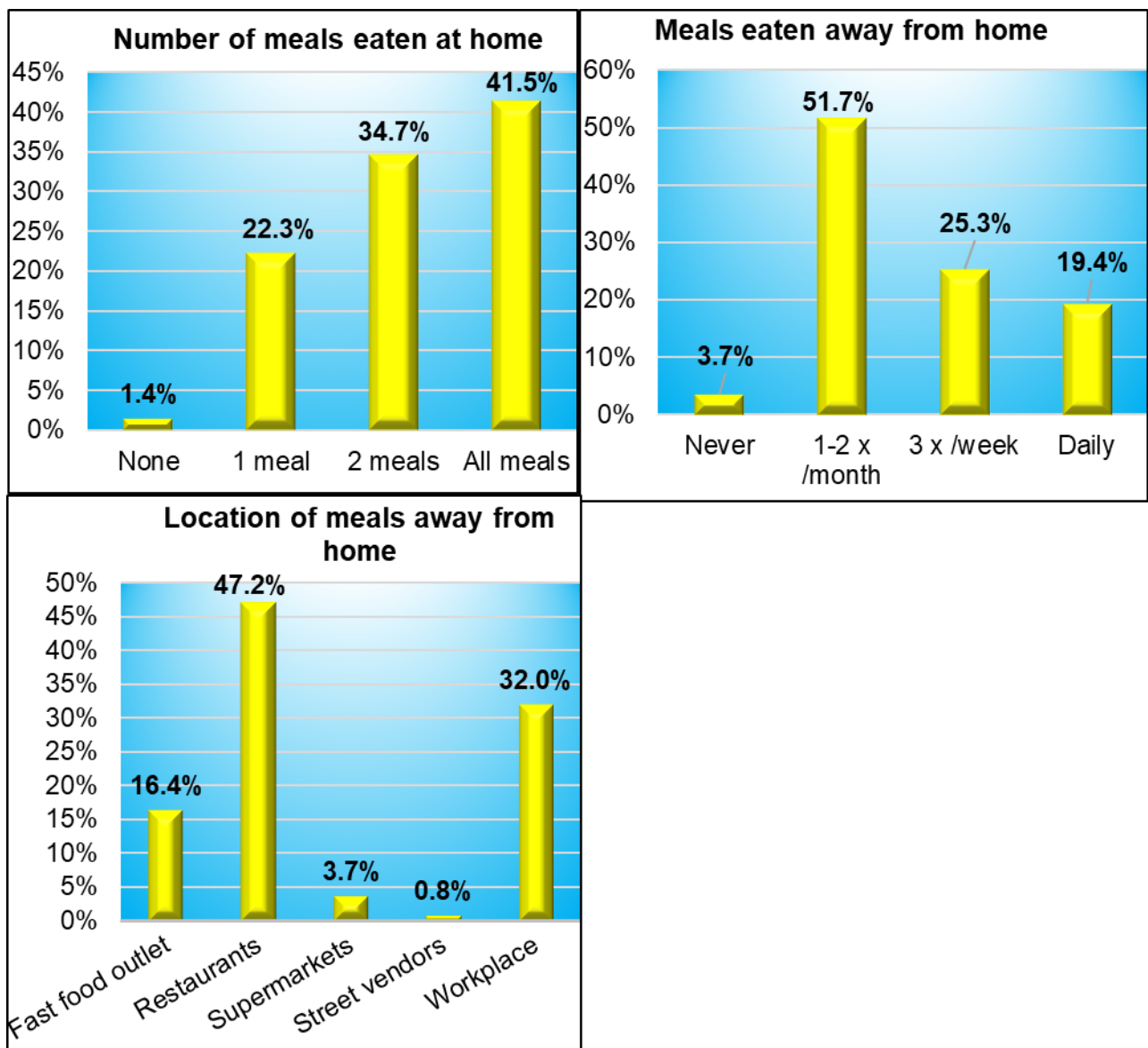
**Breakfast:** Breakfast appears to be considered the most important meal of the day (Bellisle, Hébel, Salmon-Legagneur & Vieux, 2018; Uzhova, Mullally, Peñalvo & Gibney, 2018; Rogers, 2016). The majority (56.2%, n=508) of respondents eat breakfast every day, with 12.8% (n=116) of respondents who eat breakfast 3-4 days a week, followed by 12.6% (n=114) who eat breakfast 1-2 days a week. Only 10.2% (n=92) eat breakfast 5-6 days a week, and those that never eat breakfast were 8.2% (n=74). The majority of the study group (79.2% n=716) thus enjoyed breakfast most days of the week. This is an encouraging practice because breakfast prevents overeating at other meals and can therefore aid in maintaining weight (Uzhova *et al.*, 2018). Other studies on breakfast consumption of adults similarly report a high percentage of adults who consume breakfast every day. A study among Irish adults by Uzhova *et al.* (2018), and another

by Bellisle *et al.* (2018) in France reported that over 90.0% of their study group consumed breakfast. Furthermore, another study by Drewnowski, Rehm and Vieux (2018) in the United States, reported that more than 80% adults consumed breakfast every day. South African studies that report on breakfast consumption were mainly conducted on adolescents or university students. A study by Tee, Laubscher, Botha and Jerling (2015), on adolescents reported that 81.0% of their study group consumed breakfast. In contrast, a study by Sedibe *et al.* (2018), also on adolescents, reported that 60.0% consumed breakfast every day. Another recent South African study by Viljoen *et al.* (2018) reported on the breakfast consumption of university students and indicated that 81.60% of their study group consumed breakfast.

**Lunch and supper:** Lunch and supper also followed the same pattern as breakfast, since the majority of the respondents, 56.3% (n=509) and 79.9% (n=722) respectively, consumed these meals every day. Respondents who enjoy lunch between one to six days a week were 38.5% (n=348), with only 5.2% (n=47) respondents reporting that they never eat lunch. Supper was the most consumed meal.

Snacks are usually eaten in-between meals, and they are small portions of food which come in a variety of forms such as packaged snack foods, other processed foods, fresh fruits or snacks prepared from fresh food items at home (Banna *et al.*, 2017). The consumption of snacks by this study group varied. More than a third (34.6%, n=313) of the respondents snacked every day, followed by an equal number of 24.4% (n=221) and 24.3% (n=220) who snacked 3-4 days a week and 1-2 days a week, respectively. Seven point two percent (n=65) of the respondents snacked 5-6 days a week and 9.4% (n=85) never snacked.

As part of their usual meal patterns, the respondents were also asked to indicate the number of meals they consumed at home, and how often they consumed meals away from home as well as the places where they mostly consumed these foods away from home. Figure 4.2 gives the results.



**FIGURE 4.2: MEALS EATEN AT AND AWAY FROM HOME AND WHERE MEALS AWAY FROM HOME ARE EATEN (N=904)**

**The number of meals eaten at home:** Most of the respondents (41.5%, n=375) indicated that they eat all their meals at home, followed by over a third of the respondents 34.7% (n=314) who reported that they eat two meals at home. Respondents who eat one meal at home a day were 22.3% (n=202), and those who do not eat meals at home were 1.4% (n=13).

**Frequency of meals eaten away from home:** Just over half of the respondents (51.7%, n=467) indicated that they eat meals away from home 1-2 times a month. Over a quarter of the respondents (25.3%, n=229) indicated that they eat meals away from home about three times a week. Those who eat meals away from home every day were 19.4% (n=175), while 3.7% (n=33) of respondents never eat meals away from home.



**Places where meals are eaten away from home:** Most respondents eat meals away from home at restaurants (47.2%, n=427), followed by 32.0% (n=289) who eat meals at their workplace. Respondents who eat at fast food outlets were 16.4% (n=148), and those who purchase meals at supermarkets were 3.7% (n=33). Less than one per cent (0.8%, n=7) of respondents buy meals from street vendors. Most of the adults who eat meals away from home mostly consume meals either at restaurants or at their workplace.

The majority of the respondents consume three meals a day (55.5%, n=502). Figure 4.1 also shows a congruent pattern between breakfast, lunch, and supper. Available recent information on the eating patterns of white South Africans is mainly on university students who followed a similar pattern of three meals a day with snacking in-between meals (Viljoen *et al.*, 2018). Other South African research studies that also give similar meal patterns, however on specific population groups, include De Kock (2019:65), on white urban adults, and Vogel (2018:78); Dlamini (2016:58), on black urban adults. Recent studies on eating patterns of adults in the United States of America indicate similar results to this study of three meals a day with one snack in-between meals (Kant, 2018; Mitchell, King, Courcoulas, Dakin, Elder, Engel, Flum, Kalarchian, Khandelwal & Pender, 2015).

The results on the meal patterns of the study group also indicate that respondents consume most meals at home and when not eating at home, it is either at a restaurant or at their workplace. The majority of the respondents, 51.7%, eat away from home one to two times a month. Similar findings to this study were also reported in the research by De Kock (2019:66) on white urban adults, whereby 51% of her participants eat away from home 1-2 times a month, 47% eat at a restaurant, and 40% eat at their workplace (De Kock, 2019:66). The SANHANES-1 study indicated that 57.3% of adults in formal urban areas eat away from home once a month (Shisana *et al.*, 2014:181). Studies in developed countries on the frequency of meals eaten away from home indicate that adults in these countries, specifically in the United States of America, eat out in restaurants or at fast food outlets 1-2 times a week, which is more frequent than adults in developing countries (Seguin, Aggarwal, Vermeylen & Drewnowski, 2016; Adams, Goffe, Brown, Lake, Summerbell, White, Wrieden & Adamson, 2015).

#### **4.3.1.2 Meal composition**

The meal composition indicates the diversity of food groups consumed in the meals and other eating occasions of the study group. The meal composition was determined from the number of food groups consumed the previous day as well as from the food frequency questionnaire (see Addendum C, section C: C9 and 11).



Following are the results and discussion on the diversity of foods consumed the previous day. The calculated Dietary Diversity Score derived from the diversity of food groups consumed will be given.

### 4.3.2 Diversity of foods consumed

The diversity of foods consumed was the second sub-objective on the food practises of the study group. This sub-objective seeks to determine the dietary diversity of foods consumed by the respondents the previous day. Dietary diversity refers to the number of food groups from a selected variety of food groups that were included as part of a person's meals and snacks the previous day. It gives an indication of the nutritional adequacy of an individual or group's food intake (Kennedy *et al.*, 2011:5,10) Thirteen food groups were presented in the questionnaire namely, starchy staples, orange-fleshed vegetables and fruit, dark green leafy vegetables, other vegetables and fruit, legumes and nuts, fats and oils, meat, poultry or fish, milk and dairy products, eggs, sweets, spices and condiments, beverages, and alcoholic beverages. Respondents had to indicate with a **yes** or a **no** if they included any of the foods from a specific group as part of their meals or snacks the previous day. From these 13 food groups, the first nine groups were used to calculate the Dietary Diversity Score for the study group. The results are given in Table 4.4.

**TABLE 4.4: DIVERSITY OF FOOD INTAKE (N=904)**

FOOD GROUPS	YES		NO	
	(n)	(%)	(n)	(%)
<b>Starchy staples:</b> maize, rice, wheat sorghum, and any other foods made from cereals such as porridge, bread, pasta, and noodles, potatoes, and sweet potatoes	800	88.5	104	11.5
<b>Orange-fleshed vegetables and fruits:</b> Pumpkin, carrots, butternut, orange-fleshed sweet potatoes, yellow peaches, paw-paw, mangoes, plums, spanspek, apricots	530	58.6	374	41.4
<b>Dark green leafy vegetables:</b> spinach, kale, indigenous green leafy vegetables	462	51.1	442	48.9
<b>Other vegetables and fruits:</b> tomatoes, onion, green beans, lettuce, cabbage, broccoli, cauliflower, eggplant, gem squash, beetroot, apples, bananas, grapes, pears, litchis, oranges, naartjies	808	89.4	96	10.6
<b>Legumes and nuts:</b> dried beans, dried peas, lentils, nuts, or foods made from these (i.e. peanut butter, hummus)	366	40.5	538	59.5
<b>Fats and oils:</b> oils, fats or butter added to food or used in cooking	731	80.9	173	19.1
<b>Meat, poultry, or fish:</b> beef, pork, mutton/lamb, goat, chicken, duck, fresh, frozen, tinned, or dried fish or shellfish	810	89.6	94	10.4
<b>Milk and dairy products:</b> milk, maas, cheese, yoghurt, or any other milk products	779	86.2	125	13.8
<b>Eggs:</b> eggs from chicken, duck, or any other eggs	415	45.9	489	54.1

**Starchy staples:** Foods included in this group were cereals (maize, rice, sorghum, wheat) as well as white roots and tubers. These foods were consumed by the majority (88.5%, n=800) of the respondents the previous day.

**Orange-fleshed vegetables and fruit:** This group included vegetables such as pumpkin, carrots, butternut, and fruit such as pawpaw, mangoes, plums, and apricots. The majority of the respondents (58.6%, n=530) indicated that they consumed foods from this group the previous day. However, 41.4% (n=374) of the respondents indicated they did not consume foods from this group the previous day.

**Dark green leafy vegetable:** Foods included in this group were spinach, kale, and indigenous green leafy vegetables. Just over half of the respondents (51.1%, n=462) indicated that they consumed green leafy vegetables the previous day, while 48.9% (n=442) of the respondents indicated they had not consumed any green leafy vegetables the previous day.

**Other vegetables and fruits:** Other vegetables and fruits included tomatoes, onions, green beans, lettuce, cabbage, broccoli, cauliflower, oranges, pears, litchis and naartjies. The majority (89.4%, n=808) of the respondents indicated they included foods from this group in their meals or snacks the previous day. These findings concur with other studies that confirm that South Africans consume other vegetables and fruits such as banana, grapefruits, apples, tomatoes, and onions (Ronquest-Ross *et al.*, 2015; Shisana *et al.*, 2014). Only 10.6% (n=96) respondents indicated they had not consumed any fruit or vegetable from this group the previous day.

**Legumes and nuts:** Foods in this group included dried beans, dried peas, lentils, nuts, and nut products. These were not often consumed by the study group when compared to the other food groups. Only 40.5% (n=366) of the respondents consumed foods from this group the previous day. The majority (59.5%, n=538) of the respondents indicated that they did not consume any foods from this group the previous day. In the research study by De Kock (2019:69,79), about 70% of the participants indicated they did not consume legumes and nuts the previous day or seldom consumed it. Two other research studies done by Vogel (2018:83), and Dlamini (2016:109), also report on the low consumption of legumes and nuts among their study groups. The decline in the consumption of legumes and nuts is further confirmed in studies by Ronquest-Ross *et al.* (2015); Afshin, Micha, Khatibzadeh and Mozaffarian (2014). This decline in consumption could be due to the reason that legume dishes are viewed as “the poor man’s meat” and therefore stigmatised as a low-status food. Another possible explanation relates to the preparation time. Legumes take longer to cook, and since consumers in urban areas are time-constrained due to their busy lifestyles, legumes are not convenient to prepare and might thus be

omitted from the menu. The low consumption of nuts could be attributed to nuts being relatively expensive.

**Fats and oils:** This group included oils, fats, or butter. The majority (80.9%, n=731) of the respondents included these in their meals the previous day. Recent studies also reported an increase in the consumption of fats and oils among South Africans (Ronquest-Ross *et al.*, 2015; Shisana *et al.*, 2014).

**Meat, poultry, or fish:** Foods such as fresh meat, beef, pork, mutton, lamb, as well as chicken, fresh, frozen, tinned, or dried fish were included in this group. The majority of the respondents (89.6%, n=810) included foods from this group the previous day. Other recent South African studies confirm that meat consumption, particularly poultry and pork, has increased (Desiere, Hung, Verbeke & D'Haese, 2018; Erasmus & Hoffman, 2017; Ronquest-Ross *et al.*, 2015).

**Milk and dairy products:** This food group included milk, maas, cheese, yoghurt, and other dairy products. The majority of the respondents (86.2%, n=779) consumed these foods as part of their meals or snacks the previous day. The consumption of dairy products has positive health benefits, and its consumption has increased among South Africans (Wenhold & White, 2017; Ronquest-Ross *et al.*, 2015).

**Eggs:** The majority (54.1%, n=489) of the respondents reported that they did not consume eggs the previous day. Those who included eggs in their meals were 45.9% (n=415). Egg consumption among South Africans varies; some studies reported that egg consumption is low (Labadarios *et al.*, 2011), while other studies reported that eggs are one of the foods that is often consumed (Mchiza *et al.*, 2015; Ronquest-Ross *et al.*, 2015).

The above nine food groups are regarded as important food groups that serve as an indication of the nutritional adequacy of food intake by means of the Dietary Diversity Score. Table 4.5 indicates the number of food groups consumed by the respondents the previous day. The Dietary Diversity Score serves as an indication of the nutritional adequacy of the study group's food intake. The Dietary Diversity Score is achieved by counting food groups that an individual consumed over the previous 24 hours (Vasileska & Rechkoska, 2012; Kennedy *et al.*, 2011:23).

**TABLE 4.5: DIETARY DIVERSITY SCORE OF RESPONDENTS (N=904)**

NUMBER OF FOOD GROUPS CONSUMED	FREQUENCY (n)	PERCENTAGE
1	4	0.4
2	11	1.2
3	30	3.3
4	94	10.4
5	194	21.5
6	226	25.0
7	186	20.6
8	106	11.7
9	53	5.9

The majority of the respondents (67.1%, n=606) consumed between five and seven of the nine food groups. This study reported an adequate to good Dietary Diversity Score of 6.02 which is similar to the score reported by De Kock (2019:71) on white urban adults. Other South African studies report a Dietary Diversity Score ranged between 4.02 – 4.77 (Chakona & Shackleton, 2017; Mchiza *et al.*, 2015; Shisana *et al.*, 2014:13; Drimie *et al.*, 2013). These results could be attributed to the majority of the respondents being from the white population group (76.5%, n=692), and that an equally large proportion (77.4%, n=700) had a tertiary education. It was further explained in the SANHANES-1 study (Shisana *et al.*, 2014:13, 169) that consumers who reside in urban areas usually have a higher Dietary Diversity Score. The Dietary Diversity Score in the mentioned study was significantly higher for white participants than the other population groups. The SANHANES-1 report further mentioned that this was also the case in the National Food Consumption Survey of 2009 (Labadarios, Steyn & Nel, 2011).

Table 4.6 presents the dietary diversity frequency procedure as well as the mean and standard deviation of the nine food groups discussed above.

**TABLE 4.6: MEANS PROCEDURE FOR DIETARY DIVERSITY**

N	MEAN	STD DEV	MINIMUM	MAXIMUM
904	6.02	1.57	1	9

Table 4.6 shows the minimum and maximum food groups the respondents consumed, thus leading to their Dietary Diversity Score of 6.02 and a standard deviation of 1.75. The minimum was one, and four respondents indicated they had consumed one of the nine groups the previous day. The maximum was nine, and 53 respondents confirmed they had consumed all nine food groups the previous day.

Other foods mostly consumed by consumers fairly often that are not essential for an adequate diet include sweets, spices and condiments, beverages, and alcoholic beverages. These four groups were included in the questionnaire. The results of the inclusion of these four food groups the previous day are given in Table 4.7.

**TABLE 4.7: DIVERSITY OF FOOD INTAKE (NON-ESSENTIAL FOODS) (N=904)**

FOOD GROUPS	YES		NO	
	(n)	(%)	(n)	(%)
<b>Sweets:</b> sugar, honey, sugary foods such as chocolates, candies, cookies, cakes, and sugar sweetened beverages such as fizzy drinks and cordials	543	60.1	361	39.9
<b>Spices and condiments:</b> spices, salt and pepper, condiments (i.e. tomato sauce, soy sauce, salad dressing)	812	89.8	92	10.2
<b>Beverages:</b> coffee, tea, herbal teas	825	91.3	79	8.7
<b>Alcoholic beverages:</b> beer, wine, whiskey, brandy, vodka	294	32.5	610	67.5

**Sweets:** The sweets group included sugar, honey, sugary foods (chocolates, candies, cookies) sweetened beverages and fizzy drinks. The majority (60.1%, n=543) of the respondents consumed sweet foods the previous day. Just over a third of the respondents (39.9%, n=361) had not consumed sweet foods the previous day.

**Beverages:** Beverages such as coffee, tea, and herbal teas were consumed by the majority (91.3%, n=825) of the respondents the previous day. The consumption of tea and coffee is very common among South African adults as reported in other South African surveys (Mchiza *et al.*, 2015; Ronquest-Ross *et al.*, 2015).

**Spices and condiments:** Spices and condiments such as salt and pepper, tomato sauce, soy sauce, and salad dressing were included by the majority (89.8%, n=812) of the respondents. A study by Eksteen and Mungal-Singh (2015) also indicated that South Africans consume spices and condiments in most of their meals.

