UNIVERSITY OF KWAZULU-NATAL

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DOES NUTRITION TRANSITION DISTORT FOOD CHOICES AND DIETARY PATTERNS CONTRIBUTING TO OBESITY AMONG BLACK AFRICAN WOMEN? A Case of African Women from Pietermaritzburg

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Pietermaritzburg

November 2018

ABSTRACT

Obesity and its attendant nutrition-related non-communicable diseases and other risk factors has long been identified as a serious public health concern globally and locally. Based on those concerns, the author investigated the question: 'Does nutrition transition distort food choices and dietary patterns, contributing to the overweight and obesity problem among the Black African women?' The nutrition transition is characterised by shifts from traditional diets to highly processed products with long shelf-life and regarded as energy-dense as they tend to have high oil, sugar and salt content, often purchased from supermarkets. Such diets are highly implicated in the global obesity epidemic. The focus was on women from Pietermaritzburg and the surrounding urban and rural communities.

Qualitative and quantitative research methods using various research instruments were employed in the survey-based research design to elicit information from the participants. Qualitative methods used were in-depth and focus group interviews. Raw data were collected, computed and analysed. Four hundred and fifty-two women, excluding the pilot study, were interviewed. The participants were between the ages of eighteen and sixty-five years. Research included data from seventy-three women organised into six focus groups, complemented with key informants' interviews.

The anthropometric data represented by the body mass index, reflected significantly high prevalence of obesity. The waist-to-hip ratios and the waist circumference, both indicators of abdominal obesity, similarly concurred. The socio-demographic information described the sample as homogenous in that they were all of child-bearing age and more, oversaw food preparation in their households, of the same race group, culturally and geographically from the rural and urban areas of Pietermaritzburg. The socio-demographics analysed, were: marital status through the female-headed households' implied poverty; social grants' recipients as suggestive of household poverty; ownership of consumer durables as signifying a community undergoing a nutrition transition.

The Household Food Insecurity (Access) Scale (HFIAS) measured the access component of food insecurity based on the experience of anxiety about food shortage; the perceptions of insufficient quality and variety of food and insufficient food intake. That was done through a nine occurrence- and frequency-of-occurrence questionnaire. The findings showed incidents of worrying about not having enough, as well as eating a limited variety and foods they really did not want to eat because of insufficient funds. Significantly, there were incidents of not eating any food of any kind because of lack of funds, including experiences of going to bed hungry, as well as going day and night without eating anything because there was not enough food. Those poignantly indicated a possibility of food insecurity at household level.

The Household Dietary Diversity Score (HDDS) is a food group dietary diversity indicator assessed through varieties of food-groups consumed. The results revealed limited dietary diversity with monotonous starchy staples consumed and high consumption of oily, sweet and salty food groups implicated in nutrition transition and the obesity epidemic.

Focus Groups and key informants seemed oblivious to obesity and venerated it.

Overall, the participants seemed to be relatively food and nutrition insecure, concurrently undergoing a nutrition transition, with abundance of highly processed products that seemingly distorted food choices and dietary patterns.

DECLARATION OF ORIGINALITY

I, *Ntombizodwa Phumzile Dandala*, hereby declare that:

   i.   The study hereby reported is of my own investigation, except where otherwise acknowledged.

  ii.   This study has not been submitted for any other degree or examination at any other university.

 iii.   The use of other persons' data, pictures, graphs and tables has been duly acknowledged in the text.

  iv.   The study does not contain material copied and pasted from the internet, unless specifically acknowledged.

Signed………………………….

Dated………………………………

I, *Maryann Green*, chairperson of the Supervisory Committee and

I, *Unathi Kolanisi*, co-supervisor, approve the release of this thesis for examination.

I, *Annette Van Onselen*, co-supervisor, approve the release of this thesis.

Signed……………………… Signed …………………… Signed………………………

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ACKNOWLEDGEMENTS

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ABBREVIATIONS

BMI	Body Mass Index
CBNP	Community-Based Nutrition Projects
CMO	Context-Mechanism-Outcomes
DD	Dietary Diversity
DGSP	German Society for Sports Medicine and Prevention
FANTA	Food and Nutrition Technical Assistance
FAO	Food and Agriculture Organisation of the United Nations
FRAC	Food Research and Action Centre
FDI	Foreign Direct Investment
HDDS	Household Dietary Diversity Score
HFIAP	Household Food Insecurity Access Prevalence
HFIAS	Household Food Insecurity (Access) Scale
INP	Integrated Nutrition Programme
IDF	International Diabetes Federation
LMIC	Low- and Middle-income Countries
NICD	National Institute for Communicable Diseases
NCDs	Non-communicable diseases
NPC	National Planning Commission
NR-NCDs	Nutrition Related Non-Communicable Diseases
PSNP	Primary School Nutrition Programme
RDA	Recommended Daily Allowance
SANHANES-1	South African National Health and Nutrition Examination Survey
SADHS	National Demographic and Health Survey
SCN	Standing Committee on Nutrition
SSA	Sub-Saharan African
TNC	Transnational Corporation
WC	Waist Circumference
WHR	Waist-to-hip Ratio
WCRF/AICR	World Cancer Research Fund/American Institute for Cancer Research
WHO	World Health Organisation
USAID	United States Agency for International Development Agency