**Alcoholic beverages:** Alcoholic beverages such as beer, wine, whiskey, brandy, and vodka were included in this group. Almost a third (32.5%, n=294) of the respondents revealed that they

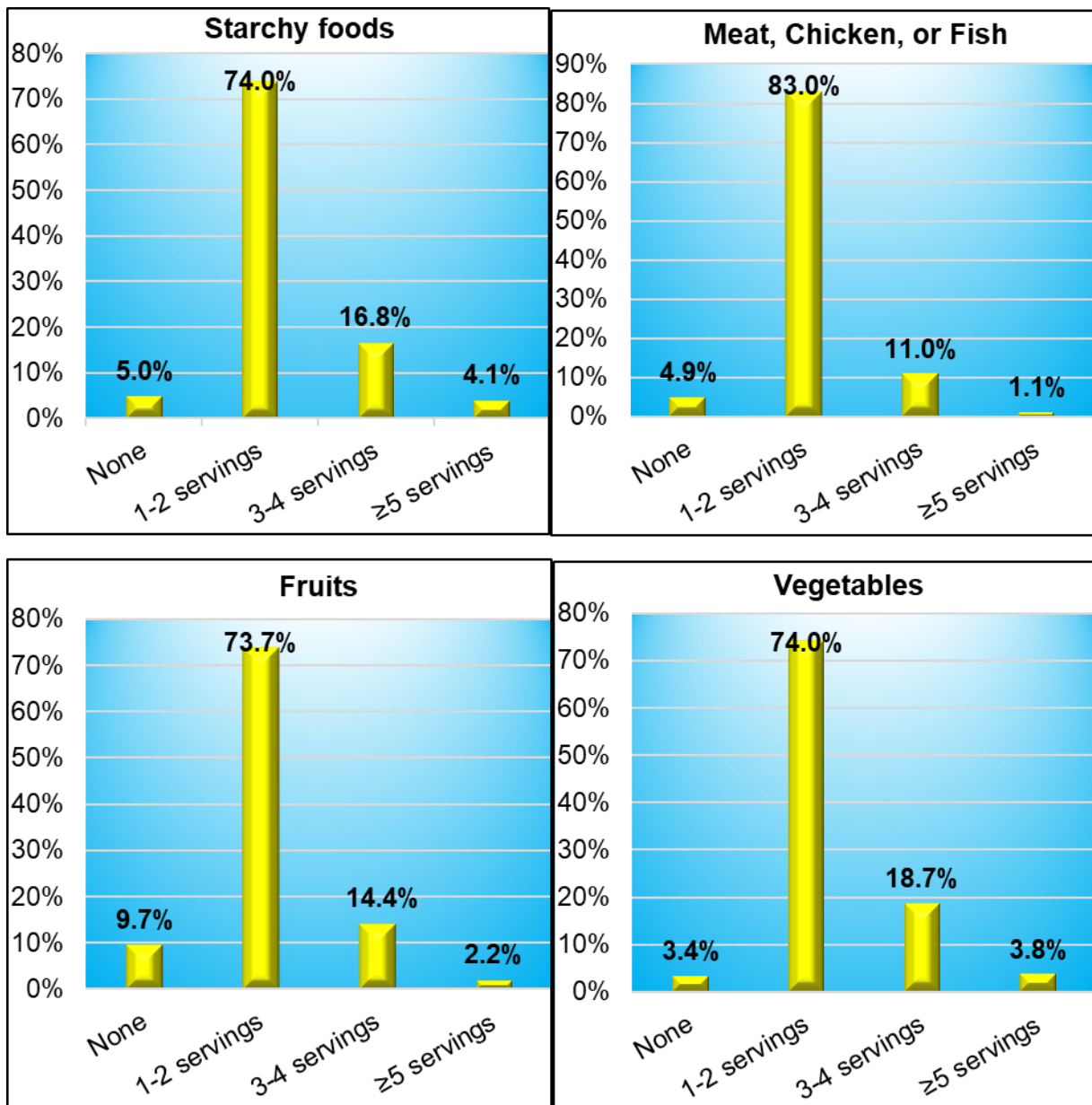
consumed these beverages the previous day. The majority of the respondents (67.5%, n=610) did not consume any alcoholic beverage the previous day.

From the results presented and discussed above, the majority of the study group consumed an adequate variety of foods and included most of the nine essential food groups to attain a Dietary Diversity Score of 6.02. The consumption of a variety of foods is important, and it is essential to include food from each food group. The South African Food Based Dietary Guidelines indicate that consumers should “enjoy a variety of foods” (Vorster *et al.*, 2013a).

In the following section, the results on the third food practise sub-objective, concerning the number of servings of selected food groups, are given. Information on the number of servings was gathered in order to give an estimation of the quantities of food that are usually consumed by the study group.

#### **4.3.3 Number of servings consumed of selected food groups**

The questions on the number of servings included eleven groups of foods namely starchy foods, vegetables, fruits, meat, chicken or fish, milk and dairy products, soft drinks, water, tea and coffee, sugar in tea and coffee, potato crisps or other savoury snacks, and chocolate bars. A serving guide was provided with each group to help respondents estimate the number of servings they consume (see Addendum C, section C: C10). Figure 4.3 presents the results of starchy foods, vegetables, fruit, meat, chicken or fish, milk, and dairy products.



**FIGURE 4.3: NUMBER OF SERVINGS OF STARCHY FOODS, VEGETABLES, FRUITS, AND MEAT, CHICKEN, OR FISH (N=904)**

**Starchy foods:** The foods included in this group were rice, maize, bread, pasta, and breakfast cereals. The serving guide provided was: 1 slice of bread, ½ cup rice, pasta, or porridge. The majority of the respondents (74.0%, n=669) indicated they had 1-2 servings of starchy foods, and 4.1% (n=38) of the respondents enjoyed five or more servings of starchy foods.

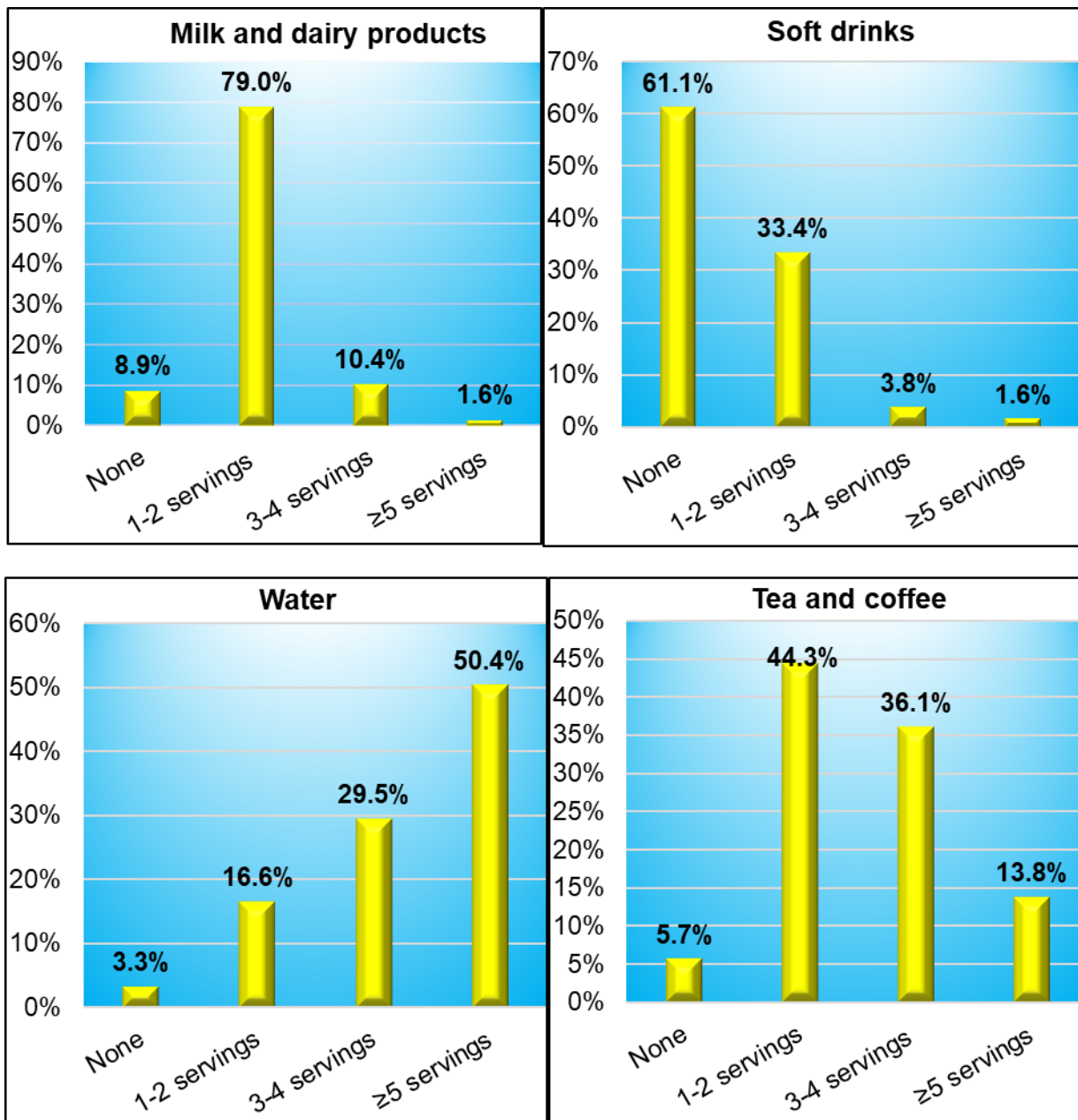
**Meat, Chicken, or Fish:** The serving size for this group included a palm size piece of meat or 10mm slice, one medium chicken breast, or one large piece of white fish. The majority of the respondents (83.0%, n=751) indicated they consumed 1-2 servings of protein-rich foods a day, and ten respondents consumed five or more servings a day.



**Fruits:** This group contained all fresh fruits, and the serving guide was ½ cup chopped fruit, 1 medium apple, 1 banana, 2 medium-sized apricots or plums, ½ cup fruit juice, and 2 tablespoons raisins. The majority of the respondents (73.7% n=666) consumed 1-2 servings of fruits, followed by 14.4% (n=130) who ate 3-4 servings a day. Only twenty respondents consumed five or more servings of fruits a day.

**Vegetables:** Included in this group were fresh or frozen vegetables, or salads, and the serving guide was ½ cup cooked vegetables or 1 cup raw leafy vegetables. The majority (74%.0, n=669) of the respondents indicated they consumed 1-2 servings of vegetables, and only 3.8% (n=35) consumed five or more servings a day.

Figure 4.4 presents the results on the number of servings of milk and dairy products, and beverages consumed.



**FIGURE 4.4: NUMBER OF SERVINGS OF MILK AND DAIRY PRODUCTS, SOFT DRINKS, WATER, TEA AND COFFEE (N=904)**

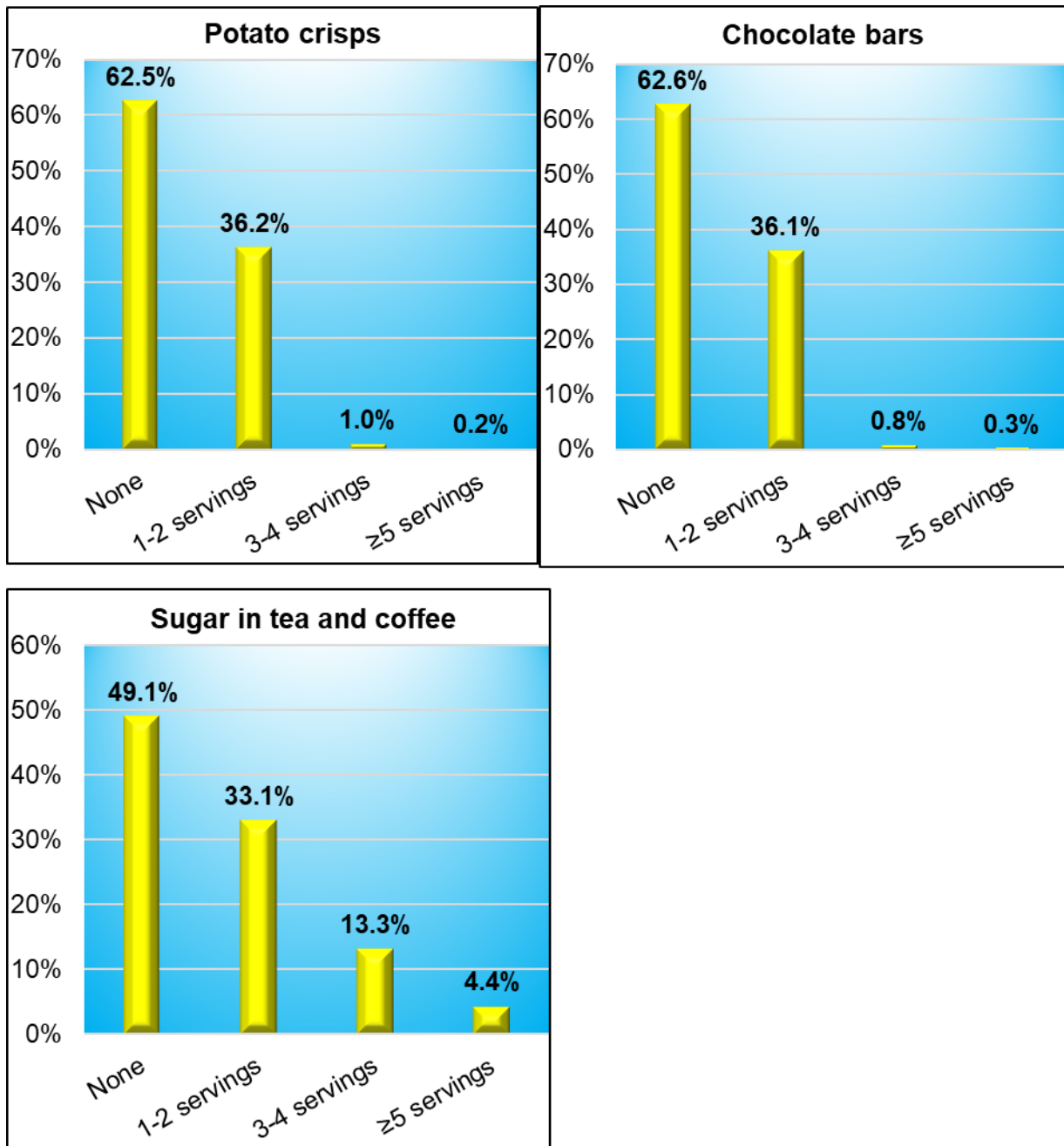
**Milk and dairy products:** Included in this group was yoghurt, cheese, cottage cheese, and maas. A serving was 1 cup milk, yoghurt or maas, and 1 cube of 30 mm cheese. The majority of the respondents (79%.0, n=714) estimated they consumed 1-2 servings of milk and dairy products a day, and 8.9% (n=81) of respondents indicated they did not consume any milk or dairy products.

**Soft drinks:** Soft drinks referred to fizzy drinks such as Sprite, Coke, Fanta, and a serving was a 340 ml can. A third of the respondents (33.4%, n=303) consumed 1-2 servings of soft drinks a day, and the majority (61.1%, n=552) indicated they did not consume any soft drinks. Only 1.6% (n=14) estimated they enjoyed five or more servings a day of soft drinks.

**Water:** The serving size for water was 1 cup/glass. Just over half of the respondents (50.4%, n=457) estimated they drank five or more servings of water a day, followed by 29.5% (n=267) who indicated they had 3-4 servings of water a day. Some of the respondents (3.3%, n=30) indicated they did not consume any servings of water.

**Tea and coffee:** The serving size for tea and coffee was 1 cup. Most of the respondents (44.3%, n=401) indicated they enjoyed 1-2 servings of tea or coffee a day, followed by 36.1% (n=326) who drank 3-4 servings a day. Tea and coffee are some of the favoured beverages in South Africa (Ronquest-Ross *et al.*, 2015), and the diversity of food intake results also revealed that 91.3% of the respondents enjoyed tea or coffee the previous day, which confirms that tea or coffee are beverages that are often consumed.

Figure 4.5 presents results on the number of servings of sugar added in tea or coffee, potato crisps, and chocolate bars.



**FIGURE 4.5: NUMBER OF SERVINGS FOR POTATO CRISPS AND CHOCOLATE BARS, AND SUGAR IN TEA AND COFFEE (N=904)**

**Potato crisps:** The serving size provided was 1 small packet (35 g). The majority of the respondents (62.5%, n=565) did not consume any servings of potato crisps the previous day, although 36.2% (n=328) of the respondents estimated they enjoyed 1-2 servings of potato crisps a day.

**Chocolate bars:** The serving guide provided in this group was 1 bar of chocolate. Likewise, the majority (62.6%, n=566) of the study group did not consume any servings of chocolate bars, followed by 36.1% (n=327) who estimated they had 1-2 servings of chocolate a day.

**Sugar in tea or coffee:** The serving size was 1 teaspoon of sugar. Most of the respondents (49.1%, n=444) did not add any sugar to their tea or coffee. However, a third of the respondents (33.1%, n=299) added 1-2 servings of sugar in their tea or coffee, and 4.4% (n=41) used five or more servings of sugar.

The following section reports on the sub-objective on the frequency of consumption of selected food groups. This indicates how often the respondents consumed food from the nine food groups including beverages, snacks, and fast foods.

#### **4.3.4 Frequency of consumption of selected food**

A non-quantitative food frequency questionnaire was used to determine the frequency of consumption of selected foods. The frequency questionnaire was also used to cross-check and triangulate the type of foods the respondents consumed, and how often. The respondents were presented with a list of groups of foods where they had to indicate how frequently they consumed foods according to the following time intervals: daily, 3-4 times a week, 1-2 times a week, seldom, and never. Table 4.8 presents the results on the frequency of consumption of selected food groups.

**TABLE 4.8: FREQUENCY OF CONSUMPTION OF SELECTED FOOD GROUPS (N = 904)**

SELECTED FOOD GROUPS	Daily		3-4 x/week		1-2 x/week		Seldom		Never	
	n	%	n	%	n	%	n	%	n	%
<b>PROTEIN-RICH FOODS</b>										
Red meat	48	5.3	327	36.2	395	43.7	92	10.2	42	4.6
Chicken	57	6.3	349	38.6	424	46.9	43	4.8	31	3.4
Boerewors	2	0.2	16	1.8	249	27.5	512	56.6	125	13.8
Processed meat	9	1.0	35	3.9	119	13.2	493	54.5	248	27.4
Fish	13	1.4	43	4.8	419	46.3	368	40.7	61	6.7
Eggs	100	11.1	192	21.2	372	41.2	203	22.5	37	4.1
<b>MILK AND DAIRY PRODUCTS</b>										
Full cream milk	339	37.5	96	10.6	70	7.7	173	19.1	226	25.0
Low-fat milk	221	24.4	69	7.6	70	7.7	212	23.5	332	36.7
Cheese	120	13.3	255	28.2	318	35.2	177	19.6	34	3.8
Yoghurt	139	15.4	140	15.5	206	22.8	303	33.5	116	12.8
<b>FRUITS AND VEGETABLES</b>										
Fruits	394	43.6	242	26.8	156	17.3	103	11.4	9	1.0
Vegetables	465	51.4	276	30.5	123	13.6	36	4.0	4	0.4
Salads	183	20.2	262	29.0	280	31.0	143	15.8	36	4.0
Potatoes	19	2.1	183	20.2	469	51.9	195	21.6	38	4.2
<b>FATS AND OILS</b>										
Butter	146	16.2	146	16.2	179	19.8	268	29.6	165	18.3
Tub Margarine	112	12.4	72	8.0	123	13.6	209	23.2	387	42.8
Brick Margarine	15	1.7	27	3.0	34	3.8	224	24.8	604	66.8
Vegetable oil	98	10.8	137	15.2	245	27.1	274	30.3	150	16.6
<b>STARCHY FOODS</b>										
White bread, bread rolls and buns	87	9.6	133	14.7	189	20.9	304	33.6	191	21.1
Brown or whole wheat bread	124	13.7	193	21.3	244	27.0	257	28.4	86	9.5
Maize meal porridge	44	4.9	56	6.2	116	12.8	314	34.7	374	41.4
Breakfast cereals	175	19.4	140	15.5	158	17.5	220	24.3	211	23.3
Rice	37	4.1	161	17.8	425	47.0	232	25.7	49	5.4
Pasta (macaroni, spaghetti, noodles)	1	0.1	90	10.0	519	57.4	248	27.4	46	5.1
<b>LEGUMES AND NUTS</b>										
Legumes (dry beans, lentils, split peas)	12	1.3	78	8.6	246	27.2	401	44.4	167	18.5
Nuts	73	8.1	97	10.7	218	24.1	419	46.4	97	10.7
<b>BEVERAGES</b>										
Fruit juice	66	7.3	83	9.2	182	20.1	406	44.9	167	18.5
Soft drinks	74	8.2	92	10.2	133	14.7	310	34.3	295	32.6
Sports or energy drinks	19	2.1	26	2.9	87	9.6	277	30.6	495	54.8
Cordials (Oros, Wild Island, Caribbean)	29	3.2	45	5.0	80	8.8	295	32.6	455	50.3
Water	772	85.4	64	7.1	35	3.9	26	2.9	7	0.8
<b>FAST FOODS</b>										
Pizza	1	0.1	11	1.2	170	18.8	663	73.3	59	6.5
Fried chips (slap chips)	2	0.2	30	3.3	210	23.2	537	59.4	125	13.8
Meat pie	5	0.6	13	1.4	81	9.0	503	55.6	302	33.4
Hamburgers	4	0.4	17	1.9	151	16.7	582	64.4	150	16.6
<b>SNACK FOODS</b>										
Potato crisps	15	1.7	45	5.0	222	24.6	507	56.1	115	12.7
Chocolate bars	22	2.4	69	7.4	207	22.9	511	56.5	97	10.7
Sweets	29	3.2	51	5.6	165	18.3	517	57.2	142	15.7
Cookies and biscuits	25	2.8	72	8.0	249	27.5	463	51.2	95	10.5
Cake, tart, cupcakes, or muffins	6	0.7	35	3.9	152	16.8	590	65.3	121	13.4

#### 4.3.4.1 *Protein-rich foods*

Protein-rich foods included red meat, chicken, boerewors, processed meat, fish, and eggs.

**Red meat:** Red meat included beef, pork, and mutton. Most (43.7%, n=395) of the respondents consumed red meat 1-2 times a week. Just over a third of the respondents (36.2%, n=327) indicated that they had red meat 3-4 times a week, while 5.3% (n=48) indicated that they eat red meat daily. Other respondents (10.2%, n=92) seldom consumed red meat, and 4.6% (n=42) indicated that they never consumed red meat.

**Chicken:** Chicken was consumed 1-2 times a week by most of the respondents (46.9%, n=424), followed by 38.6% (n=349) of the respondents who indicated they eat chicken 3-4 times a week. Only 6.3% (n=57) of respondents indicated that they enjoyed chicken daily, and 4.8% (n=43) seldom eat chicken. Only 3.4% (n=31) of respondents never eat chicken.

**Boerewors:** The majority of the study group (56.6%, n=512) seldom consumed boerewors, followed by 27.5% (n=249) who consume it 1-2 times a week. Only 1.8% (n=16) of the respondents indicated they consumed boerewors 3-4 times a week, and only two respondents consumed it daily. Those who never consumed boerewors were 13.8% (n=125) of the study group.

**Processed meat:** The majority (54.5%, n=493) of the study group indicated they seldom consumed processed meat, followed by 27.4% (n=248) who indicated they never consumed it.

**Fish:** The majority of the study group (46.3%, n=419) consumed fish 1-2 times a week, followed by 40.7% (n=368) of the respondents who indicated that they seldom consumed fish. Only 4.8% (n=43) of the respondents eat fish 3-4 times a week, and 1.4% (n=13) of the respondents enjoy fish daily, yet 6.7% (n=61) of respondents indicated that they never eat fish.

**Eggs:** Most (41.2%, n=372) respondents enjoyed eggs 1-2 times a week, while 21.2% (n=192) indicated they consumed eggs 3-4 times a week. Nearly a quarter (22.5%, n=203) of the respondents, however, seldom consumed eggs, 11.1% (n=100) of respondents consumed eggs daily, and 4.1% (n=37) never consumed them.

The consumption of the listed protein-rich foods by the study group is reported as between 1-2 times a week for most of the respondents. From the diversity of food intake results, 89.6% of respondents indicated they consumed foods from this group as part of their meals or snack the previous day. Processed meat and boerewors were seldom consumed by the respondents, and



this could be due to the recent listeriosis outbreak in South Africa in 2018 (Freaun, Blumberg, McCarthy & Thomas, 2018).

#### **4.3.4.2 Milk and dairy products**

Milk and dairy products included foods such as full cream milk, low fat milk, cheese, and yoghurt.

**Full cream milk:** Most (37.5%, n=339) of the respondents consumed full cream milk daily, although a quarter 25.0% (n=226) never consumed full cream milk. Those who seldom consumed full cream milk were 19.1% (n=173), 10.6% (n=96) consumed it 3-4 times a week, and 7.7% (n=70) of respondents consumed it 1-2 times a week.

**Low-fat milk:** Just over a third of the respondents (36.7% n=332) never consumed low-fat milk, followed by 24.4% (n=221) of the respondents who indicated they consumed it daily. Nearly a quarter of the respondents (23.5%, n=212) seldom consumed low-fat milk. Respondents who consumed low-fat milk between 3-4 times a week and 1-2 times a week were 7.6% (n=69), and 7.7% (n=70) respectively.

**Cheese:** Over a third of the respondents (35.2%, n=318) indicated that they consumed cheese 1-2 times a week, followed by 28.2% (n=255) who consumed it 3-4 times a week. Those who enjoyed cheese daily were 13.3% (n=120), those who seldom consumed cheese were 19.6% (n=177), and only 3.8% (n=34) never consumed cheese.

**Yoghurt:** A third of the study group (33.5%, n=303) seldom consumed yoghurt, followed by 22.8% (n=206) who consumed yoghurt 1-2 times a week, and 15.5% (n=140) who consumed yoghurt 3-4 times a week. Those who enjoyed yoghurt daily were 15.4% (n=139), and only 12.8% (n=116) respondents never consumed yoghurt.

The frequency of consumption of milk and dairy products indicates that most of the respondents often consumed these products. The diversity of food intake results also confirm these results as 86.2% of the respondents included milk or dairy products as part of their meals or snacks the previous day.

#### **4.3.4.3 Fruits and vegetables**

This food group included fruits, vegetables, salads and potatoes.

**Fruits:** Although the guidelines recommend that people should consume fruits daily, only 43.6% (n=394) of the respondents consumed fruits daily, followed by 26.8% (n=242) who consumed

them 3-4 times a week. The remaining 28.7% (n=259) of the respondents consumed fruits 1-2 times a week or seldom, while nine respondents indicated they never consumed fruits.

**Vegetables:** The majority of respondents (51.4%, n=465) indicated they consumed vegetables daily, followed by 30.5% (n=276) who consumed them 3-4 times a week. Respondents who seldom or at most consumed vegetables 1-2 times a week were 17.6% (n=159) respectively.

**Salads:** The frequency of consumption for salads varied as 20.2% (n=183) of respondents indicated they have salads daily, while 31% (n=280) of respondents had salads 1-2 times a week, 29% (n=262) enjoyed salads 3-4 times a week, 15.8% (n=143) seldom enjoyed salads, and 4% (n=36) never consumed salads.

**Potatoes:** Most of the respondents (51.9%, n=469) consumed potatoes 1-2 times a week, followed by 21.6% (n=195) who seldom enjoyed potatoes. Twenty point two percent (n=183) of the respondents consumed potatoes 3-4 times a week, and only 4.2% (n=38) never consumed potatoes, while 2.1% (n=19) of respondents enjoyed potatoes daily.

#### **4.3.4.4            *Fats and oils***

Fats and oils include butter, tub margarine, brick margarine, and vegetable oil.

**Butter:** The consumption of butter varied, with 29.6% (n=268) of the respondents seldom used it, followed by 19.8% (n=179) who used butter 1-2 times a week. There were 16.2% respondents who indicated they used butter daily, while 16.2% (n=146) of the study group used butter 3-4 times a week. Overall, 52.2% of the respondents used butter once or more a week.

**Tub Margarine:** Most of the respondents (42.8%, n=387) revealed they never consumed tub margarine. This was followed by 23.2% (n=210) who seldom consumed tub margarine, 21.6% (n=195) of respondents consumed tub margarine once or more a week, and 12.4% (n=112) respondents used tub margarine daily.

**Brick Margarine:** The majority (66.8%, n=604) of the respondents never consumed brick margarine, followed by 24.8% (n=224) who seldom consumed it. Only 1.7% (n=15) of the respondents used brick margarine daily.

**Vegetable oil:** The consumption of vegetable oil also varied as most of the respondents (30.3%, n=274) seldom used it. This was followed by 27.1% (n=245) of the respondents who used vegetable oil 1-2 times a week. Respondents who often used vegetable oil, that is 3-4 times a week or daily, represented 26.0% (n=235) of the respondents.

The results on the consumption frequency of fats and oils indicate that just over half of the respondents consumed butter and vegetable oil at least once or more times a week (52.2% and 53.1%). The results also indicate that tub and brick margarine are not often used by most of the respondents. According to the joint report by the WHO and FAO on diet, nutrition and prevention of chronic diseases, the consumption of fats and oils is lowest in Africa and highest in North America and Europe (WHO & FAO, 2016). South African studies on the consumption and household availability of fats and oil, report that in most urban households tub margarine is used more often than brick margarine, and that vegetable oil consumption is generally high in most Southern African countries (Ford, Faber, Kunneke & Smuts, 2016; Nnyepi, Gwisai, Lekgoa & Seru, 2015).

#### **4.3.4.5 Starchy foods**

Starchy food group (breads and cereal) included white bread, bread rolls and buns, brown or whole wheat bread, breakfast cereals (cornflakes, bran flakes, Weet-Bix), maize meal porridge, rice, and pasta. These foods form part of the staple foods that should be consumed daily (Vorster, 2013).

**White bread, bread rolls and buns:** A third (33.6%, n=304) of the study group seldom consumed white bread, 20.9% (n=189) of the respondents consumed white bread 1-2 times a week, and 24.3% (n=220) enjoyed white bread daily to 3-4 times a week. The remaining 21.1% (n=191) of the respondents never consumed it.

**Brown or whole wheat bread:** Although 28.4% (n=257) of the study group seldom consumed brown bread, 27.0% (n=244) consumed it 1-2 times a week. Furthermore, 35.0% (n=316) of the respondents often enjoyed brown bread or whole wheat bread three to four times a week or daily.

**Maize meal porridge:** Most of the respondents (41.4% n=374) indicated that they never eat maize meal porridge, followed by 34.7% (n=314) who seldom consumed it. Only 4.9% (n=44) consumed maize meal porridge daily, while 6.2% (n=56) did so 3-4 times a week.

**Breakfast cereals:** Most of the respondents seldom (24.3%, n=220) or never (23.3%, n=211) consumed breakfast cereals. Although breakfast cereals are a quick and convenient morning meal, only 19.4% (n=175) of the respondents consumed them daily, and 15.5% (n=140) did so 3-4 times a week.

**Rice:** Most of the respondents (47.0% n=425) eat rice 1-2 times a week, followed by 17.8% (n=161) who consumed it 3-4 times a week, while 25.7% (n=232) of respondents seldom consumed rice, 4.1% (n=37) of respondents eat rice daily.

**Pasta (macaroni, spaghetti, noodles):** The majority of the respondents (57.4% n=519) consume pasta 1-2 times a week, while 27.4% (n=248) indicated that they seldom eat pasta. Only 5.1% (n=46) of the respondents indicated they never eat pasta.

The frequency of consumption of breads and cereals by the study group reveals that the starchy staples mostly consumed were rice and pasta, as indicated by 68.9% of the respondents who consume rice more than once a week and 67.5% who consume pasta more than once a week. Maize meal porridge is the least frequently consumed, as only 23.9% consumed it once or more times a week, followed by white bread which was consumed by 45.2% once or more times a week. Brown bread and breakfast cereals were also often consumed once or more times a week. The diversity of food intake results indicated that 88.5% of the respondents consumed starchy staples the previous day. The frequency of consumption results, therefore, verifies that rice and pasta are the starchy foods the respondents most often include in their meal composition together with brown or whole wheat bread and/or breakfast cereals.

#### **4.3.4.5            *Legumes and nuts***

Legumes and nuts included dry beans, lentils, split peas, and nuts.

**Legumes and nuts:** Most of the respondents, 44.4% (n=401) and 46.4% (n=419) respectively, indicated that they seldom consumed legumes and nuts. Another 27.2% (n=246), and 24.1% (n=218) of the respondents however, indicated that they enjoyed legumes or nuts 1-2 times a week. Only 1.3% (n=12) of the respondents consumed legumes daily and 8.1% (n=73) who enjoyed nuts daily. This indicates that legumes and nuts were not often consumed by the respondents as less than half of the respondents respectively enjoyed them only once or more times a week. The low consumption of legumes might be because legumes such as beans need extended cooking times and are not convenient or quick to prepare.

#### **4.3.4.6            *Beverages***

The beverages group included fruit juice, soft drinks, sports or energy drinks, cordials, and water.

**Fruit juice:** Most of the respondents (44.9%, n=406) seldom drink fruit juice, while 20.1% (n=182) of the respondents consumed it 1-2 times a week. Only 7.3% (n=66) consumed fruit juice daily.

**Soft drinks:** Most of the respondents seldom (34.3%, n=310) or never (32.6%, n=295) consumed soft drinks. There were 14.7% (n=133) of the respondents indicated they consumed soft drinks 1-2 times a week, and only 8.2% (n=74) enjoyed them daily.

**Sports or energy drinks:** The majority of the respondents (54.8%, n=495) never consumed any sports drinks, followed by 30.6% (n=277) who seldom consumed them. Of those respondents who consumed sports or energy drinks, 12.5% (n=113) indicated that they do so once to four times a week, while only 2.1% (n=19) consumed them daily.

**Cordials (Oros, Wild Island, Caribbean):** These beverages also show a similar pattern to the consumption of sports drinks as the majority of the respondents (50.3%, n=455) never consumed any of them. Nearly a third of the respondents (32.6%, n=295) seldom consumed cordials. Cordials and sports or energy drinks were the least frequently consumed beverages by the study group.

**Water:** was frequently consumed by this study group, as 85.4% (n=772) of the respondents indicated they drink water daily.

From the results on the frequency of consumption of fruit juice, soft drinks, sports drinks, and cordials, it is clear that the majority of the study group seldom or never consumed these beverages. Less than 10% of the respondents indicated that they consumed these drinks daily. Since the diversity of food intake results revealed that tea, coffee, and herbal teas were consumed by 91.3% of the respondents, it can be assumed that tea or coffee substituted other beverages such as soft drinks.

#### **4.3.4.7 Fast foods**

Fast foods included pizza, fried chips, meat pie and hamburger.

**Pizza:** The majority (73.3%, n=663) of the respondents seldom consumed pizza, followed by 18.8% (n=170) who indicated that they consumed pizza 1-2 times a week and 6.5% (n=59) of the respondents who never consumed pizza.

**Fried chips (slap chips):** The majority (59.4%, n=537) of respondents indicated that they seldom consumed fried chips, followed by 23.2% (n=210) of the respondents who consumed them 1-2 times a week, and 13.8% (n=125) who never consumed fried chips.

**Meat pies:** This food item was seldom consumed by the majority (55.6%, n=503) of the respondents, and 33.4% (n=302) never consumed it. Some respondents (10.4%, n=94)

consumed meat pies between one and four times a week. Only five respondents consumed meat pies daily.

**Hamburgers:** The majority (64.4%, n=582) of the respondents seldom enjoyed hamburgers, while 16.7% (n=151) indicated that they never consumed hamburgers. There were 16.7% (n=150) who consumed hamburgers 1-2 times a week and 1.9% (n=17) who consumed it 3-4 times a week.

#### **4.3.4.8            *Snack foods***

Foods that were listed as snack foods included potato crisps, chocolate bars, sweets, cookies or biscuits, and cakes.

**Potato crisps:** The majority (56.1% n=507) of the study group seldom enjoyed potato chips, while 24.6% (n=222) consumed them 1-2 times a week. Another 12.7% (n=115) never consumed potato chips and 5% (n=45) consumed them 3-4 times a week, with only 1.7% (n=15) who consumed them daily.

**Chocolate bars:** This snack was seldom consumed by the majority (56.5%, n=511) of the respondents, and 22.9% (n=207) consumed it 1-2 times a week. Others, 7.4% (n=67) had chocolate 3-4 times a week. There were, however, 2.4% (n=22) of the respondents who indicated that they enjoyed chocolate daily, and 10.7% (n=97) who never consumed chocolate bars.

**Sweets:** Similar to other snacks, sweets were seldom consumed by the majority of the respondents (57.2%, n=517), yet 18.3% (n=165) consumed sweets 1-2 times a week and 15.7% (n=142) of the respondents never consumed sweets.

**Cookies and biscuits:** The majority (51.2%, n=463) of the respondents indicated they seldom consumed these types of snacks. However, 27.5% (n=249) consumed cookies and biscuits 1-2 times a week, followed by 8% (n=72) who consumed cookies and biscuits 3-4 times a week. Only 2.8% (n=25) of the respondents consumed cookies and biscuits daily, and 10.5% (n=95) never consumed any.

**Cakes, tarts, cupcakes, or muffins:** Similar to the consumption of other snack foods, cakes, tarts, cupcakes, and muffins were seldom consumed by the majority of the respondents (65.3%, n=590) with another 13.4% (n=121) who never did so. There were 16.8% (n=152) and 3.9% (n=35) respondents who enjoyed these 1-2 times a week and 3-4 times a week respectively, with only six respondents who had them daily.

In conclusion, the results on the food practices of the study group indicate that the respondents do consume a variety of foods. Moreover, they consume three meals a day. Most of these meals are enjoyed at home, and when eating away from home, it is at a restaurant or at their workplace. However, for food groups such as starchy foods, fruits and vegetables, and legumes and nuts, the respondents must strive to regularly eat the recommended servings.

In the next section results on the second objective of the study are discussed. This objective investigated the food knowledge component of food literacy of the study group. Two sub-objectives were formulated, and they measured the declarative and procedural food knowledge of the study group.

#### **4.4 THE FOOD KNOWLEDGE OF THE STUDY GROUP**

The food knowledge of the study group was determined by means of a food literacy scale developed with the middle-class South African in mind. The development and validation of this food literacy scale for South Africans formed part of the PhD thesis of the co-supervisor. The food literacy scale consisted of six dimensions of food literacy. These dimensions included food procurement (sourcing), financial (economics), consumption, nutrition, food safety, and the social aspects of food. The food literacy scale consisted of 151 scale items. Of these 151 scale items, 107 were identified as measuring food knowledge, of which 63 scale items measured declarative knowledge, and 44 measured procedural knowledge. Respondents had to answer either **yes** or **no** for each scale item presented in the questionnaire. The composition of the food literacy questionnaire is discussed in chapter 3 on the measuring instrument section 3.7.2.1.

The results on the food knowledge of the study group are given in the following six Tables (Table 4.9, 4.11, 4.13, 4.15, 4.17, 4.19), each representing a dimension of the food literacy scale. For each scale item an indication is given to distinguish if the scale item measured declarative or procedural food knowledge. The correct response to each scale item is highlighted in each of these Tables.

##### **4.4.1 Food knowledge on the procurement (sourcing) dimension**

The procurement (sourcing) dimension relates to sourcing or “the process of acquiring goods” (food) (Furneaux & Barraket, 2014). It also includes the transportation, storage, distribution and use of these goods. Procurement (sourcing) measured the respondents’ competency in purchasing food from the available and accessible food sources. A total of nine scale items were used to determine procurement knowledge, of which eight represented declarative food knowledge and one procedural food knowledge. Table 4.9 presents the results.



**TABLE 4.9: FOOD KNOWLEDGE OF THE RESPONDENTS ON THE PROCUREMENT (SOURCING) DIMENSION (N=904)**

FOOD KNOWLEDGE SCALE ITEMS	TYPE OF KNOWLEDGE	YES		NO	
		N	%	n	%
Fruit in season is tastier.	Declarative	835	92.4	69	7.6
Ham is processed pork.	Declarative	815	90.2	89	9.8
A firm potato is fresh.	Declarative	788	87.2	116	12.8
Sprouting potatoes are poisonous.	Declarative	342	37.8	562	62.2
Fresh fish can be refrigerated for one week.	Declarative	445	49.2	459	50.8
Tinned fruit contains added sugar.	Declarative	852	94.2	52	5.8
All chocolate contains sugar.	Declarative	300	33.2	604	66.8
Coconut milk is a dairy product.	Declarative	77	8.5	827	91.5
Meat with bones improves the flavour of soup and stews.	Procedural	846	93.6	58	6.4

**TABLE 4.10: MEANS PROCEDURE FOR PROCUREMENT (SOURCING) DIMENSION**

N	MEAN	STD DEV	MINIMUM	MAXIMUM
904	7.29	1.17	1	9

The mean score for procurement (sourcing) was 7.29 with a standard deviation of 1.17. The minimum correctly answered items was one and the maximum was nine. The majority of the respondents answered all nine items correctly.

For the scale item *“Fresh fish can be refrigerated for one week”*, almost half of the respondents (49.2%, n=445) were not knowledgeable about the keeping quality of fresh fish. Another scale item *“Sprouting potatoes are poisonous”*, was incorrectly answered by 37.8% of the respondents, meaning they regarded them as poisonous.

#### 4.4.2 Food knowledge on the financial (economics) dimension

The financial or economics dimension measured the respondents' competence in terms of their ability to acquire food wisely and economically from available and accessible food sources without wastage within their own means or financial ability. This dimension of food literacy consisted of six items, and Table 4.11 presents the results. Of the six items that measured financial (economics) knowledge, three represented declarative food knowledge, and the other three procedural food knowledge.

**TABLE 4.11: FOOD KNOWLEDGE OF THE RESPONDENTS ON THE FINANCIAL (ECONOMICS) DIMENSION (N=904)**

FOOD KNOWLEDGE SCALE ITEMS	TYPE OF KNOWLEDGE	YES		NO	
		N	%	n	%
All high-quality food is expensive	Declarative	335	37.1	569	62.9
Imported food is more expensive than locally produced food	Declarative	682	75.4	222	24.6
No-name brand food is low quality	Declarative	99	11.0	805	89.0
Spinach stems can be used to make a dish	Procedural	714	79.0	190	21.0
Buying loose vegetables is better value for money	Procedural	526	58.2	378	41.8
Fresh milk is always cheaper than long-life milk	Procedural	547	60.5	357	39.5

**TABLE 4.12: MEANS PROCEDURE FOR FINANCIAL (ECONOMICS) DIMENSION**

N	MEAN	STD DEV	MINIMUM	MAXIMUM
904	4.32	1.04	1	6

The financial (economics) knowledge dimension of food literacy achieved a mean score of 4.32, and a standard deviation of 1.04. The minimum correctly answered scale items were one, and the maximum was six.

The majority of the respondents correctly answered all the scale items in this dimension. However, two procedural food knowledge scale items namely “*Fresh milk is always cheaper than long-life milk*”, and “*Buying loose vegetables is better value for money*”, were incorrectly answered. For the scale item “*Fresh milk is always cheaper than long-life milk*”, the majority (60.5%, n=547) of the respondents selected **yes** for this scale item which was incorrect. Regarding the scale item “*Buying loose vegetables is better value for money*”, nearly half of the respondents (41.8%, n=378) selected **no** as an answer for this scale item which was incorrect.

#### **4.4.3 Food knowledge on the consumption dimension**

This dimension related to the respondents’ knowledge or competency in making informed food choices to plan, prepare and eat meals. This included storing and cooking food, interpreting and adapting recipes, and using kitchen equipment. The consumption dimension contained 18 scale items, three scale items measured declarative food knowledge and 15 measured procedural food knowledge. Table 4.13 presents the results of the consumption dimension.

**TABLE 4.13: FOOD KNOWLEDGE OF THE RESPONDENTS ON THE CONSUMPTION DIMENSION (N=904)**

FOOD KNOWLEDGE SCALE ITEMS	TYPE OF KNOWLEDGE	YES		NO	
		n	%	n	%
Cut avocado discolours	Declarative	865	95.7	39	4.3
Mayonnaise contains oil	Declarative	867	95.9	37	4.1
Over-ripe tomatoes can be frozen whole	Declarative	454	50.2	450	49.8
Tinned food should be stored in a cool place	Procedural	818	90.5	86	9.5
It is better to use a serrated knife to cut fresh bread	Procedural	849	93.9	55	6.1
Marinades are used to add flavour to food	Procedural	830	91.8	74	8.2
Eggs at room temperature are better for baking	Procedural	823	91.0	81	9.0
Vegetables should be cooked with their skins	Procedural	687	76.0	217	24.0
Lamb shanks are ideal for deep-frying	Procedural	159	17.6	745	82.4
Salt is only added to pasta after boiling	Procedural	171	18.9	733	81.1
Bread dough should be kneaded lightly	Procedural	377	41.7	527	58.3
Jelly powder should first be mixed with some cold water	Procedural	357	39.5	547	60.5
Melted ice cream can be successfully refrozen	Procedural	227	25.1	677	74.9
Green vegetables should be cooked rapidly in a pot without a lid	Procedural	455	50.3	449	49.7
Ovens have to be pre-heated before baking a cake	Procedural	885	97.9	19	2.1
South African recipes indicate oven temperatures in degrees Fahrenheit	Procedural	139	15.4	765	84.6
All vegetables should be boiled with the lid on	Procedural	279	30.9	625	69.1
Mutton is more flavourful than lamb	Procedural	472	52.2	432	47.8

**TABLE 4.14: MEANS PROCEDURE FOR CONSUMPTION DIMENSION**

N	MEAN	STD DEV	MINIMUM	MAXIMUM
904	13.92	2.06	4	18

The mean score for the consumption knowledge dimension of food literacy was 13.92, with a standard deviation of 2.06. The minimum correctly answered scale items were four and 18 was the maximum correctly answered.