DEFINITION OF TERMS

Some terms that have similar meanings have been used interchangeably in the study and they are briefly defined below.

Food insecurity exists when there is uncertainty about the availability of nutritionally acceptable and safe food.

Food poverty is when monthly food spending is less than the cost of a nutritionally adequate very low-cost diet.

Nutrition-related non-communicable diseases (NR-NCDs) is used interchangeably with non-communicable diseases (NCDs).

Female-headed households and woman-headed households are also used interchangeably. The study adopted the 'female-headed household' terminology.

Chapter 1

Introduction

1.1 Problem statement for the thesis

The problem of obesity and its associated non-communicable diseases (NCDs) and other risk factors had long been identified as a serious public health concern globally and locally. Based on those concerns, the author set out to investigate the obesity problem by asking the question: *Does nutrition transition distort people's food choices and dietary patterns contributing to obesity among Black African women?* - A case of African women from Pietermaritzburg. The current study therefore investigated the incidence of obesity among Black African women in Pietermaritzburg. There was evidence that it had reached epidemic proportions with over 56% of adult Black African females either overweight or obese in South Africa (SA) (Shisana, *et al.,* 2013; Goedecke *et al.,* 2005).

The SA population demonstrated shifts in dietary intakes that culminated in the increasing frequency of obesity (Sartorius *et al.,* 2015; Shisana *et al.,* 2013). Studies on obesity trends and risk factors among the adult SA population indicated that SA's epidemiological transition was moving at an alarming rate (Cois and Day, 2015). Another global study of these trends within the WHO's 6 regions (Africa, the Americas, Eastern Mediterranean, South East Asia, Western Pacific, and Europe), showed that SA topped the list of the three African countries with the highest incidences among adults, such trends twice more common among females (Yatsuya *et al.,* 2014).

That Black South African women were the most affected by the high prevalence of obesity was a trend that could be associated with socio-cultural, environmental and behavioural factors, as well as the impact of socio-economic status (Sartorius *et al.,* 2015; Tugendhaft, *et al.,* 2015; Micklesfield *et al.,* 2013). The observed obesity trends mostly among Black women, were also detected among children, adolescents and other race groups within SA, an indication that the South African population might be undergoing epidemiological transition (Sartorius *et al.,* 2015; Shisana *et al.,* 2013; Solomon *et al.,* 2014). Sartorius *et al.* (2015) demonstrated the progression of

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obesity in three cross-sectional surveys of South African adults aged ≥15 years, in 2008, 2010/2011 and 2012, showing that obesity increased significantly from 23.5% in 2008, to 27.2% in 2012, with even higher prevalence (p-value<0.001) among women (37.9% in 2012) compared to men (13.3% in 2012).

Black African females also tended to suffer from under- and over-nutrition with both having had detrimental health effects as they reflected deficiencies, excesses, or imbalances in the consumption of macro- and /or micronutrients (Faber and Wenhold, 2016). Steyn and Ochse, (2013) revealed that numerous micronutrient deficiencies existed in the diets of South Africans, such as thiamine, riboflavin, niacin, vitamin B6, folate, vitamin B12, calcium and vitamin C. Oelofse *et al.* (2002), cited by Iversen *et al.* (2011), showed that micronutrient deficiency was reportedly more common among Black population groups, compared with other ethnic groups, especially vitamin A deficiency, long recognised as a major problem among disadvantaged South Africans (Iversen *et al.,* 2011). Oelofse *et al.* (2002) stated that even among communities of similar lower socio-economic status, the Black community was clearly more disadvantaged, with more than 80% living in informal housing, compared to the 94% of Coloured community who lived in brick houses.

1.2 Research objectives

The current study was undertaken to establish if a nutrition transition [which Ervin *et al.* (2014) and Caballero and Popkin (2002) described by five stages where people were either emerging from undernourishment or involved in the modern-day type of malnutrition associated with too many calories] - had any relationship to the food choices and dietary patterns of 452 sampled women from Pietermaritzburg. The aim was to establish if nutrition transition had played a role in the incidence of overweight and obesity among the sampled women. For the current study to achieve those goals, four objectives were identified which were interrogated to see whether each one could be connected with the pervasiveness of overweight and obesity.