The majority of the respondents correctly answered all scale items representing declarative food knowledge. However, one item that stated “*Over-ripe tomatoes can be frozen whole*”, was incorrectly answered by 49.8% of the respondents.

Items representing procedural food knowledge were all correctly answered. However, some respondents were not knowledgeable on three scale items namely “*Bread dough should be kneaded lightly*”, “*Green vegetables should be cooked rapidly in a pot without a lid*”, and “*Mutton is more flavourful than lamb*”.

The scale item “*Bread dough should be kneaded lightly*”, was incorrectly answered by 41.7% (n=377) of the respondents, as they selected **yes** which was the incorrect answer. Regarding the

scale item “*Green vegetables should be cooked rapidly in a pot without a lid*”, almost half of the respondents did not know that green vegetables should be cooked rapidly without a lid. This is indicated by 49.7% (n=449) who selected **no** as their answer.

The scale item “*Mutton is more flavourful than lamb*”, was incorrectly answered by 47.8% (n=432) of the respondents, who selected **no** as their response.

#### 4.4.4 Food knowledge on the nutrition dimension

This dimension measured the respondents’ knowledge on nutrition and how it affects health and well-being by incorporating competencies such as the selection, preparation and consumption of foods. Since nutrition knowledge mainly pertains to declarative food knowledge, the total of 30 scale items on the nutrition dimension measured declarative food knowledge. Table 4.15 presents nutrition knowledge results.

**TABLE 4.15: FOOD KNOWLEDGE OF THE RESPONDENTS ON THE NUTRITION DIMENSION (N=904)**

FOOD KNOWLEDGE SCALE ITEMS	TYPE OF KNOWLEDGE	YES		NO	
		n	%	n	%
The fibre in whole-wheat bread makes you fat	Declarative	69	7.6	835	92.4
Vegetables should be cooked just before serving	Declarative	729	80.6	175	19.4
Brown rice releases energy slowly	Declarative	772	85.4	132	14.6
Pure olive oil contains no bad fats	Declarative	736	81.4	168	18.6
All fruit juices are good for you	Declarative	131	14.5	773	85.5
Fruit provides quick energy	Declarative	807	89.3	97	10.7
Butter is related to increased cholesterol	Declarative	645	71.3	259	28.7
All carbohydrates are bad	Declarative	62	6.9	842	93.1
Oats porridge is more nutritious than corn flakes	Declarative	845	93.5	59	6.5
Peanuts are a source of protein	Declarative	855	94.6	49	5.4
All added food colours are bad	Declarative	373	41.3	531	58.7
The carbohydrates in potatoes are healthy	Declarative	652	72.1	252	27.9
Salt is harmful	Declarative	552	61.1	352	38.9
Brown sugar is healthy	Declarative	418	46.2	486	53.8
Low-fat milk is good for healthy bones	Declarative	444	49.1	460	50.9
Pumpkins contain large amounts of starch	Declarative	445	49.2	459	50.8
It is recommended to drink more than 6 glasses of water per day	Declarative	806	89.2	98	10.8
Use oil sparingly when cooking	Declarative	870	96.2	34	3.8
Brown bread is recommended	Declarative	860	95.1	44	4.9
When deep-frying the oil temperature has health consequences	Declarative	695	76.9	209	23.1
It is recommended to eat five fruits and vegetables every day	Declarative	796	88.1	108	11.9
Root vegetables are unhealthy	Declarative	54	6.0	850	94.0
Cooking vegetables in the microwave destroys the nutrients	Declarative	503	55.6	401	44.4
Egg yolks are unhealthy	Declarative	164	18.1	740	81.9
Root vegetables are cooked for vitamins to be taken up by the body	Declarative	700	77.4	204	22.6
Chicken is sometimes plumped up with salt water	Declarative	769	85.1	135	14.9
Goat’s milk is taken up easier by the body.	Declarative	563	62.3	341	37.7

**TABLE 4.15 CONTINUED: FOOD KNOWLEDGE OF THE RESPONDENTS ON THE NUTRITION DIMENSION (N=904)**

FOOD KNOWLEDGE SCALE ITEMS	TYPE OF KNOWLEDGE	YES		NO	
		n	%	n	%
It is important to eat a variety of foods daily	Declarative	881	97.5	23	2.5
Coffee creamer is a healthy milk substitute	Declarative	104	11.5	800	88.5
Yellow and white maize are equally nutritious	Declarative	418	46.2	486	53.8

**TABLE 4.16: MEANS PROCEDURE FOR NUTRITION DIMENSION**

N	MEAN	STD DEV	MINIMUM	MAXIMUM
904	23.21	2.51	12	30

A mean score of 23.21 was attained by the respondents with a standard deviation of 2.51. The minimum correctly answered scale items for nutrition knowledge were 12, and the maximum correctly answered scale items were 30.

The majority of the respondents answered most scale items correctly in the nutrition dimension, however, the scale item *“Cooking vegetables in the microwave destroys the nutrients”*, was incorrectly answered by 55.6% (n=503) of the respondents. These respondents selected **yes** as the answer. Other items that were incorrectly answered by most of the respondents included *“All added food colours are bad”*, where 41.3% (n=373) of respondents did not know that all food colours are not bad. The scale item *“Brown sugar is healthy”*, was regarded to be correct by 46.2% (n=418) of the respondents, while in fact, brown sugar is not healthy. For the scale item *“Low-fat milk is good for healthy bones”*, the majority (50.9%, n=450) of the respondents wrongly selected **no** as their response, meaning they did not know that low-fat milk is good for healthy bones. Regarding the scale item *“Pumpkins contain large amounts of starch”*, almost half of the respondents (49.2%, n=445) considered pumpkins to contain large amounts of starch which is incorrect. The scale item *“Yellow and white maize are equally nutritious”*, was incorrectly answered by 46.2% (n=418) of the respondents. These respondents selected **yes** as an answer and did not know that yellow maize is more nutritious than white maize. As most of the nutrition dimension scale items were answered correctly, it can, therefore, be assumed that the respondents seemed to be knowledgeable on the nutritional aspects of food that relate to health and well-being.

#### 4.4.5 Food knowledge on the food safety dimension

This dimension covered aspects of food handling, preparation, and storage. Food safety knowledge is essential for the prevention of food-borne diseases, and it guides consumers

towards providing a safe, hygienic food environment and safe food practices (Smigic, Djekic, Martins, Rocha, Sidiropoulou & Kalogianni, 2016). The food safety dimension was measured by 22 scale items; twelve of these items represented declarative food knowledge, and ten items procedural food knowledge. Table 4.17 presents the results of this dimension.

**TABLE 4.17: FOOD KNOWLEDGE OF THE RESPONDENTS ON THE FOOD SAFETY DIMENSION (N=904)**

FOOD KNOWLEDGE SCALE ITEMS	TYPE OF KNOWLEDGE	YES		NO	
		n	%	n	%
It is dangerous to eat raw chicken	Declarative	880	97.3	24	2.7
Milk is pasteurised to improve flavour	Declarative	223	24.7	681	75.3
Long life milk needs no refrigeration at all	Declarative	321	35.5	583	64.5
Food can be eaten after the sell-by-date	Declarative	544	60.2	360	39.8
Keep eggs in the fridge	Declarative	599	66.3	305	33.7
Wash vegetables and fruits before use	Declarative	889	98.3	15	1.7
Minced meat can be frozen for up to 12 months	Declarative	475	52.5	429	47.5
Defrost chicken in lukewarm water	Declarative	586	64.8	318	35.2
Salt can be used to kill germs on a cutting board	Declarative	570	63.1	334	36.9
Add bleach to water to wash vegetables	Declarative	217	24.0	687	76.0
Cooking kills all bacteria	Declarative	464	51.3	440	48.7
Meat can be kept outside the fridge for a day	Declarative	290	32.1	614	67.9
Leg of pork should be roasted until well-done	Procedural	778	86.1	126	13.9
Do not store raw and cooked food in the same container together	Procedural	883	97.7	24	2.3
Adding spices to a stew will improve its storage life	Procedural	253	28.0	651	72.0
Fish and chicken can be deep-fried in the same oil	Procedural	160	17.7	744	82.3
Cool hot food in the fridge	Procedural	103	11.4	801	88.6
The same cutting board can be used for cutting vegetables and chicken	Procedural	136	15.0	768	85.0
Food can be defrosted in the microwave oven	Procedural	828	91.6	76	8.4
Opened tinned food can be refrigerated in the tin	Procedural	179	19.8	725	80.2
Salting is a way to keep food longer	Procedural	772	85.4	132	14.6
It is acceptable to taste and stir food with the same spoon	Procedural	110	12.2	794	87.8

**TABLE 4.18: MEANS PROCEDURE FOR FOOD SAFETY DIMENSION**

N	MEAN	STD DEV	MINIMUM	MAXIMUM
904	16.57	2.30	6	22

The means procedure for food safety knowledge reveals that a mean score of 16.57 was attained, with a standard deviation of 2.30. The minimum correctly answered scale items were six, and 22 was the maximum.

Three of the 12 declarative food knowledge items were incorrectly answered by the majority of the respondents. The three scale items incorrectly answered by most of the respondents were: The scale item “*Minced meat can be frozen for up to 12 months*” was incorrectly answered by the

majority (52.5%, n=475) of the respondents, who selected **yes** as the answer. Regarding the scale item *“Defrost chicken in lukewarm water”*, the majority of the respondents (64.8%, n=586) did not know the safe procedure to defrost chicken, as they selected **yes** as the response. The scale item *“Cooking kills all bacteria”*, posed a problem to the majority of the respondents (51.3%, n=464), as they selected **yes** as the answer, which is incorrect.

Slightly over a third of the respondents also incorrectly answered five declarative food knowledge scale items, namely *“Long life milk needs no refrigeration”*, *“Food can be eaten after the sell-by-date”*, *“Keep eggs in the fridge”*, *“Salt can be used to kill germs on a cutting board”*, and *“Meat can be kept outside the fridge for a day”*.

All procedural food knowledge scale items were correctly answered by the majority of the respondents. Proper food safety practices or behaviour must be followed when preparing and storing food at home for the prevention of food-borne illnesses.

#### 4.4.6 Food knowledge of the dimension on the social aspects of food

The last dimension on the food literacy scale related to the social aspects of food and this dimension measured respondents' competency to consider socio-cultural, food and culinary rules in food choice. The social aspect knowledge dimension consisted of 22 scale items, of which six items represented declarative food knowledge and 16 items procedural food knowledge. Table 4.19 gives the results.

**TABLE 4.19: FOOD KNOWLEDGE OF THE RESPONDENTS ON THE DIMENSION OF THE SOCIAL ASPECTS OF FOOD (N=904)**

FOOD KNOWLEDGE SCALE ITEMS	TYPE OF KNOWLEDGE	YES		NO	
		n	%	n	%
Naartjie is a citrus fruit	Declarative	883	97.7	21	2.3
Vegetarian food is Kosher	Declarative	452	50.0	452	50.0
Vegetarians eat only fruits and vegetables	Declarative	364	40.3	540	59.7
All Halaal foods are Kosher	Declarative	393	43.5	511	56.5
Curry powder is also called garam masala	Declarative	709	78.4	195	21.6
Snoek is a fresh-water fish	Declarative	271	30.0	633	70.0
Marshmallows can be eaten by people who do not eat animal products	Declarative	395	43.7	509	56.3
Biltong is made from beef and game	Procedural	866	95.8	38	4.2
Mabela is made from sorghum	Procedural	713	78.9	191	21.1
All sushi is made with raw fish	Procedural	393	43.5	511	56.5
A pita is a small pizza	Procedural	185	20.5	719	79.5
Chakalaka contains chillies	Procedural	735	81.3	169	18.7



**TABLE 4.19 CONTINUED: FOOD KNOWLEDGE OF THE RESPONDENTS ON THE DIMENSION OF THE SOCIAL ASPECTS OF FOOD (N=904)**

FOOD KNOWLEDGE SCALE ITEMS	TYPE OF KNOWLEDGE	YES		NO	
		n	%	n	%
Braaiing is done on open flames	Procedural	721	79.8	183	20.2
Stir putu pap frequently	Procedural	584	64.6	320	35.4
Mageu is an alcoholic drink	Procedural	359	39.7	545	60.3
Morogo is a specific green leafy vegetable	Procedural	751	83.1	153	16.9
Atchar is made from green mangoes	Procedural	814	90.0	90	10.0
Biryani is made with pasta	Procedural	77	8.5	827	91.5
Samp can be cooked in a pressure cooker	Procedural	617	68.3	287	31.7
Bunny chow is made with brown bread	Procedural	135	14.9	769	85.1
Yellow rice is served with bobotie	Procedural	831	91.9	73	8.1
Amasi can be used in baking	Procedural	691	76.4	213	23.6

**TABLE 4.20: MEANS PROCEDURE FOR DIMENSION ON THE SOCIAL ASPECTS OF FOOD**

N	MEAN	STD DEV	MINIMUM	MAXIMUM
904	14.69	2.36	7	22

The mean score attained was 14.69, with a standard deviation of 2.36. The minimum correctly answered score items were seven, and the maximum was 22.

The majority of the respondents answered most of the social aspects of food knowledge scale items correctly; however, four scale items were incorrectly answered. The scale items incorrectly answered by most of the respondents included “*Curry powder is also called garam masala*”, which the majority (78.4% n=709) of the respondents incorrectly answered by selecting **yes** as the answer, yet the correct answer was **no**. The scale item “*Vegetarian food is Kosher*” was also incorrectly answered. Kosher foods adhere to the Orthodox Jewish dietary regulations, and half of the respondents (50.0%, n=452) selected **no** as an incorrect answer. For scale item “*Braaiing is done on open flames*”, the majority 79.8% (n=721) of the respondents incorrectly selected **yes**, which indicates that the majority of the respondents seemed not to know the procedure of braaiing. Lastly, for the scale item “*Morogo is a specific green leafy vegetable*”, the majority (83.1%, n=751) of the respondents were not aware that it is not a specific green leafy vegetable as they selected **yes** as the answer. Morogo is a traditional South African dish that includes at least three different indigenous dark green leafy vegetables, namely cowpea, vegetable amaranth, or spider flower (Njeme, Goduka & George, 2014).

Other items in the social aspects of food knowledge dimension that were incorrectly answered by more than 40% of the respondents included; “*Marshmallows can be eaten by people who do not*

*eat animal products”, “All Halaal foods are Kosher”, “All sushi is made with raw fish”, and “Vegetarians eat only fruits and vegetables”.*

This study deals with food knowledge (declarative and procedural food knowledge) of the study group. The mean score procedure for the overall food knowledge as well as declarative and procedural food knowledge is presented in Table 4.21.

**TABLE 4.21: THE MEAN SCORE PROCEDURE FOR FOOD KNOWLEDGE (DECLARATIVE AND PROCEDURAL KNOWLEDGE) (N=904)**

LABEL	MEAN	STD DEV	MINIMUM	MAXIMUM	TOTAL
Overall food knowledge	80	7.23	44	100	107
Declarative food knowledge	46.37	4.61	25	60	63
Procedural food knowledge	33.63	3.68	17	43	44

The food literacy scale consisted of 107 scale items which measured food knowledge, of which 63 scale items represented declarative food knowledge and 44 scale items procedural food knowledge. For the overall 107 scale items, a mean score of 80.0 was attained with a standard deviation of 7.23. The minimum correctly answered scale items were 44, and the maximum was 100, meaning that there were no respondents who correctly answered all 107 scale items.

From the 63 declarative food knowledge scale items, a mean score of 46.37 was attained with a standard deviation of 4.61. The minimum correctly answered scale items were 25, and the maximum was 60. For procedural food knowledge, a mean score of 33.63 and a standard deviation of 3.68 was attained. A minimum of 17 score items was correctly answered with a maximum of 43. These mean scores provide evidence that the respondents had good declarative and procedural food knowledge.

The results of the six dimensions of the food literacy scale indicate that the majority of the respondents correctly answered most of the scale items on each dimension, although there were a few items about which some of the respondents were not knowledgeable. The respondents showed adequate to good knowledge for all six of the food literacy scale dimensions. Adequate knowledge regarding each dimension of food literacy is important, as such knowledge can be assumed to guide consumers to make sound food choices.

The next section presents the results on objective 3 of the study which deals with the explication of the study group’s food practices in relation to their food knowledge, and how compliant the

study group's food consumption practices are with the Food Based Dietary Guidelines for South Africa.

#### **4.5 EXPLICATION OF THE STUDY GROUP'S FOOD PRACTICES IN RELATION TO THEIR FOOD KNOWLEDGE AND COMPLIANCE TO THE FOOD BASED DIETARY GUIDELINES FOR SOUTH AFRICA**

Research shows that food knowledge gives an indication of consumers' relationship with food and that with adequate knowledge, individual skills and behaviour can be changed (Lee *et al.*, 2018; Worsley, Wang, Yeatman, Byrne & Wijayarathne, 2015b; Vaitkeviciute, Ball & Harris, 2015). To explicate the study group's food consumption practices in relation to their food knowledge, scale items from the six dimensions of food literacy which simultaneously measured aspects related to the food groups (starchy foods, fruits and vegetables, legumes and nuts, protein-rich foods, milk and dairy products) were used. Recommendations for adequate food intake, the number of servings, and the frequency of consumption were used in the further analysis and interpretation to determine to what extent the study group complied with the Food Based Dietary Guidelines for South Africa. Tables representing each of the food groups that were included in the data collection were used for this purpose.

The first guideline recommends that South Africans should “*enjoy a variety of foods*” (Steyn, 2013). The majority of the study group consumed a variety of foods, and this was indicated by their consumption of five or more of the nine food groups that were presented to them (See 4.3.2 for the detailed results on the dietary diversity of the study group). A Dietary Diversity Score of 6.02 was thus attained by the study group. The consumption of a variety of foods is important, and it is recommended that consumers should strive to include foods from each food group daily (Steyn, 2013).

Table 4.22 presents the food consumption practices, compliance with the Food Based Dietary Guidelines for South Africa, and food knowledge on starchy foods.

**TABLE 4.22: FOOD CONSUMPTION PRACTICES, COMPLIANCE TO THE GUIDELINE, AND FOOD KNOWLEDGE ON STARCHY FOODS (N=904)**

FOOD PRACTICES			FOOD KNOWLEDGE	
FOOD GROUP	CONSUMPTION PRACTICES	COMPLIANCE WITH GUIDELINE	FOOD KNOWLEDGE SCALE ITEMS	FOOD KNOWLEDGE SCORES
STARCHY FOODS	88.50% consumed starchy foods the previous day.	The majority did not completely comply with the guideline	-Brown bread is recommended.	95.10%
			-Oats porridge is more nutritious than corn flakes	93.50%
	-All carbohydrates are bad		93.10%	
	-The fibre in whole-wheat bread makes you fat.		92.40%	
	74% consumed 1-2 servings a day		-Brown rice releases energy slowly.	85.40%
	-Salt is only added to pasta after boiling.		81.10%	
	-Mabela is made from sorghum.		78.90%	
	-Samp can be cooked in a pressure cooker.		68.30%	
	-Bread dough should be kneaded lightly.		58.30%	
	-Yellow and white maize are equally nutritious.		53.80%	
Consumption frequency of listed starchy foods varied. Most consumed from listed items 1-2 times a week. Exception of maize meal porridge that was seldom or never consumed.				

### Food consumption practices of starchy foods

Starchy food included maize meal, rice, wheat, sorghum, and any other foods prepared from cereals such as porridge, bread, pasta, and noodles, as well as white roots and tubers such as potatoes and white sweet potatoes. The majority (88.50%, n=800) of the respondents included food from this group as part of their meals the previous day. However, the majority (74.0%, n=669) of the respondents indicated that they only consumed 1-2 servings of starchy foods, meaning they consumed one or two slices of bread, or 1 cup of rice or pasta or any cereal or starchy food a day. Although the frequency of consumption data reveals that various starchy foods such as rice, pasta (macaroni, spaghetti, noodles), and brown or whole wheat bread are consumed 1-2 times a week, the majority of the respondents reported that they seldom or never consumed maize meal porridge.

### Compliance with Food Based Dietary Guidelines for South Africa

The Food Based Dietary Guidelines for South Africa recommends that South Africans should “*make starchy foods part of most meals*”. The guideline on starchy foods consumption

recommends that South African consumers should plan their meals around starchy foods. It further states that sufficient dietary carbohydrates from minimally processed, traditional and indigenous whole-grain and cereal products should be consumed in high amounts (Vorster, 2013). It seems, therefore, that the respondents of this study did not fully comply to the guideline since the majority of the respondents consumed 1-2 servings of starchy food a day.

### **Food knowledge of starchy foods**

The food knowledge of the study group regarding starchy foods was measured by means of ten scale items, which were represented by the food literacy dimensions of consumption, nutrition, and the social aspects of food. Two scale items from the consumption dimension, namely, "*Bread dough should be kneaded lightly*" and "*Salt is only added to pasta after boiling*" were included. Both scale items measured procedural food knowledge, and the majority of the respondents answered them correctly. For the nutrition dimension, six scale items were included, and they measured declarative food knowledge. These scale items included "*The fibre in whole wheat bread makes you fat*", "*Brown rice releases energy slowly*", "*All carbohydrates are bad*", "*Oats porridge is more nutritious than corn flakes*", "*Brown bread is recommended*", and "*Yellow and white maize are equally nutritious*". More than 80% of the respondents correctly answered all nutrition knowledge scale items. Although the scale item pertaining to yellow and white maize was correctly answered by 53.8% of the respondents, many did not know the nutritional value of yellow maize. The dimension on the social aspects of food consisted of two scale items measuring procedural food knowledge. These scale items were "*Mabela is made from sorghum*", and "*Samp can be cooked in a pressure cooker*". The majority of the respondents answered both these scale items correctly.

The average food knowledge scores for these ten scale items showed that the study group possessed adequate food knowledge regarding starchy foods, although the respondents did not fully comply with the food consumption practices, as it seemed that not all respondents made starchy foods part of most meals as recommended.

Table 4.23 presents the food consumption practices, compliance with the Food Based Dietary Guidelines for South Africa, and food knowledge on vegetables and fruits.

**TABLE 4.23: FOOD CONSUMPTION PRACTICES, COMPLIANCE TO THE GUIDELINE, AND FOOD KNOWLEDGE ON FRUITS AND VEGETABLES (N=904)**

FOOD PRACTICES			FOOD KNOWLEDGE	
FOOD GROUP	CONSUMPTION PRACTICES	COMPLIANCE WITH GUIDELINE	FOOD KNOWLEDGE SCALE ITEMS	FOOD KNOWLEDGE SCORES
<b>FRUITS AND VEGETABLES</b>  Dark green leafy vegetables  Orange-fleshed vegetables and fruits  Other vegetables and fruits	Majority often consumed vegetables & fruits daily  51.10% consumed dark green leafy vegetables the previous day  58.60% consumed orange-fleshed vegetables & fruits the previous day  89.40% consumed other vegetables & fruits the previous day  74% enjoyed 1-2 servings a day of vegetables & fruits	The majority did not completely comply with the guideline.	-Wash vegetables and fruit before use.	98.30%
			-Naartjie is a citrus fruit.	97.70%
			-Tinned fruit contains added sugar.	94.20%
			-Root vegetables are unhealthy.	94.00%
			-Fruit in season is tastier.	92.40%
			-Fruits provide quick energy.	89.30%
			-It is recommended to eat five fruits and vegetables every day.	88.10%
			-Vegetables should be cooked just before serving	80.60%
			-Spinach stems can be used to make a dish	79.0%
			-Root vegetables are cooked for Vitamins to be taken up by the body.	77.40%
			-Vegetables should be cooked with their skins.	76.00%
			-The carbohydrates in potatoes are healthy.	72.10%
			-All vegetables should be boiled with the lid on.	69.10%
			-Buying loose vegetables is better value for money	58.20%
			-Pumpkins contain large amounts of starch.	50.80%
			-Green vegetables should be cooked rapidly in a pot without a lid.	50.30%
-Over-ripe tomatoes can be frozen whole.	50.20%			
-Cooking vegetables in the microwave destroys the nutrients.	44.40%			
-Morogo is a specific green leafy vegetable.	16.90%			

### Food Consumption practices of fruits and vegetables

The vegetables and fruits food group included fresh and frozen vegetables or salad, as well as orange-fleshed vegetables and fruits, green leafy vegetables, other vegetables and fruits such as tomatoes, onion, green beans, lettuce, cabbage, broccoli, cauliflower, potatoes, eggplant, apples, pears, bananas, oranges, and naartjies. The majority of the respondents enjoyed a variety of vegetables and fruits daily. Vegetables such as dark green leafy vegetables were consumed by

51.10% respondents the previous day, orange fleshed vegetables and fruits were included by 58.60% of the respondents the previous day, and 89.40% had other vegetables and fruits the previous day. However, consumption of fruits and vegetable was limited to between 1-2 servings a day, which is less than the recommended amount. This means that the respondents consumed ½ cup chopped vegetables or fruits, and/or 1 or 2 fruits a day.

### **Compliance with Food Based Dietary Guidelines for South Africa**

The Food Based Dietary Guidelines for South Africa regarding fruits and vegetables recommend that South Africans should “*eat plenty of vegetables and fruit every day*”. This is recommended in order to minimise the burden of non-communicable diseases, overweight and obesity (Naudé, 2013). The respondents of this study did not fully comply with the guideline because the majority consumed 1-2 servings of fruits and vegetables a day. The study group needs to strive to eat more servings of vegetables and fruits, as recommended by the Food Based Dietary Guidelines for South Africa.

### **Food knowledge of fruits and vegetables**

The food knowledge scale items regarding fruits and vegetables consisted of 19 scale items from the six dimensions of food literacy.

Two of the scale items measured procurement (sourcing) knowledge, namely “*Fruit in season is tastier*”, as well as “*Tinned fruit contains added sugar*”. Both scale items measured declarative food knowledge and over 90% (n=814) of the respondents answered them correctly.

Two scale items measured financial (economics) knowledge. These scale items on vegetables measured procedural food knowledge, namely “*Spinach stems can be used to make a dish*”, and “*Buying loose vegetables is better value for money*”. Both scale items were correctly answered by 79.0% (714) and 58.2% (n=526) of the respondents, respectively.

The consumption dimension contained four scale items that measured fruits and vegetable knowledge. These scale items included, “*Over-ripe tomatoes can be frozen whole*”. This scale item measured declarative food knowledge and was answered correctly by only 50.2% (n=454) of the respondents; meaning the other 50% were not aware that over-ripe tomatoes could be frozen whole. The other three scale items measured declarative food knowledge, and they stated, “*Vegetables should be cooked with their skins*”, “*Green vegetables should be cooked rapidly in a pot without a lid*”, and “*All vegetables should be boiled with the lid on*”. These scale items were answered correctly by the majority of the respondents. However, for the scale item on green



vegetables, about 50% of the respondents did not know that green vegetables should be cooked rapidly without a lid.

For the dimension on nutrition knowledge, eight scale items on fruits and vegetables measured declarative food knowledge. These scale items included, *“Root vegetables are healthy”*, *“Vegetables should be cooked just before serving”*, *“It is recommended to eat five fruits and vegetables every day”*, *“Fruit provides quick energy”*, *“Root vegetables are cooked for vitamins to be taken up by the body”*, and *“The carbohydrates in potatoes are healthy”*. These scale items were answered correctly by the majority of the respondents. However, the scale items *“Pumpkins contain large amounts of starch”*, and *“Cooking vegetables in the microwave destroys the nutrients”* were respectively answered correctly by 50.8% (n=459) and 44.4% (n=401) of the respondents, meaning the other 50% of the respondents were not knowledgeable on these. The majority of the respondents (88.1%, n=769) were aware of the recommendation to eat five fruits and vegetables a day. However, when asked about the number of servings of fruits and vegetables consumed a day, only 3.0% of the respondents consumed five or more servings of fruits and vegetables a day.

For the dimension on food safety, only one scale item on fruit and vegetables measured declarative food knowledge. This scale item stated, *“Wash vegetables and fruits before use”*, which 98.3% (n=889) of the respondents correctly answered.

The last dimension on knowledge of the social aspects of food contained two scale items regarding fruits and vegetables. The scale items included, *“Naartjie is a citrus fruit”*, and it measured declarative food knowledge, which 97.7% (n=883) of the respondents correctly answered. The other scale item *“Morogo is a specific green leafy vegetable”* measured procedural food knowledge, which 16.9% (n=153) of the respondents correctly answered. The majority (83.1%, (n=751) of the respondents were not aware that *morogo* is not a specific green leafy vegetable.

The food knowledge scores on fruits and vegetables revealed that the study group possessed adequate knowledge regarding fruits and vegetables. Further, their consumption practices regarding fruits and vegetables reveal that the majority of the respondents included one or two, or half a cup of fruits and vegetables, in their meals. However, the respondents did not fully comply with the guideline since they consumed fewer fruits and vegetables than the daily recommended amount. Although the study group is knowledgeable about the daily recommended amount of fruits and vegetables, their food behaviour does not correlate with their knowledge.

Table 4.24 presents the food consumption practices, compliance with the Food Based Dietary Guidelines for South Africa, and food knowledge on legumes and nuts food group.

**TABLE 4.24: FOOD CONSUMPTION PRACTICES, COMPLIANCE TO THE GUIDELINE, AND FOOD KNOWLEDGE ON LEGUMES AND NUTS (N=904)**

FOOD PRACTICES			FOOD KNOWLEDGE	
FOOD GROUP	CONSUMPTION PRACTICES	COMPLIANCE WITH GUIDELINE	FOOD KNOWLEDGE SCALE ITEMS	FOOD KNOWLEDGE SCORES
<b>LEGUMES AND NUTS</b>	The majority seldom consumed legumes and nuts.	The study group did not comply with the guideline	-Peanuts are a source of protein.	94.60%

### Food Consumption practices of legumes and nuts

The legumes and nuts food group included dried beans, dried peas, lentils, nuts, or foods made from these (peanut butter, hummus). The majority of the respondents indicated they seldom consumed legumes and nuts.

### Compliance with Food Based Dietary Guidelines for South Africa

The Food Based Dietary Guidelines for South Africa advises South Africans to “*eat dry beans, split peas, lentils and soya regularly*”. The regular consumption of legumes can aid in the prevention of overweight and obesity, and the occurrence of non-communicable diseases which are prevalent in South Africa (Venter, Ochse & Swart, 2013). However, the results on the food consumption practices of the study group indicate that they did not comply with the guideline regarding the consumption of legumes and nuts.

### Food knowledge of legumes and nuts

Only one scale item from the nutrition dimension measured declarative food knowledge on legumes and nuts, namely “*Peanuts are a source of protein*”. The majority of the respondents (94.6%, n=855) correctly answered this scale item. However, their food consumption practices results indicate that the study group consumes less legumes and nuts, despite knowing that they are a source of protein.

Table 4.25 presents the food consumption practices, compliance with Food Based Dietary Guideline for South Africa, and food knowledge on fats and oils.

**TABLE 4.23: FOOD CONSUMPTION PRACTICES, COMPLIANCE TO THE GUIDELINE, AND FOOD KNOWLEDGE ON FATS AND OILS (N=904)**

FOOD PRACTICES			FOOD KNOWLEDGE	
FOOD GROUP	CONSUMPTION PRACTICES	COMPLIANCE WITH GUIDELINE	FOOD KNOWLEDGE SCALE ITEMS	FOOD KNOWLEDGE SCORES
FATS AND OILS	Majority included fats and oils in their meals the previous day.	The study group complied with guideline	-Use oil sparingly when cooking.	96.20%
			-Mayonnaise contains oil.	95.90%
	-When deep-frying the oil temperature has health consequences.		76.90%	
	-Butter is related to increased cholesterol.		71.30%	
	-Pure olive oil contains no bad fats.		51.40%	
	Consumption varied in terms of types of fats			

### Food Consumption practices of fats and oils

Fats and oils include oils, butter, vegetable oil, tub, and brick margarine, and these were consumed by the majority (80.90%, n=731) of the respondents the previous day. The frequency of consumption of fats and oils varied in terms of the type of fat, with butter and vegetable oil consumed most often. The number of servings of fats and oils was not measured.

### Compliance with Food Based Dietary Guidelines for South Africa

The Food Based Dietary Guidelines for South Africa recommends that consumers should “*use fats sparingly: choose vegetable oils rather than hard fats*” (Smuts & Wolmarans, 2013). Although the quantity of fats and oils used by the study group was not measured, it can be assumed that the study group adhered to this guideline since fats and oils consumption varied. However, the fats and oils consumed most often were butter and vegetable oil as indicated by the frequency of consumption results.

### Food knowledge of fats and oils

Regarding the food knowledge on fats and oils, five scale items measured the consumption and nutrition dimension. The consumption dimension had one scale item regarding fats and oils, and this item measured declarative food knowledge, “*Mayonnaise contains oil*”. The majority of the respondents 95.9% (n=867) did know this.

The nutrition dimension consisted of four scale items regarding fats and oils, which measured declarative food knowledge. These scale items included “*Pure olive oil contains no bad fats*”,

“Butter is related to increased cholesterol”, “Use oil sparingly”, and “When deep-frying the oil temperature has health consequences”. All four scale items were correctly answered by the majority of the respondents, especially the scale item regarding the use of oil when cooking. Although the quantity of oils used by the respondents was not measured, it can be assumed that the respondents do use it sparingly as per their knowledge and food consumption results.

Table 4.26 presents the food consumption practices, compliance with Food Based Dietary Guidelines for South Africa, and food knowledge on protein-rich foods.

**TABLE 4.26: FOOD CONSUMPTION PRACTICES, COMPLIANCE TO THE GUIDELINE, AND FOOD KNOWLEDGE ON PROTEIN-RICH FOODS (N=904)**

FOOD PRACTICES			FOOD KNOWLEDGE		
FOOD GROUP	CONSUMPTION PRACTICES	COMPLIANCE WITH GUIDELINE	FOOD KNOWLEDGE SCALE ITEMS	FOOD KNOWLEDGE SCORES	
PROTEIN-RICH FOODS	Majority consumed red meat, chicken, or fish the previous day	The majority complied with the guideline, however, fish was less consumed.	-Biltong is made from beef and game.	95.80%	
	- Red meat		45.90% consumed eggs the previous day.	-Leg of pork should be roasted until well-done.	86.10%
			-Chicken/poultry	The majority consumed red meat, chicken, and eggs once or more a week. Fish was consumed seldom or 1-2 times a week	-Chicken is sometimes plumped up with salt water.
	-Fish and chicken can be deep-fried in the same oil.				82.30%
	-Fish		Majority had 1-2 servings a day of protein-rich foods.	-Egg yolks are unhealthy.	81.90%
				-Meat can be kept outside the fridge for a day.	67.90%
	-Eggs			-Keep eggs in the fridge.	66.30%
				-All sushi is made with raw fish.	56.50%
				-Mutton is more flavourful than lamb.	52.20%
				-Fresh fish can be refrigerated for one week.	50.80%
				-Minced meat can be frozen for up to 12 months.	47.50%
				-Defrost chicken in lukewarm water.	35.20%

### Food Consumption practices of protein-rich foods

Protein-rich foods include beef, pork, mutton/lamb, goat, chicken, duck, fresh, frozen, tinned, or dried fish or shellfish, and eggs. The majority of the respondents (89.6%, n=810) consumed protein-rich foods the previous day, and eggs were consumed by 45.9% (n=415) of the respondents. The respondents indicated that they often consumed certain protein-rich food 1-2 times a week, and the majority (83%, (n=750) of the study group also consumed 1-2 servings of

protein-rich foods a day. This means the study group enjoyed one or two pieces of palm-sized red meat or one piece of chicken or fish or eggs a day.

### **Compliance with Food Based Dietary Guidelines for South Africa**

The Food Based Dietary Guidelines for South Africa regarding the consumption of protein-rich foods recommends that *“fish, chicken, lean meat or eggs can be eaten daily”*, and it seems the study group complied with this guideline since the majority consumed red meat, chicken and eggs more than once a week. The inclusion of these protein-rich foods adds to the nutritional adequacy of an individual’s diet (Schonfeldt & Hall, 2013). South African consumers, therefore, need to be encouraged to include these foods in their daily diet.

### **Food knowledge of protein-rich foods**

The food knowledge scale items regarding protein-rich foods contained 12 scale items. Five dimensions of food literacy contained scale items regarding protein-rich foods, namely procurement (sourcing), consumption, food safety, nutrition, and social aspects of food. One scale item on procurement (sourcing) measured declarative food knowledge, and it stated, *“Fresh fish can be refrigerated for one week”*. This scale item was correctly answered by 50.8% (n=459) of the respondents. The other 49.2% (n=445) of the respondents were not aware of the keeping quality of fresh fish.

The consumption dimension also had one scale item regarding protein-rich foods, namely *“Mutton is more flavourful than lamb”*. This scale item measured procedural food knowledge and was correctly answered by 52.2% (n=472) of the respondents.

The nutrition dimension contained two scale items regarding protein-rich foods; both scale items measured declarative knowledge. These scale items included *“Egg yolks are unhealthy”*, as well as *“Chicken is sometimes plumped up with saltwater”*. Both scale items were correctly answered by over 80% of the respondents.

Six scale items in the food safety dimension were on protein-rich foods. Four of the scale items measured declarative food knowledge, which included, *“Keep eggs in the fridge”*, *“Minced meat can be frozen for up to 12 months”*, *“Defrost chicken in lukewarm water”*, and *“Meat can be kept outside the fridge for a day”*. The scale items *“Keep eggs in the fridge”*, and *“Meat can be kept outside the fridge for a day”* were correctly answered by over 60% of the respondents. However, the scale items *“Minced meat can be frozen for up to 12 months”* and *“Defrost chicken in lukewarm water”* were correctly answered by respectively 47.5% (n=429) and 35.2% (n=318) of the

respondents. This means that over 50% of the respondents were not knowledgeable about the food safety practices relating to protein-rich foods.

The two remaining scale items measured procedural food knowledge, and they included “*Leg of pork should be roasted until well-done*”, and “*Fish and chicken can be deep-fried in the same oil*”. The procedural food knowledge scale items were correctly answered by over 80% of the respondents.

The dimension on the social aspects of food contained two scale items regarding protein-rich foods, and both scale items measured procedural food knowledge. These scale items included “*Biltong is made from beef and game*”, and “*All sushi is made with raw fish*”. The majority of the respondents, 95.8% (n=866) and 56.5% (n=511) respectively, correctly answered these scale items.

Although most of the respondents did not often include fish in their meals, the majority of the study group included other protein-rich foods in their meals. The food knowledge of the respondents regarding protein-rich foods reveals that the majority possesses adequate knowledge regarding this food group, apart from scale items relating to the food safety dimension, about which most of the respondents lacked adequate knowledge.

Table 4.27 presents the food consumption practices, compliance with the Food Based Dietary Guidelines for South Africa, and food knowledge on milk and dairy products.

**TABLE 4.27: FOOD CONSUMPTION PRACTICES, COMPLIANCE TO THE GUIDELINE, AND FOOD KNOWLEDGE ON MILK AND DAIRY PRODUCTS (N=904)**

FOOD PRACTICES			FOOD KNOWLEDGE	
FOOD GROUP	CONSUMPTION PRACTICES	COMPLIANCE WITH GUIDELINE	FOOD KNOWLEDGE SCALE ITEMS	FOOD KNOWLEDGE SCORES
MILK AND DAIRY PRODUCTS	Majority consumed milk and dairy products the previous day.	The majority complied with the guideline	-Coconut milk is a dairy product.	91.50%
			-Coffee creamer is a healthy milk substitute.	88.50%
			-Amasi can be used in baking.	76.40%
	Majority had 1-2 servings a day.		-Milk is pasteurised to improve flavour.	75.30%
			-Melted ice-cream can be successfully refrozen.	74.90%
			-Long life milk needs no refrigeration at all.	64.50%
	The consumption varied, with full-cream milk often consumed		-Goat's milk is taken up easier by the body.	62.30%
			-Low-fat milk is good for healthy bones.	49.10%
			-Fresh milk is always cheaper than long-life milk.	39.50%

### Food Consumption practices of milk and dairy products

Milk and dairy products included milk, maas, cheese, yoghurt, or any other milk product. The food consumption practices of the study group indicate that the majority of the respondents consumed foods from this group the previous day. The majority of the study group also consumed 1-2 servings of milk and dairy products a day, meaning they had one or two cups of milk, yoghurt, maas, and one or two cubes or slices of cheese. The frequency of consumption of milk and dairy products varied in terms of the food item presented.

### Compliance with the Food Based Dietary Guideline for South Africa

The majority of the respondents adhered to the guideline *“have milk, maas or yoghurt every day”*. The guideline concerning milk recommends milk, maas or yoghurt to be consumed every day because these dairy products have a high nutritional value (Vorster, Wentzel-Viljoen & Vermaak, 2013b). Respondents' consumption of milk and dairy products varied with the type of food item.

### Food knowledge of milk and dairy products

Nine food knowledge scale items were used to determine respondents' knowledge about milk and dairy products. Each of the six dimensions of food literacy contained scale items relating to this



food group. One scale item on procurement (sourcing) measured declarative food knowledge. This scale item: *“Coconut milk is a dairy product”*, was correctly answered by 91.5% (n=827) of the respondents.

The financial (economics) dimension also had one scale item regarding milk and dairy products. This scale item measured procedural food knowledge: *“Fresh milk is always cheaper than long-life milk”*, which only around 40% of the respondents answered correctly. This indicates that 60% of the respondents did not know that fresh milk is a cheaper option.

The consumption dimension contained one scale item regarding milk and dairy products which measured procedural food knowledge. The scale item, *“Melted ice-cream can be successfully refrozen”*, was correctly answered by 74.9% (n=677) of the respondents.

There were three scale items in the nutrition dimension, which measured declarative food knowledge. These scale items included *“Low-fat milk is good for healthy bones”*, *“Goat’s milk is taken up easier by the body”*, and *“Coffee creamer is a healthy milk substitute”*. The majority of the respondents correctly answered scale items regarding coffee creamer and goat’s milk. However, for the scale item *“Low-fat milk is good for healthy bones”*, less than 50% of the respondents answered it correctly indicating that the other 50% of the respondents did not know that low-fat milk is also good for healthy bones. The food practices of the respondents also suggest that full-cream milk is most often consumed by respondents.

Two scale items in the food safety dimension measured aspects on the milk and dairy products food group and both scale items measured declarative food knowledge. These scale items included *“Milk is pasteurised to improve flavour”*, and *“Long life milk needs no refrigeration at all”*. Both scale items were correctly answered respectively by 75.3% (n=681) and 64.5% (n=583) of the respondents.

The social dimension had one scale item measuring procedural food knowledge which stated, *“Amasi can be used in baking”*. This question was correctly answered by 76.4% (n=692) of the respondents.

The majority of the respondents showed adequate knowledge concerning scale items regarding milk and dairy products. However, the majority of the respondents were not knowledgeable about the scale items *“Fresh milk is always cheaper than long-life milk”*, and *“Low-fat milk is good for healthy bones”*. This response indicates that the respondents consume full-cream milk instead of low-fat milk. The study group complied with the guideline concerning the consumption of milk and dairy products, since the majority of the respondents included food from this group in their meals.

Table 4.28 presents the food consumption practices, compliance with the Food Based Dietary Guidelines for South Africa, and food knowledge on drinking lots of clean and safe water.

**TABLE 4.28: FOOD CONSUMPTION PRACTICES, COMPLIANCE WITH THE GUIDELINE ON DRINKING WATER, AND THE FOOD KNOWLEDGE OF THE STUDY GROUP (N=904)**

FOOD PRACTICES			FOOD KNOWLEDGE	
FOOD GROUP	CONSUMPTION PRACTICES	COMPLIANCE WITH FBDG	FOOD KNOWLEDGE SCALE ITEMS	FOOD KNOWLEDGE SCORES
WATER	Most had $\geq 5$ servings of water a day  The majority consumed water daily	The majority complied with the guideline of drinking lots of clean and safe water.	-It is recommended to drink more than six glasses of water per day.	89.20%

#### Food Consumption practices of water

The majority of the respondents indicated they consumed water daily, drinking five or more servings a day.

#### Compliance with the Food Based Dietary Guidelines for South Africa

The study group complied with the guideline recommending that individuals should “*drink lots of clean, safe water*”, since most of the respondents drank five or more servings of water a day.

#### Food knowledge on water

Food knowledge items regarding water only consisted of one scale item. This scale item measured declarative food knowledge of the nutrition dimension. It stated: “*It is recommended to drink more than six glasses of water per day*”. The majority of the respondents (89.2%) knew that more than six glasses of water should be consumed a day.

Table 4.29 presents the food consumption practices, compliance with the Food Based Dietary Guidelines for South Africa, and food knowledge on the consumption of sugar, and foods and beverages high in sugar.

**TABLE 4.29: FOOD CONSUMPTION PRACTICES, COMPLIANCE WITH THE GUIDELINE ON CONSUMPTION OF SUGAR, AND FOOD AND DRINKS HIGH IN SUGAR, AND THE FOOD KNOWLEDGE OF THE STUDY GROUP (N=904)**

FOOD PRACTICES			FOOD KNOWLEDGE	
FOOD GROUP	CONSUMPTION PRACTICES	COMPLIANCE WITH FBDG	FOOD KNOWLEDGE SCALE ITEMS	FOOD KNOWLEDGE SCORES
<b>SUGAR AND FOOD AND DRINKS HIGH IN SUGAR</b>	Majority consumed sweets/ foods high in sugar the previous day.	The majority complied with the guideline.	-All fruit juices are good for you.	85.50%
			-All chocolate contains sugar.	66.80%
	Sweets and drinks high in sugar were seldom or never consumed.		-Brown sugar is healthy.	53.80%

### **Food Consumption practices of sugar, and food and drinks high in sugar**

Sugar, and food and drinks high in sugar including sugar or honey added to tea or coffee, soft drinks, cordials, fruit juice, energy drinks, chocolates, candies, cookies, and cakes.

Food items in this group were consumed by the majority the previous day. However, the frequency of consumption results indicated that the respondents seldom or never consumed food items such as soft drinks, cordials, energy drinks, chocolate bars, cookies, and cakes.

### **Compliance with the Food Based Dietary Guidelines for South Africa**

Regarding the guideline “*use sugar and foods and drinks high in sugar sparingly*”, the study group complied with this guideline as the majority seldom or never consumed them.

### **Food knowledge of sugar, and food and drinks high in sugar**

Three scale items measured aspects regarding sugar, and food and drinks high in sugar, and all three scale items measured declarative food knowledge. Food literacy dimensions measured included procurement (sourcing) and the nutrition dimensions. There was one scale item on the procurement (sourcing) dimension. This scale item stated, “*All chocolate contains sugar*”, which 66.8% of the respondents answered correctly. The other two scale items measured the nutrition dimension, and they included, “*All fruit juices are good for you*,” which 85.5% of the respondents answered correctly. The second scale item, “*Brown sugar is healthy*”, was answered correctly by 53.8% of the respondents. From the information provided, it can be deduced that the study

group's food knowledge correlated with their food consumption practices of sugar, and food and drinks high in sugar.

The results on objective 3 indicate that the respondents possess adequate to good food knowledge that contributes positively to their food consumption practices. The respondents complied with most of the Food Based Dietary Guidelines for South Africa, and they consumed a variety of foods. However, in relation to the consumption of the recommended five servings of fruits and vegetables, the inclusion of starchy foods in most meals, and the regular consumption of legumes and nuts, the food practices of the respondents did not comply with the Food Based Dietary Guidelines for South Africa. Respondents indicated that only 1-2 servings a day of fruits and vegetables and starchy foods were consumed. Legumes and nuts were seldom consumed by most of the respondents. The majority of the respondents were compliant regarding the consumption of a variety of foods daily. This was further confirmed by their knowledge on the scale item in the nutrition dimension that stated, "*It is important to eat a variety of foods daily*", as indicated by 97.5% (n=881) of the respondents. Their knowledge of this scale item may have contributed to their consumption of a variety of foods and also contributed to the dietary diversity score of 6.02.

#### **4.6 CONCLUDING SUMMARY**

This chapter presented and discussed results on the study group's food practices and the food knowledge component of food literacy. The chapter further explicated the study group's food practices in relation to their food knowledge and their compliance to the Food Based Dietary Guidelines for South Africa. The demographic profile of the study group was discussed first in order to give a description of the study group. The majority of the respondents were educated, female, and from the White population group. The results on the first objective of the study group on their food practices included their usual eating patterns, diversity of food consumed, the number of servings, and the frequency of consumption of selected food groups. This was followed by the second objective on food knowledge, in which the declarative and procedural food knowledge of the study group were explored and reported on. The study group's food practices in relation to their food knowledge and compliance with the Food Based Dietary Guidelines for South Africa were explicated in the third and last objective.

The next and final chapter of the study discusses the conclusions and recommendations derived from the results of the study are given.

## Chapter 5

# CONCLUSIONS & RECOMMENDATIONS OF THE STUDY

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### 5.1 INTRODUCTION

This chapter provides the conclusions on each of the objectives set for the study, which aimed to explore and describe urban South African adults' food practices and the food knowledge component of food literacy. The study further aimed to explicate the group's food practices in relation to their food knowledge and how compliant their food practices are with the Food Based Dietary Guidelines for South Africa. The significance of the study, recommendations, limitations of the current study as well as suggestions for future studies are given in the following sections of this chapter.

A shift in food consumption practices away from the consumption of whole-grain foods, fruits and vegetables, pulses and other nutrient-rich foods has been observed globally. Instead, consumers increasingly consume energy-dense processed foods not only high in fats, sugar, and salt but also in animal-protein (Hawkes *et al.*, 2017; Popkin, 2017; Haggblade, Duodu, Kabasa, Minnaar, Ojijo & Taylor, 2016; Spires *et al.*, 2016; Nnyepi *et al.*, 2015; Popkin, 2015; Belahsen, 2014; Popkin *et al.*, 2012). The consumption of these energy-dense foods is becoming more prevalent in developing countries, including South Africa (Nnyepi *et al.*, 2015). The accelerated rate of urbanisation and modernisation, technological changes, and economic developments has contributed towards this shift in food consumption practices.

The urban food environment, as an external environment in which a person lives, influences their food choices. The urban food environment includes the human-built environment, which consists of infrastructures and physical landscapes such as roads, neighbourhoods, schools, homes, worksites, and shopping malls. The urban food environment can constrain an individual from making healthy food choices, or it can provide possibilities and opportunities for an individual to make healthy food choices through the food access dimensions of accessibility, affordability, acceptability, availability, and accommodation. The urban food environment contains numerous diverse food sources such as large supermarkets, convenience stores, street vendors, butcheries, restaurants, bakeries, and fast food outlets that offer a wide variety of food products to choose from. Both healthy and unhealthy food options are on offer (Andress & Fitch, 2016; Caspi *et al.*, 2012). Although the external food environment influences the food choices of an

individual, other internal or individual factors such as taste, cost, convenience, lifestyle, food preferences, the health status of a person, and knowledge about health and nutrition amongst others are some personal factors that also influence a person's daily food choices (Story *et al.*, 2002). For urban consumers, the availability of diverse food options can serve as a constraint to making healthy food choices. This is because consumers in urban areas live a busy lifestyle which includes long hours of work, meeting deadlines, travelling long distances between home and work, and social engagements. The busy lifestyles of consumers in urban areas often constrain them from practicing, applying, or developing their food preparation skills. Their busy lifestyles often affect the consumer's food selection and eating behaviours, as they consume more convenient and fast foods which are usually high in salt, sugar, fats, and processed meat. The consumption of these foods lead to the emergence of overweight and obesity that often leads to the development of non-communicable diseases (Popkin, 2017; Gitau, Micklesfield, Pettifor & Norris, 2014b; Popkin *et al.*, 2012). The overweight and obese rates of South African adults is evidence enough that South Africans do not always make healthy food choices. It is reported in the South African Demographic and Health survey 2016 that 68% of women and 31% of men in South Africa are overweight or obese. Moreover, the percentage of those who are overweight or obese is high among urban dwellers (South African Demographic and Health Survey 2016, 2019:298-299). The South African Demographic and Health survey (2016:301-302), further reported that although consumption of fruits and vegetables is high among urban dwellers, their consumption of fried foods, fast foods, salty snacks, and processed meat was equally high. The food practices of South African urban consumers are therefore of concern and appear to contribute to the increasing rates of overweight and obesity in the country.

The concept of food literacy, which refers to the food knowledge, skills, and behaviours of individuals, has recently gained prominence in food literature (Begley & Vidgen, 2016). Food literacy acts as a guide to an individual in the planning, managing, selection, preparation, and consumption of foods to enhance health and well-being. Food knowledge, skills and behaviour are interrelated components of food literacy, meaning they are smaller yet self-sustaining parts of food literacy (Vidgen & Gallegos, 2014). Food knowledge has been perceived to help guide and motivate consumers towards adopting healthy food practices. Food knowledge serves as a primary guide to what food is, where it comes from, how to source it, and how to make informed and good food choices (Colatruglio & Slater, 2014; Rozin, 2007:24; Bryant *et al.*, 2003:93; Story *et al.*, 2002). However, one study by Kupolati *et al.* (2019), reported that a nutrition education programme for South African teachers and learners yielded no significant changes in the dietary practices of their subjects. However, the teachers' and learners' nutritional knowledge and attitudes improved after the nutrition education programme. It can be assumed that although there

was no significant difference in the dietary practices of participants in the programme, the improvement in knowledge and attitudes may in time lead to changed behaviour.

Food knowledge differs from individual to individual due to other contributing factors such as education, age, gender, family history, personal interests, cultural beliefs or a combination of these factors (Worsley *et al.*, 2015b). Individuals who possess food knowledge are more likely to consume fruits and vegetables, and a variety of foods (Worsley *et al.*, 2016). The consumption of a variety of foods from the different food groups - also known as dietary diversity - is highly encouraged among consumers as it is a key requirement to attaining nutritional adequacy (Martin-Prével *et al.*, 2015:1). Dietary diversity is also the first guideline in the Food Based Dietary Guidelines for South Africa. Limited information on the food practices and food knowledge of South African urban adults is available, since not many studies have been done regarding the compliance of urban South African adults' food practices with the Food Based Dietary Guidelines for South Africa.

This study, therefore, set out to explore and describe the food practices and food knowledge of South African adults living in urban areas who were 18 years and older. Further, the study aimed to explicate the group's food practices in relation to their food knowledge and how compliant their food practices are with the Food Based Dietary Guidelines for South Africa.

The next section discusses the conclusions drawn on each of the objectives set for the study.

## **5.2 CONCLUSIONS ON THE OBJECTIVES OF THE STUDY**

This section presents the conclusions on each of the formulated objectives of the study.

### **5.2.1 Conclusions on the food practices of the study group**

The first objective of the study dealt with exploring and describing the food practices of the study group, which included determining and describing the usual eating patterns of the study group (meal patterns and meal composition), the diversity of food intake, the number of servings of food consumed a day, and the frequency of consumption of selected food groups.

#### **5.2.1.1 Eating patterns**

Results on the number of meals consumed a day indicated that the majority (55.5%, n=502) of the respondents eat three meals a day. This meal pattern included the daily consumption of breakfast, lunch, and supper, while a third of the respondents indicated that they also snacked in-between meals. These results concur with the recent studies by De Kock (2019:65), on white



urban adults, Viljoen *et al.* (2018), on a group of white South African students, Vogel (2018:78); Dlamini (2016:58), on black urban adults, and Kant (2018), on American adults. Twenty four point four percent (n=221) of the respondents enjoyed only two meals a day.

The majority (76.2%, n=689) of the respondents also confirmed that they eat all their meals or at least two meals a day at home. When eating away from home, 51.7% (n=467) of the respondents revealed they do so 1-2 times a month, which is almost similar to the findings of the SANHANES-1 study which indicated 57.3% of adults in urban areas eat away from home 1-2 times a month (Shisana *et al.*, 2014:181). Less than twenty percent (19.4%, n=175) of the respondents eat away from home daily.

The locations where most of the respondents (47.2%, n=427) eat away from home were restaurants, followed by 32% (n=289) of the respondents who enjoy some of their meals at their workplace.

### **5.2.1.2 Diversity of foods consumed**

The diversity of foods consumed was determined by calculating the number of food groups included from a selected variety of food groups as part of a person's meals and snacks the previous day (Habte & Krawinkel, 2016). The results on the diversity of foods consumed also served as an indication of the meal composition of the study group. The respondents were presented with 13 food groups, of which nine were used to determine the Dietary Diversity Score (DDS) of the study group, namely meat, poultry or fish, other vegetables and fruits, starchy foods, milk and dairy products, fats and oils, orange-fleshed vegetables and fruits, dark green leafy vegetables, eggs, and legumes and nuts.

The majority of the respondents indicated they consumed foods from these groups, namely meat, poultry or fish (89.6%, n=810), other vegetables and fruits (89.4%, n=808), starchy foods (88.5%, n=800), milk and dairy products (86.2%, n=779), fats and oils (80.9%, n=731), orange-fleshed vegetables and fruits (58.6%, n=530), and dark green leafy vegetables (51.1%, n=462). However, eggs and legumes and nuts were only consumed by 45.9% (n=415) and 40.5% (n=366) of the respondents respectively, the previous day. Other foods that do not contribute to the dietary adequacy, such as beverages (tea, coffee, or herbal tea), and spices and condiments were consumed by the majority of the respondents the previous day.

The study group, therefore, consumed an adequate variety of foods. The majority indicated they consumed between five to seven of the nine essential food groups to attain a Dietary Diversity Score of 6.02. A similar Dietary Diversity Score of 6.20 was also reported by a recent research

study by De Kock (2019:71) on white urban adults. Other studies on South African groups reported a Dietary Diversity Score that ranged between 4.02 – 4.77 (Chakona & Shackleton, 2017; Mchiza *et al.*, 2015; Shisana *et al.*, 2014:13; Drimie *et al.*, 2013). The dietary diversity score attained by the study group was thus higher than the minimum cut-off level of 4.0, which is required as a minimum score for dietary adequacy (Kennedy *et al.*, 2011).

### **5.2.1.3            *Number of servings consumed of selected food groups***

The number of servings of selected food items was also measured. A serving guide was given for eleven groups of foods to help respondents estimate the number of servings they consumed. Information on the number of servings assisted in indicating the quantities of food usually consumed by the study group.

The majority 74.0% (n=669) of the respondents indicated they enjoy 1-2 servings of foods from the starchy foods, vegetables, fruits, meat (chicken or fish), and milk and dairy groups each day. Thus, the number of servings consumed for starchy foods, fruits and vegetables were less than the recommended daily intake. The Food Based Dietary Guidelines for South Africa recommend that starchy foods should be made part of most meals daily and that five servings of a variety of fruits and vegetables should be consumed a day (Naudé, 2013; Vorster, 2013). The majority (50.4%, n=457) of the respondents had  $\geq 5$  servings of water a day. A third (33.1%, n=299) of the respondents added 1-2 servings of sugar in their tea or coffee, while another 33.4% (n=303) consumed 1-2 servings a day of soft drinks. The results on the number of servings thus indicate that although the respondents consume a variety of foods, items such as fruits and vegetables and starchy foods are not consumed in the quantities recommended by the Food Based Dietary Guidelines for South Africa. The inability of consumers to consume the recommended quantities of fruits and vegetables is a general concern of health care professionals (Faber *et al.*, 2017; Alaunyte *et al.*, 2015; Shisana *et al.*, 2014; Naudé, 2013).

### **5.2.1.4            *Frequency of consumption of selected food groups***

The frequency of the study group's consumption of selected foods from the nine food groups (protein-rich foods, legumes and nuts, milk and dairy products, fruits and vegetables and salads, fats and oils, bread and cereals, beverages, snack foods, and fast foods) was measured through a non-quantitative food frequency questionnaire. The results contributed to triangulation and served as a cross-check to the frequency and the type of food consumed. Table 5.1 summarises the results on the food groups consumed by the respondents to indicate their dietary diversity, frequently consumed foods, and the number of servings.

**TABLE 5.1: SUMMARY ON DIVERSITY OF FOOD CONSUMED AND ADEQUACY OF CONSUMPTION (N=904)**

FOOD GROUP	CONSUMED THE PREVIOUS DAY	FREQUENCY OF FOODS CONSUMED	NUMBER OF SERVINGS
<b>PROTEIN-RICH FOODS</b> -Meat -Chicken/poultry -Fish -Eggs	89.6%  45.9%	Majority consumed red meat, chicken, and eggs at least once or more a week.  Fish was seldom consumed or consumed 1-2 times a week.	83% had 1-2 servings a day
<b>MILK AND DAIRY PRODUCTS</b> -Full-cream milk -Low-fat milk -Cheese -Yoghurt	86.2%	Consumption varied, with full-cream milk often consumed.	79% had 1-2 servings a day
<b>FRUITS, VEGETABLES AND SALADS</b> Orange-fleshed vegetables and fruits Dark green leafy vegetables Other vegetables and fruits	58.6% 51.1% 89.4%	Majority consumed daily. Consumption of salads varied.	74% had 1-2 servings a day
<b>FATS AND OILS</b>	80.9%	Consumption varied in terms of types of fats.	-
<b>STARCHY FOODS</b>	88.5%	Consumption frequency of listed starchy foods varied. Most consumed from listed items 1-2 times a week with exception of maize meal porridge that was seldom or never consumed.	74% had 1-2 servings a day
<b>BEVERAGES</b> Coffee, tea, herbal tea	- 61.9%	The majority often consumed water. Sugar-sweetened beverages were seldom or never consumed.	Tea or coffee: 44.3% had 1-2 servings a day Water: 50.4% had ≥5 servings a day
<b>FAST FOODS</b>	-	Seldom consumed.	-
<b>SNACK FOODS</b>	60.1%	Seldom consumed.	62.6% confirmed none

**Protein-rich foods:** included red meat, chicken, fish, and eggs, which the majority of the respondents consumed the previous day. Protein-rich foods were often consumed once or more a week. Although fish was consumed 1-2 times a week by some, other respondents indicated they seldom consumed it.

**Milk and dairy products:** Milk and dairy products included full-cream milk, low-fat milk, cheese, and yoghurt. Food items from this group were consumed by the majority of the respondents the previous day. However, the frequency of consumption of milk and dairy products varied according to the type of food, with full cream milk consumed daily by 37.5% (n=339) of the respondents.

**Fruits, vegetables, and salads:** Results on the consumption of fruits, vegetables and salads indicated that most of the respondents enjoyed them daily. The consumption of salads varied as some respondents consumed salads 1-2 times a week, while others enjoyed salads 3-4 times a

week, and 20.2% (n=183) consumed salads daily. Results from a study by Ronquest-Ross *et al.* (2015) on the consumption of fruits and vegetables reported that South Africans often consume fruits and vegetables such as banana, grapefruits, apples, tomatoes, and onions. Fruits and vegetables are readily available, accessible, and affordable to urban consumers, therefore, they do consume them daily (South African Demographic and Health Survey 2016, 2019:297; Shisana *et al.*, 2014:176). However, since only 1-2 servings of fruits and vegetables were consumed by the study group, the recommended daily serving amounts are not achieved. The World Health Organisation recommends that adults should consume 5 fruits and vegetables a day (WHO & FAO, 2016).

**Fats and oils:** Fats and oils included butter, tub and brick margarine, and vegetable oil. The results on the frequency of consumption of this group varied according to the type of fat or oil. The majority of the respondents indicated that they consumed fats and oils the previous day. However, the number of servings consumed were not determined.

**Starchy foods:** Starchy foods included white bread, bread rolls, brown or whole wheat bread, maize meal porridge, breakfast cereals, rice, and pasta (macaroni, spaghetti, noodles). The consumption frequency of items in this group varied, with the exception of maize meal porridge, which was seldom or never consumed by the respondents.

**Legumes and nuts:** Legumes and nuts were not often consumed by the study group. Most of the respondents also did not consume legumes and nuts the previous day. Although the number of servings of legumes and nuts were not determined in this study, a decline in the consumption of legumes and nuts has been noted among urban dwellers, which could be because they require considerable time to prepare. Instead, foods that are highly consumed include processed meat and convenient foods which are easy to prepare (Wijayarathne *et al.*, 2018; Ronquest-Ross *et al.*, 2015; Afshin *et al.*, 2014).

**Beverages:** included fruit juice, soft drinks, sports or energy drinks, cordials, and water. The majority of the respondents revealed they seldom or never drink these beverages, except for water, which was drunk daily by the majority of respondents.

**Fast foods:** Fast foods included pizza, fried chips, meat pies, and hamburgers. The majority of respondents indicated they seldom or never consumed these food items.

**Snack foods:** Snack foods such as potato chips, chocolate bars, sweets, cookies or biscuits, and cakes were seldom or never consumed by the respondents.

In conclusion, results on dietary diversity indicated that the respondents do consume a variety of foods from each of the selected food groups. The results on the frequency of consumption further confirmed that the meal composition of the study group consists of a variety of foods. Although fast foods, snacks, and beverages listed were seldom or never consumed, which indicates that the majority of the respondents do make good food choices, there is still room for improvement on the food consumption practices of the respondents. Food groups such as fruits and vegetables, legumes and nuts, and starchy foods were not consumed in the recommended quantities. The results of the study further indicate that the consumption of three meals a day (breakfast, lunch, and supper), and snacking in-between meals is typical to consumers living in urban environments. The majority of the respondents indicated that they consumed two or three meals a day at home. When eating away from home, meals were enjoyed at a restaurant, or at their workplace.

### **5.2.2 Conclusions on the food knowledge component of food literacy of the study group**

The second objective of the study explored and described the study group's food knowledge component of food literacy. This objective consisted of two sub-objectives that measured the declarative and procedural food knowledge of the respondents, respectively. The food knowledge of the study group was determined using a food literacy scale. The food literacy scale consisted of six dimensions of food literacy, namely, procurement (sourcing), financial (economics), consumption, nutrition, food safety, and the social aspect of foods. In each of these dimensions, scale items measuring declarative and procedural food knowledge are identified.

**Procurement (sourcing):** This dimension measured the consumers' competency in purchasing food from available and accessible food sources. This first dimension consisted of a total of nine scale items measuring food knowledge. Eight scale items measured declarative food knowledge, and one scale item measured procedural food knowledge. The majority of the respondents answered all nine items correctly, and a mean score of 7.29 out of nine was attained.

**Financial (economics) knowledge:** This dimension measured the respondents' competency in terms of their financial ability to acquire food wisely from available and accessible food sources without wastage. A total of six scale items measured financial (economics) knowledge, three measured declarative food knowledge, and another three measured procedural food knowledge. One scale item measuring declarative food knowledge was incorrectly answered by the respondents. A mean score of 4.32 out of 6 was attained.

**Consumption:** This dimension measured the respondents' competency in making informed choices to plan, prepare and eat meals. The consumption dimension had a total of 18 scale items,

of which three measured declarative food knowledge, and 15 measured procedural food knowledge. A mean score of 13.92 out of the 18 was attained.

**Nutrition knowledge:** This dimension measured the respondents' knowledge regarding the nutritional value of food and how it affects health and well-being by including aspects such as the selection and preparation of food. A total of 30 nutrition knowledge scale items all measured declarative food knowledge. Two scale items were incorrectly answered by the respondents, and a mean score of 23.21 out of 30 was attained.

**Food safety:** This dimension measured the respondents' competence when handling, preparing, and storing food in a manner that will prevent foodborne illnesses. A total of 22 scale items measured food safety, twelve of these items measured declarative food knowledge, and ten measured procedural food knowledge. Three declarative food knowledge scale items were incorrectly answered by the respondents. A mean score of 16.57 out of 22 was thus reached by the study group.

**Knowledge on the social aspects of food:** This dimension measured the respondents' competency to consider socio-cultural, food and culinary rules relating to food choice in the South African context. A total of 22 scale items measured knowledge on the social aspects of food. Six scale items measured declarative food knowledge, and 16 scale items measured procedural food knowledge. One declarative food knowledge scale item and two procedural food knowledge scale items were incorrectly answered by the respondents. A mean score of 14.69 out of 22 on the social aspects of food was attained by the study group.

The food knowledge component of food literacy measured a total of 107 scale items, of which 63 measured declarative food knowledge and 44 measured procedural food knowledge. Over 50% of the respondents did not have sufficient knowledge to answer questions relating to ten scale items. Seven measured declarative knowledge: two from the nutrition dimension, three from the food safety dimension, and two from the dimension on the social aspects of food. The remaining three incorrectly answered scale items measured procedural knowledge, and they included one from the financial (economics) dimension and two from the dimension on the social aspects of food. Although the declarative food knowledge scale items were more than the procedural food knowledge scale items, the respondents could respond to scale items that measured procedural knowledge. This was indicated by the high frequency of respondents who were knowledgeable about scale items measuring procedural food knowledge. Procedural food knowledge relates to practical knowledge; that is, having the skills to select, plan, prepare, and consume food in a health-promoting manner (Fordyce-Voorham, 2015). The ability of the respondents to correctly answer more procedural food knowledge scale items could be because more females than males



participated in the study. Previous studies identified that females are generally more involved in food and all aspects related to food provisioning and preparation (Worsley *et al.*, 2016; Worsley, 2002). The declarative food knowledge (which relates to having theoretical knowledge about food) of the respondents was also good. The nutrition dimension of food literacy measured 30 declarative food knowledge scale items and indicated that the respondents were knowledgeable about the nutritional aspects relating to food. Being knowledgeable on the nutritional aspects of food can also assist and guide an individual to make sound food choices (de Bruin & Gresse, 2018; Omari *et al.*, 2017; Stroud, 2013; Peltzer, 2004b).

It can be concluded that the study group possessed good food knowledge, since they demonstrated competence in procuring food wisely and economically and in making informed food choices based on the nutritional value of food. Furthermore, the respondents showed competence on aspects of food safety, the socio-cultural role of food, and culinary rules in relation to food choice.

The last objective of the study (objective 3) explicated the study group's food practices in relation to their food knowledge, and how compliant the study group's food practices are with the Food Based Dietary Guidelines for South Africa. The conclusion of the third objective of the study follows.

### **5.2.3 Conclusions on the explication of the study group's food practices in relation to their food knowledge and compliance with the Food Based Dietary Guidelines for South Africa**

To explicate the relation of the study group's food practices to their food knowledge, the study group's food consumption practices were used together with food knowledge scale items relating to each of the food groups. The food groups used included starchy foods, fruits and vegetables, legumes and nuts, protein-rich foods, milk and dairy products, water, and sugar, and food and drinks high in sugar. The guidelines for a variety of foods were used to explore the relationship between the study group's food knowledge and food practices, and to determine if their food practices complied with the Food Based Dietary Guidelines for South Africa.

#### **Food practices in relation to food knowledge and compliance with the Food Based Dietary Guideline for South Africa on the consumption of a variety of foods**

As indicated by the results of the food practices of the study group, a variety of foods were consumed by the respondents. The study group complied with the Food Based Dietary Guidelines for South Africa, which recommends that South Africans should “*enjoy a variety of foods*”. This



was supported by the study group's Dietary Diversity Score of 6.02 out of nine essential food groups.

### **Food knowledge on the consumption of a variety of foods**

The respondents were knowledgeable about the scale item in the nutrition dimension of food literacy, measuring declarative food knowledge, which stated, "*It is important to eat a variety of foods daily*".

### **Food practices in relation to food knowledge and compliance with the Food Based Dietary Guideline for South Africa on starchy foods**

Starchy foods included maize meal, rice, wheat, sorghum, and any other foods prepared from cereals such as porridge, bread, pasta, and noodles, as well as white roots and tubers such as potatoes and white sweet potatoes. Foods from this group were consumed by the majority of the respondents the previous day, and the frequency of consumption was 1-2 times a week. The respondents consumed only 1-2 servings of starchy foods a day, which indicates that the respondents did not fully comply with the guideline "*make starchy foods part of most meals*" since the study group consumed fewer servings per day than the recommended number.

### **Food knowledge of starchy foods**

The respondents showed good knowledge about the scale item relating to starchy foods, as indicated by their ability to correctly answer all the food scale items relating to starchy foods. Ten food knowledge scale items on starchy food were measured. The food literacy dimensions measured were consumption, nutrition, and social aspects of food. Of the ten scale items, four measured procedural food knowledge and six measured declarative food knowledge. Although the respondents showed good food knowledge regarding starchy foods, their food consumption practices on the number of servings consumed a day indicate that starchy foods do not form part of most meals, meaning that starchy foods were not consumed as recommended. The lower than recommended consumption of starchy foods might be because growing numbers of South Africans are following the banting diet trend, which recommends following a low carbohydrate, high-fat diet (Douglas, 2016:1).

## **Food practices in relation to food knowledge and compliance with the Food Based Dietary Guidelines for South Africa on fruits and vegetables**

Although the study group enjoyed fruits and vegetables daily, only 1-2 servings a day of fruits and vegetables were consumed by the respondents. The study group, therefore, did not fully comply with the guideline “*eat plenty of vegetables and fruit every day*”.

### **Food knowledge of fruits and vegetables**

The respondents possessed good food knowledge regarding scale items on fruits and vegetables. Food knowledge scale items relating to fruits and vegetables consisted of 19 scale items from the six dimensions of food literacy. Six of these scale items measured procedural food knowledge, and 13 measured declarative food knowledge. Only two of the 19 scale items were incorrectly answered. The study group's food practices in relation to their food knowledge indicate that, although the respondents were knowledgeable on the scale items regarding fruits and vegetables, this knowledge was not applied in their food practices. The World Health Organisation recommends that adults should consume five servings, which is equal to 400g of fruits and vegetables a day (WHO & FAO, 2016). However, the majority of the respondents consumed less than the recommended amounts. Although the majority of the respondents was knowledgeable about the scale item “*It is recommended to eat five fruit and vegetables every day*”, only 16.5% (n=149) of respondents consumed between 3-4 servings a day, and only 3.0% (n=27) consumed five or more servings a day of fruits and vegetables.

## **Food practices in relation to food knowledge and compliance with the Food Based Dietary Guideline for South Africa on legumes and nuts**

Legumes and nuts were not often consumed by the study group. The guideline recommending that consumers should “*eat dry beans, split peas, lentils, and soya regularly*”, was not adhered to by the respondents since most of them seldom consume legumes and nuts.

### **Food knowledge of legumes and nuts**

There was only one scale item from the nutrition dimension regarding legumes and nuts, which measured declarative food knowledge, and the majority of the respondents answered it correctly. It is presumed that the infrequent consumption of legumes and nuts could be because legumes require long preparation time and nuts are relatively expensive. Consumers, therefore, shy away from these foods due to their inconvenience or expense.

## **Food practices in relation to food knowledge and compliance with the Food Based Dietary Guideline for South Africa on fats and oils**

Fats and oils were included in the meals of the study group the previous day. The frequency of consumption results indicated that the consumption of fats and oils varied, and that the most often used fats or oils were butter and vegetable oil. The consumption of fats and oils among South African consumers is within the goal of less than or equal to 30% of energy intake. However, the quality or type of fat consumed is of importance (Smuts & Wolmarans, 2013). The number of servings for fats and oils was not determined. Still, the type of fat often consumed by the respondents led to the assumption that the respondents adhered to the guideline that recommends consumers to *“use fats sparingly. Choose vegetable oils, rather than hard fats”*.

### **Food Knowledge of Fats and oils**

The study group was knowledgeable about scale items relating to fats and oils. This was indicated by their ability to correctly answer all five scale items in this group. The food literacy scale items regarding fats and oil consumption and nutrition were measured by declarative food knowledge statements. The majority of the respondents (96.2%, n=870) was knowledgeable of the scale item *“Use oil sparingly when cooking”*. Their knowledge and varied consumption of fats and oils led to the conclusion that the study group complied with the Food Based Dietary Guidelines for South Africa recommendation regarding fats and oils.

## **Food practices in relation to food knowledge and compliance with the Food Based Dietary Guideline for South Africa on protein-rich foods**

Protein-rich foods included in this group were red meat, chicken, fish, and eggs. The majority of the respondents often consume red meat, chicken, and eggs once or more a week; fish was consumed seldom or only 1-2 times a week. The study group also indicated that they usually eat 1-2 servings of protein-rich foods a day. The Food Based Dietary Guidelines for South Africa recommends that *“fish, chicken, lean meat or eggs can be eaten daily”*. Respondents of this study seemed to comply with this guideline since red meat, chicken, and eggs were each consumed once or more times a week.

### **Food knowledge of protein-rich foods**

The respondents were knowledgeable about the food knowledge scale items regarding protein-rich foods. Food literacy dimensions with scale items regarding protein-rich foods included procurement (sourcing), consumption, food safety, nutrition, and the social aspects of food.

Twelve scale items from these dimensions were identified, of which seven scale items measured declarative food knowledge and five measured procedural food knowledge. Two scale items on food safety and consumption were incorrectly answered by the study group, namely, *“Fresh fish can be refrigerated for one week”*, and *“Mutton is more flavourful than lamb”*. The study group had adequate food knowledge regarding protein-rich foods, which was confirmed by their food practices.

### **Food practices in relation to food knowledge and compliance with the Food Based Dietary Guideline for South Africa on milk and dairy products**

The consumption of milk and dairy products varied with the type of item; however, full-cream milk was often consumed daily by the study group. The majority of the respondents consumed 1-2 servings a day of milk and dairy products. Although the consumption of milk and dairy products varied, the study group seemed to comply with the guideline, *“have milk, maas or yoghurt every day”*. Most of the respondents confirmed the inclusion of items from this group in their food consumption every day.

### **Food knowledge of milk and dairy products**

The study group possessed adequate food knowledge concerning scale items measuring knowledge relating to milk and dairy products. The six dimensions of food literacy contained scale items relating to milk and dairy products. Nine scale items were identified, of which three scale items measured procedural food knowledge, and six measured declarative food knowledge. Of the nine scale items, the majority of the study group incorrectly answered two scale items. One of the incorrectly answered scale items measured declarative food knowledge, and it stated, *“Low-fat milk is good for healthy bones”*. The other scale item, namely *“Fresh milk is always cheaper than long-life milk”*, measured procedural food knowledge.

### **Food practices in relation to food knowledge and compliance with the Food Based Dietary Guidelines for South Africa on water**

Water is the only beverage which consumers are encouraged to consume in greater quantities. The study group confirmed that they do drink lots of water daily, consuming five or more servings of water a day. The study group, therefore, complied with the guideline *“drink lots of clean, safe water”*.

## **Food knowledge on water**

The study group possessed adequate knowledge regarding the consumption of water. This was indicated by their ability to correctly answer the scale item *“It is recommended to drink six glasses of water a day”*. This scale item measured declarative food knowledge of the nutrition dimension.

## **Food practices in relation to food knowledge and compliance with the Food Based Dietary Guideline for South Africa on sugar, and food and drinks high in sugar**

Sugar/sweets were consumed by the majority of the respondents the previous day. However, the results on the frequency of consumption indicated that sugar/sweets and food and drinks high in sugar were seldom or never consumed by the respondents. It seems the respondents complied with the guideline *“use sugar and foods and drinks high in sugar sparingly”*. The number of servings of soft drinks and sugar in tea and coffee also confirmed that the respondents use or drink sugar-sweetened drinks sparingly.

In conclusion, the food consumption practices of the study group do comply with the first Food Based Dietary Guideline for South Africa, which recommends that a variety of foods should be enjoyed. This compliance is made evident by the Dietary Diversity Score attained by the study group, which was 6.02 out of nine selected food groups. The study group further demonstrated that they possess good food knowledge, since scale items relating to each of the food groups were correctly answered by the majority of the respondents.

The food knowledge of the study group was determined by using a total of 107 scale items to measure the respondents' declarative and procedural food knowledge. Declarative food knowledge was measured by a total of 63 scale items. The minimum declarative food knowledge scale items correctly answered were 25, and the maximum was 60. A mean score of 46.37 out of 63 was attained by the study group. Procedural food knowledge measured a total of 44 scale items. A minimum of 17 scale items and a maximum of 43 scale items were correctly answered. A mean score of 33.63 out of 44 was attained for procedural food knowledge. The overall food knowledge mean score attained by the study group was 80 out of 107 scale items. No respondent correctly answered all 107 scale items.

It was further explicated that the food knowledge of the study group contributes positively to their food practices. This was indicated by the study group's intake of a variety of foods indicating that the study group complied with most of the Food Based Dietary Guidelines for South Africa. However, the specific guidelines for certain food groups such as starchy foods, legumes and nuts, and fruits and vegetables, were not fully comply with. Although the respondents include fruits and

vegetables daily in their diet and know that they should eat plenty of fruits and vegetables every day, the 1-2 servings of fruits and vegetables and starchy foods consumed per day did not correlate with their reported knowledge. The results also revealed that the study group does not regularly consume legumes and nuts as recommended, whilst foods from this group can help improve the health of South Africans. Consumption of half a cup a day of legumes can improve the diet quality of an individual, boosting the intake of fibre, proteins, magnesium, iron, zinc, and folate, with lower intakes of fat and saturated fat (Venter *et al.*, 2013). Consumer education and facilitation should, therefore, be directed towards increasing consumers' awareness to include starchy foods in most meals and to consume more fruits and vegetables daily. Consumers should also be motivated to include legumes and nuts more often on their menus.

The next section deals with the significance of the study.

### **5.3 SIGNIFICANCE OF THE STUDY**

This study explored and described the food practices and food knowledge component of food literacy of urban South African adults who were 18 years and older. Further, the study explicated the food practices of the study group in relation to their food knowledge and how compliant their food practices are with the Food Based Dietary Guidelines for South Africa. There is a lack of current information on the food practices of adult South Africans (Mchiza *et al.*, 2015), and to the researcher's knowledge, there is also limited information on the food knowledge of urban South African adults. This study was limited to urban South African adults who were on the Consulta Pty (Ltd) database and who gave their informed consent to participate in the study. The results discussed can therefore not be generalized to all urban South African adults. However, the results gathered provided valuable insights and fill a gap in the literature on the food practices and food knowledge of urban South African adults, including how compliant their food practices are with the Food Based Dietary Guidelines for South Africa.

The eating patterns, frequency of eating away from home, as well as the places where meals are most often consumed when eating away from home, were determined by the study. The pattern of eating three meals a day with snacking in-between meals is typical to consumers in urban areas. Eating away from home once or twice a month is also common among urban adults. The places where meals are consumed when eating away from home was either at a restaurant or the respondents' workplace. Valuable information on the dietary diversity of the study group was obtained, and indicated that urban South African adults consume a diversified diet, and seldom consume fast foods, sugar/sweets, and beverages high in sugar. However, a closer examination of the results on the food groups consumed revealed that the study group did not fully comply with some of the guidelines formulated in the Food Based Dietary Guidelines for South Africa.

Food groups such as fruits and vegetables, starchy foods, and legumes and nuts were not consumed as recommended by the Food Based Dietary Guidelines for South Africa.

Further, the study's results on the food knowledge of the study group revealed that they possessed good food knowledge and displayed good declarative and procedural food knowledge. The study group's food knowledge was measured using the six dimensions of food literacy, namely procurement (sourcing), financial (economics), consumption, nutrition, food safety, and social aspects of food. The majority of the respondents not only appear to possess good declarative and procedural food knowledge, but they were informed about economically procuring food. Further, they were knowledgeable on consuming food in a health-promoting manner and were informed of the nutritional aspects of food. Moreover, the study group proved to be knowledgeable of food safety handling procedures and demonstrated sufficient knowledge to consider socio-cultural, food and culinary rules in food choice. Since the majority of the study group possessed good food knowledge, it can thus be assumed that they can make healthy food choices in the urban environment where diverse food options are found.

Based on the study's results, it can also be assumed that the majority of the respondents have a healthy relationship with food. Measuring the study group's food knowledge component of food literacy, indicated that the respondents of this study are knowledgeable about food and all other aspects involving food and nutrition. Other studies have reported that consumers who possess good food knowledge are motivated to make healthy food choices (Lee *et al.*, 2018; Poelman *et al.*, 2018; Worsley *et al.*, 2016). Moreover, studies also report that the measurement of food literacy as well as conducting nutritional education programmes can help to increase food knowledge awareness in participants. Furthermore, it can improve their knowledge about and attitudes to nutrition (Said *et al.*, 2020; Kupolati *et al.*, 2019; Begley *et al.*, 2019; Davies, 2012). This present study, therefore, can be useful to consumer and nutrition facilitators and educators to conduct programmes and intervention strategies that will help fill the food literacy gap among South African consumers. The intervention strategies developed can also help to motivate consumers to make healthy food choices and adhere to good food practices. Consumer educators can also use the information provided to educate and motivate consumers to strive to comply with all the Food Based Dietary Guidelines for South Africa.

The next section addresses the limitations of the study.

#### **5.4 LIMITATIONS OF THE STUDY**

The current study had the following limitations.



#### **5.4.1 Population group, gender, age distribution, and education**

The study group was unequally distributed in terms of population group, age, and gender. The study had more respondents from the White population than from the other population groups, and more females than males. The study focused on South African adults of all ages; however, most of the respondents were between 23-41 years of age, representing generation Y. Most of the study's participants were educated.

#### **5.4.2 Shortcomings of the food intake recall**

Previous studies have advised that food intake recalls should be repeated more than once, preferably at least on three different occasions (Wark, Hardie, Frost, Alwan, Carter, Elliott, Ford, Hancock, Morris & Mulla, 2018). Although this is generally advised, the question in the questionnaire on the diversity of food consumed only allowed respondents to reflect one day's food intake due to time constraints, financial limitations and to prevent respondents becoming fatigued by completing multiple questionnaires.

It is further acknowledged that respondents often under-report or forget what they have eaten, meaning that what they report may be what they think is right for them to eat, and not what is actually eaten (Garden, Clark, Whybrow & Stubbs, 2018; Kirkpatrick, Subar & Tooze, 2017:19; Lopes, Luiz, Hoffman, Ferriolli, Pfrimer, Moura, Sichieri & Pereira, 2016). The respondents were further asked to estimate the number of servings of selected food groups consumed a day. A serving guide was included in the questionnaire to assist respondents to estimate the number of servings consumed. Their estimations may not have been correct.

Lastly, another limitation of this study is that the results of the study are not generalisable and do not give a good representation of the South African population.

### **5.5 RECOMMENDATIONS**

The results of this study provided useful insights on food practices and the food knowledge component of food literacy that could be of value to consumer and nutrition educators and facilitators. The following recommendations are made:

- i. The results of the study indicated that the guidelines regarding starchy foods, legumes and nuts, as well as fruits and vegetables, were not adhered to by the study group. Consumer facilitators and nutrition educators should therefore aim to educate consumers to try to increase their intake of these food groups by striving to include at least the minimum recommended quantities of each food group. The respondents showed adequate

knowledge regarding these food groups; therefore, consumer and nutrition educators should educate consumers on the importance of consuming these foods in the recommended amounts.

- ii. The study group seldom consumed energy-dense foods (such as listed fast foods, beverages, and sweet and salty snacks). Consumer and nutrition educators, therefore, can use this information to educate and motivate consumers to continue eating such foods sparingly. Consumers should also be made aware of the implications of consuming excessive portions of energy-dense foods and the benefits of consuming fruits and vegetables daily and in the recommended quantities.
- iii. The study group possessed good food knowledge, and their consumption of a variety of foods indicated that they make good food choices. These results, therefore, show that being knowledgeable about food and nutrition-related aspects, does help consumers to make healthy food choices. Consumer and nutrition educators can thus use this information to plan and organise food knowledge education interventions to help guide urban consumers to make health-promoting food choices.

The next sections give suggestions for future research based on the results of the study.

## **5.6 SUGGESTIONS FOR FUTURE RESEARCH**

Future research on the topic of South African adults' food knowledge and food practices could include the following.

- i. A study comparing the food practices and food knowledge of adults from different South African population, generational age groups and lower educated groups can be conducted to identify those groups that need food and nutrition education interventions. The comparison can also provide more information on the food practices and food knowledge of the different population, generational age groups and education groups of South Africans.
- ii. A mixed-method research approach can be employed to investigate South African adults' food literacy, attitudes and motivation towards healthy food choices. Since the rates of overweight and obesity are still on the rise among South African adults, a mixed-method study can be helpful to provide useful information on the attitudes of South African adults towards healthy foods and what would motivate them to make healthy food choices. The developed South African food literacy scale can be used to measure their food literacy.

## 5.7 CONCLUDING REMARKS

This study provided insight on the contribution of the food knowledge component of food literacy to food practices of South African urban adults. The study also provided valuable insights on how compliant the food practices of the study group are with the Food Based Dietary Guidelines for South Africa. Although several international studies have been conducted on the contribution of food knowledge and food literacy to food practices, South African studies that have researched this topic are limited. According to the researcher's knowledge, few studies have reported on the compliance of South African adults' food practices with the Food Based Dietary Guidelines for South Africa (de Bruin & Gresse, 2018; Ronquest-Ross *et al.*, 2015; Labadarios *et al.*, 2011). This study, therefore, contributed to filling the gap in literature by exploring and describing the food practices and food knowledge of urban South African adults and how compliant their food practices are with the Food Based Dietary Guidelines for South Africa.

Results on the eating patterns (meal patterns and meal composition), the diversity of food consumed, the number of servings, and the frequency of consumption for selected food groups were presented and discussed. Eating three meals a day (breakfast, lunch, and supper) with snacking in-between meals is common among urban consumers, as reported in other studies (De Kock, 2019:65; Viljoen *et al.*, 2018; Kant, 2018; Vogel, 2018:78; Dlamini, 2016:58). The study found that all three or two meals a day were enjoyed at home. Eating away from home occurred 1-2 times a month for some, and when eating away from home, it was at a restaurant or at the respondents' workplace. Eating of most meals at home is associated with lower consumption of fast foods (Wolfson & Bleich, 2015), which was confirmed in this study as well. The study group consumed a diverse diet since they included food items from nine selected food groups and attained a Dietary Diversity Score of 6.02. However, responses about the number of servings of foods consumed a day indicated that some food groups were not consumed in the recommended quantities. This was noted for food groups such as fruits and vegetables, starchy foods, and legumes and nuts.

The study group's food knowledge was measured by using a food literacy scale which was developed as part of a PhD study, which this Master's study was part of. Six food literacy dimensions (procurement (sourcing), financial (economics), consumption, food safety, nutrition, and the social aspects of food) from the food literacy scale were used to measure the declarative and procedural food knowledge of the study group. The food knowledge results indicated that the study group possessed good food knowledge. The study group proved to have good knowledge by being able to correctly answer the majority of scale items on the six dimensions of the food literacy scale that measured declarative and procedural food knowledge. A food knowledge score

of 80 out of 107 scale items was attained. An individual's age and level of education are two of the indicators for adequate food knowledge. Most of the respondents of this study were between the ages of 23-41 and had an educational level of grade 12 or a tertiary qualification, which could also be a reason why the study group was more knowledgeable about most scale items on the six dimensions of food literacy. The relationship between the study group's food practices and food knowledge, as well as their compliance with the Food Based Dietary Guidelines for South Africa, were explicated. The explication of these aspects revealed that the food knowledge of the study group contributes positively to their food practices and food choices. However, the study group did not comply with all the guidelines contained in the Food Based Dietary Guidelines for South Africa. Guidelines not complied with were those concerning the consumption of fruits and vegetables, legumes and nuts, and starchy foods. The consumption of fruits and vegetables and legumes and nuts in recommended amounts seems to be challenging for most South African adults (de Bruin & Gresse, 2018; Ronquest-Ross *et al.*, 2015; Labadarios *et al.*, 2011).

In conclusion, the food knowledge of the study group may have positively contributed to their food practices since the results confirm that they consume a diversified diet and seldom consume listed fast foods, sugar, and beverages high in sugar as well as sweet and salty snacks. The study group, therefore, makes good food choices. It was noted by Worsley *et al.* (2016) and Worsley (2002), that individuals who possess good food knowledge are more likely to consume fruits and vegetables daily and to consume a diversified diet. This was also confirmed in this study. However, the study group still needs to improve consumption of fruits and vegetables, starchy foods and legumes and nuts. The study group must strive to at least consume the minimum recommended quantities of these foods, which can help mitigate the prevalence of non-communicable diseases among South African adults. Review studies done by Vaitkeviciute *et al.* (2015) and Spronk *et al.* (2014) on the relationship between food literacy and dietary intake also concluded that food literacy might play a role in determining healthy food intake. However, extensive research must be conducted to confirm a positive relationship. Another extensive study of this nature can be done in order to triangulate and confirm the results of this study. The study can be useful to consumer and nutrition educators, who could use the results to plan and organise health and nutrition education intervention strategies for South Africans. The results from the study can help consumer and nutrition educators to develop education interventions on food practices that are not in compliance with the Food Based Dietary Guidelines for South Africa. Other interventions can address education on food literacy and/or food knowledge since it has been proven that possession of food knowledge can positively contribute towards making healthy food choices.

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## Addendum A

# INFORMATION SHEET FOR RESPONDENTS

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### Food Literacy Scale [English (South Africa)]

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### Welcome to the Food Literacy Scale

**Here are a few general tips before we start:**

- Don't use your internet browser's, back, reload and forward buttons when participating in our questionnaires as this may cause unintended results.
- Maximise the survey window then you don't have to scroll as much
- We recommend you finish the questionnaire in one go.

This survey forms part of the design of a very important measuring instrument within the South African context. We need at least 1500 respondents to complete the questionnaire. By participating, you could therefore become a very important voice in terms of how food literacy is measured in the future.

**Thank you for your willingness to participate, please click "Next" to continue.**

(End of Page 1 )



## Addendum B

# ETHICS LETTER OF APPROVAL

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UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIBESITHI YA PRETORIA

Faculty of Natural and Agricultural Sciences  
Ethics Committee

E-mail: [ethics.nas@up.ac.za](mailto: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,

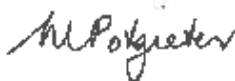
We are pleased to inform you that your submission conforms to the requirements of the Faculty of Natural and Agricultural Sciences Ethics committee on the condition that the only participation of the subjects is as described in the proposal narrative.

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 on 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

## Addendum C

# SURVEY QUESTIONNAIRES

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### QUESTIONNAIRE 1: DEMOGRAPHIC INFORMATION AND FOOD LITERACY SCALE

#### SECTION A: Demographic information

		For official use only												
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A1 What is your age?	<input style="width: 30px; height: 15px;" type="text"/> <input style="width: 30px; height: 15px;" type="text"/>	A1 <input style="width: 30px; height: 15px;" type="text"/> <input style="width: 30px; height: 15px;" type="text"/>												
A2 What is your gender?	<input style="width: 40px; height: 15px;" type="text" value="Male"/> <input style="width: 20px; height: 15px;" type="text" value="1"/> <input style="width: 40px; height: 15px;" type="text" value="Female"/> <input style="width: 20px; height: 15px;" type="text" value="2"/>	A2 <input style="width: 30px; height: 15px;" type="text"/>												
A3 What is your highest level of education?		<input style="width: 30px; height: 15px;" type="text"/>												
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Lower than grade 12	1													
Grade 12	2													
Grade 12 plus a degree/diploma	3													
Postgraduate degree	4													
A4 What is your approximate monthly household income rounded up to the nearest R1000? (this question is optional)														
	<input style="width: 150px; height: 15px;" type="text" value="R"/>													
A5 What is the approximate monthly food budget for your household, rounded up to the nearest R1000?														
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A6 In terms of the employment Equity Act of SA, to which population group do you belong to?														
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Asian	2													
Coloured	3													
Indian	4													
White	5													
Other	6													

## SECTION B: FOOD LITERACY SCALE

Please indicate your answer by selecting **yes** or **no** for **all** the statements below

**Procurement (sourcing)** – consumers are competent in acquiring (obtaining, buying, purchasing) from the available accessible food source wisely.

		Type of food knowledge	Yes	No
1.	Fruit in season is tastier.	Declarative	1	0
2.	Ham is processed pork.	Declarative	1	0
3.	A firm potato is fresh.	Declarative	1	0
4.	Sprouting potatoes are poisonous.	Declarative	1	0
5.	Fresh fish can be refrigerated for one week.	Declarative	1	0
6.	Tinned fruit contains added sugar.	Declarative	1	0
7.	Meat with bones improves the flavour of soup and stews.	Procedural	1	0
8.	All chocolate contains sugar.	Declarative	1	0
9.	Coconut milk is a dairy product.	Declarative	1	0

**Financial (economics)** – consumers are competent in terms of their own financial ability in acquiring (buying, purchasing) from the available accessible food source wisely and without wastage.

		Type of food knowledge	Yes	No
1.	All high-quality food is expensive.	Declarative	1	0
2.	Imported food is more expensive than locally produced food.	Declarative	1	0
3.	No-name brand food is low quality.	Declarative	1	0
4.	Spinach stems can be used to make a dish.	Procedural	1	0
5.	Buying loose vegetables is better value for money.	Procedural	1	0
6.	Fresh milk is always cheaper than long-life milk.	Procedural	1	0

**Consumption** – consumers are competent to make informed choices to plan, prepare and eat meals, incorporating competencies such as store and cook food, interpret, and adapt recipes and use equipment.

		Type of food knowledge	Yes	No
1.	Cut avocado discolours.	Declarative	1	0
2.	Mayonnaise contains oil.	Declarative	1	0
3.	Over-ripe tomatoes can be frozen whole.	Declarative	1	0
4.	Tinned food should be stored in a cool place.	Procedural	1	0
5.	It is better to use a serrated knife to cut fresh bread.	Procedural	1	0
6.	Marinades are used to add flavour to food.	Procedural	1	0
7.	Eggs at room temperature are better for baking.	Procedural	1	0
8.	Vegetables should be cooked with their skins on.	Procedural	1	0
9.	Lamb shanks are ideal for deep-frying.	Procedural	1	0
10.	Salt is only added to pasta after boiling.	Procedural	1	0
11.	Bread dough should be kneaded lightly.	Procedural	1	0
12.	Jelly powder should first be mixed with some cold water.	Procedural	1	0
13.	Melted ice cream can be successfully refrozen.	Procedural	1	0
14.	Green vegetables should be cooked rapidly in a pot without a lid.	Procedural	1	0
15.	Ovens have to be preheated before baking a cake.	Procedural	1	0
16.	South African recipes indicate oven temperatures in degrees Fahrenheit.	Procedural	1	0
17.	All vegetables should be boiled with the lid on.	Procedural	1	0

18.	Mutton is more flavourful than lamb.	Procedural	1	0
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**Nutrition** – consumers are competent in addressing health and well-being by incorporating competencies such as the selection, preparation and consumption of health promoting foods and practices.

		Type of food knowledge	Yes	No
1.	The fibre in whole-wheat bread makes you fat.	Declarative	1	0
2.	Vegetables should be cooked just before serving.	Declarative	1	0
3.	Brown rice releases energy slowly.	Declarative	1	0
4.	Pure olive oil contains no bad fats.	Declarative	1	0
5.	All fruit juices are good for you.	Declarative	1	0
6.	Fruit provides quick energy.	Declarative	1	0
7.	Butter is related to increased cholesterol.	Declarative	1	0
8.	All carbohydrates are bad.	Declarative	1	0
9.	Oats porridge is more nutritious than corn flakes.	Declarative	1	0
10.	Peanuts are a source of protein.	Declarative	1	0
11.	All added food colours are bad.	Declarative	1	0
12.	The carbohydrates in potatoes are healthy.	Declarative	1	0
13.	Salt is harmful.	Declarative	1	0
14.	Brown sugar is healthy.	Declarative	1	0
15.	Low-fat milk is good for healthy bones.	Declarative	1	0
16.	Pumpkins contain large amounts of starch.	Declarative	1	0
17.	It is recommended to drink more than 6 glasses of water per day.	Declarative	1	0
18.	Use oil sparingly when cooking.	Declarative	1	0
19.	Brown bread is recommended.	Declarative	1	0
20.	When deep-frying, the oil temperature has health consequences.	Declarative	1	0
21.	It is recommended to eat five fruits and vegetables every day.	Declarative	1	0
22.	Root vegetables are unhealthy.	Declarative	1	0
23.	Cooking vegetables in the microwave oven destroys the nutrients.	Declarative	1	0
24.	Egg yolks are unhealthy.	Declarative	1	0
25.	Root vegetables are cooked for vitamins to be taken up by the body.	Declarative	1	0
26.	Chicken is sometimes plumped up with saltwater.	Declarative	1	0
27.	Goat's milk is taken up easier by the body.	Declarative	1	0
28.	It is important to eat a variety of foods daily.	Declarative	1	0
29.	Coffee creamer is a healthy milk substitute.	Declarative	1	0
30.	Yellow and white maize are equally nutritious.	Declarative	1	0

**Food safety** – consumers are competent in food safety when handling, preparing, and storing food in a manner that will prevent food borne illnesses.

		Type of food knowledge	Yes	No
1.	It is dangerous to eat raw chicken.	Declarative	1	0
2.	Milk is pasteurised to improve flavour.	Declarative	1	0
3.	Long life milk needs no refrigeration at all.	Declarative	1	0
4.	Food can be eaten after the sell-by date	Declarative	1	0
5.	Keep eggs in the fridge.	Declarative	1	0
6.	Wash vegetables and fruit before use.	Declarative	1	0
7.	Minced meat can be frozen for up to 12 months.	Declarative	1	0

8.	Defrost chicken in lukewarm water.	Declarative	1	0
9.	Salt can be used to kill germs on a cutting board.	Declarative	1	0
10.	Add bleach to water to wash vegetables.	Declarative	1	0
11.	Cooking kills all bacteria.	Declarative	1	0
12.	Meat can be kept outside the fridge for a day.	Declarative	1	0
13.	Leg of pork should be roasted until well-done.	Procedural	1	0
14.	Do not store raw and cooked food in the same container together.	Procedural	1	0
15.	Adding spices to a stew will improve its storage life.	Procedural	1	0
16.	Fish and chicken can be deep-fried in the same oil.	Procedural	1	0
17.	Cool hot food in the fridge.	Procedural	1	0
18.	The same cutting board can be used to for cutting vegetables and chicken.	Procedural	1	0
19.	Food can be defrosted in the microwave oven.	Procedural	1	0
20.	Opened tinned food can be refrigerated in the tin.	Procedural	1	0
21.	Salting is a way to keep food longer.	Procedural	1	0
22.	It is acceptable to taste and stir food with the same spoon.	Procedural	1	0

**Social aspects of food**– consumers are competent to consider their culture, ethnicity, trends, entertainment and status in food choices.

		Type of food knowledge	Yes	No
1.	Naartjie is a citrus fruit.	Declarative	1	0
2.	Vegetarian food is Kosher.	Declarative	1	0
3.	Vegetarians eat only fruits and vegetables.	Declarative	1	0
4.	All Halaal foods are Kosher.	Declarative	1	0
5.	Curry powder is also called Garam Masala.	Declarative	1	0
6.	Snoek is a fresh-water fish.	Declarative	1	0
7.	Marshmallows can be eaten by people who do not eat animal products.	Declarative	1	0
8.	Mabela is made from sorghum.	Procedural	1	0
9.	Biltong is made from beef and game.	Procedural	1	0
10.	All sushi is made with raw fish.	Procedural	1	0
11.	A pita is a small pizza.	Procedural	1	0
12.	Chakalaka contains chillies.	Procedural	1	0
13.	Braaiing is done on open flames.	Procedural	1	0
14.	Stir putu pap frequently.	Procedural	1	0
15.	Mageu is an alcoholic drink.	Procedural	1	0
16.	Morogo is a specific leafy green vegetable.	Procedural	1	0
17.	Atchar is made from green mangoes.	Procedural	1	0
18.	Briyani is made with pasta.	Procedural	1	0
19.	Samp can be cooked in a pressure cooker.	Procedural	1	0
20.	Bunny chow is made with brown bread.	Procedural	1	0
21.	Yellow rice is served with bobotie.	Procedural	1	0
22.	Amasi can be used in baking.	Procedural	1	0

## QUESTIONNAIRE 2: FOOD PRACTICES QUESTIONNAIRE

In this questionnaire information is needed on your usual eating patterns, diversity of consumption, the number of servings a day, as well as the frequency of consumption of selected food groups. Please answer **all** the questions provided.

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### 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

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

#### DIVERSITY OF CONSUMPTION

C9 Please indicate if you have included foods from the following groups as part of your **meals** or **snacks yesterday**.

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

#### NUMBER OF SERVINGS A DAY OF SELECTED FOODS

C10 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
<b>Starchy food</b> (rice, maize meal, bread, pasta, breakfast cereals). <b>Serving size:</b> 1 slice of bread, ½ cup rice, pasta, porridge,	
<b>Vegetables</b> (fresh, frozen, or salad). <b>Serving size:</b> ½ cup cooked, 1 cup for raw leafy vegetables	
<b>Fruit</b> (all fresh) <b>Serving size:</b> cup chopped fruit, 1 medium apple, banana, 2 medium sized apricots, plums, ½ cup fruit juice, 2 tablespoons raisins	



<b>Meat, chicken, or fish. Serving size:</b> meat - palm size, slice 10mm, chicken – 1 medium breast, white fish – 1 large piece	
<b>Milk and dairy products</b> (yoghurt, cheese, cottage cheese, maas). <b>Serving size:</b> 1 cup milk, yoghurt, maas, 1 cube of 30mm cheese.	
<b>Soft drinks</b> (fizzy drinks i.e. Sprite, Coke, Fanta). <b>Serving size:</b> 340ml can	
<b>Water. Serving size:</b> 1 cup/ 1 glass	
<b>Tea and coffee. Serving size:</b> 1 cup	
<b>Sugar in tea or coffee. Serving size:</b> 1 teaspoon	
<b>Potato crisp</b> or other savoury snacks <b>Serving size:</b> 1 small packet (35g)	
<b>Chocolates bars. Serving size:</b> 1 bar	

### NON QUANTITATIVE FOOD FREQUENCY QUESTIONNAIRE

C11 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
Fish	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
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 drinks (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

Cakes, tarts, cupcakes, 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
Cordials (Oros, wild island, Caribbean)	1	2	3	4	5
Hamburger	1	2	3	4	5
Cookies, biscuits	1	2	3	4	5

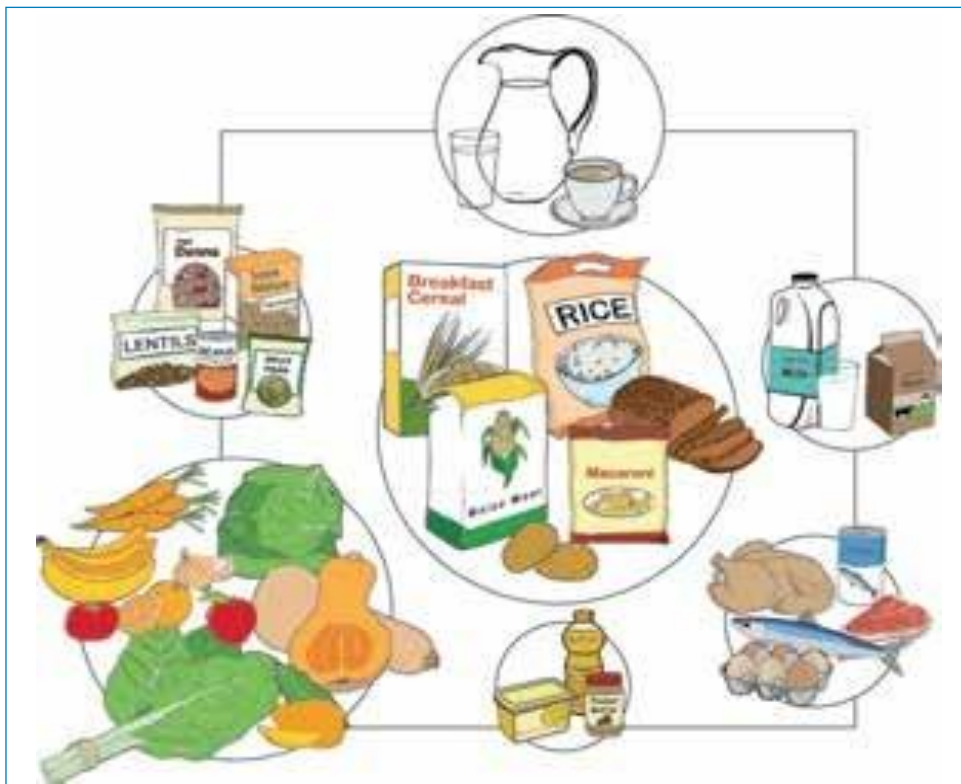
## Addendum D

# **FOOD BASED DIETARY GUIDELINES FOR SOUTH AFRICA**

The revised general Food Based Dietary Guidelines for South Africa, 2012 (Vorster *et al.*, 2013a).

- 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.

The South African food guide (Department of Health, Directorate Nutrition



## Addendum E

### TURNITIN REPORT

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