1. The first objective was to determine the anthropometric and socio-demographic status of sampled Black African, South African women in Pietermaritzburg. The research instruments used were the Anthropometric Data Information Sheet, to define the severity of overweight and obesity using

the BMI measurement (Lee *et al.,* 2015) and the waist-to-hip ratio (WHR) which are an important measure of central obesity (Yang *et al.,* 2017). The other instrument employed was a Socio-demographic questionnaire which provided key variables such as marital status, gender and race of the sampled women.

2. The second objective was to assess the status of food security or insecurity of the women at household level. This was achieved using the Household Food Insecurity (Access) Scale (HFIAS) questionnaire on a 30-day recall period, commonly used for measuring the three generally accepted domains of food security viz., adequate food availability, adequate access to food by all people and appropriate food consumption or utilisation by all (Coates *et al.,* 2007; Gebreyesus *et al.*, 2015).

3. The third objective was to assess the nutrition security or insecurity levels at household level using the Household Dietary Diversity Score (HDDS) questionnaire to evaluate the household access to quality diet defined as micronutrient adequate (Leroy *et al.*, 2015). This is a survey instrument based on Food and Nutrition Technical Assistance (FANTA) 's 12 food-groups administered over a 24-hour recall period, to determine a household economic access to food and determining the dietary diversity of the women's diets (Leroy *et al.*, 2015; Swindale and Bilinsky, 2006).

4. The fourth objective was to determine the nutritional knowledge of the study sample by assessing their perceptions and understanding of obesity to see if they understood its link to ill-health. This objective employed Focus Groups as a survey method through a Focus Group Interview Guide as the main research instrument.

The methodology for the study therefore employed qualitative and quantitative methods or mixed methods to investigate the thesis statement, and focused on each research objective. The methods sought to explore how each objective was associated with nutrition transition, and the contribution of each in the prevalence of overweight and obesity.

1.3 Research approach

As the purpose of the study was to explore the prevalence of obesity as it applied to Black African women in Pietermaritzburg, it thus assumed an interpretivist and constructivist theoretical paradigm (Henning *et al.,* 2010). This framework helped the researcher to capture the lives and meanings that the participants assign to situations in order to interpret them in the quest for validity. In this framework, knowledge is constructed from descriptions people assign to certain beliefs, values and their self-understanding (Henning *et al.,* 2010). This paradigm is more suitable for the qualitative research methods which the current study mostly adopted (Creswell, 2009). This paradigm was important because participants had the opportunity to interpret their knowledge and, with the help of the researcher, construct meanings to their experiences. The research instruments used were:

1. *The Anthropometric and Socio-demographic questionnaires:*
   The Anthropometric status of the research participants was examined using the body mass index data (BMI) to measure the severity of the obesity (BMI) (Lee *et al.,* 2015). The waist-to-hip ratio (WHR), which is the proportion of the circumference of waist to that of the hips, (an important measure of central obesity) (Yang, *et al.,* 2017), was also measured.

   The Socio-demographic questionnaire provided information on important variables related to the individual participants, such as marital status, gender, race and government grant recipients. Those variables provided information on the socio-economic status of the research participants. The lower the socio-economic status of the participant was, the higher the probability of food and nutrition insecurity was likely to be at household level.

2. *The Household Food Insecurity (Access) Scale:*
   The Household Food Insecurity (Access) Scale (HFIAS) survey instrument, established by Food and Nutrition Technical Assistance (FANTA) of the United States Agency for International Development Agency (USAID) (Chaparro, 2012), was used through a 30-day recall period. The purpose of the questions was to assess the three generally accepted domains of food

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security, viz. adequate food availability, adequate access to food by all people and appropriate food consumption/utilisation by all (Chaparro, 2012) within the participant's households.

3. *The Household Dietary Diversity Score:*

The other survey instrument used was FANTA and Food and Agriculture Organisation of the United Nations (FAO)'s Household Dietary Diversity Score (HDDS) (Kennedy, Ballard and Dop, 2013). It is based on 12 food groups proposed by FANTA to measure dietary diversity as a proxy for measuring household economic access to food, using a 24-hour recall questionnaire (Kennedy *et al.,* 2013).

4. *The Focus Group Interview Guide:*

Another survey instrument used in the current study was the semi-structured focus group interview guide. It was used in focus groups that consisted of participants stratified into rural and urban groups of under 35-year olds (younger women) and the over 35-year olds (older women). They were organised into six focus groups.

1.4 Delineations and limitations

The current study cannot be generalised to other communities because the survey sample was not random. The subjects were chosen from among Black African women who came from various directions towards the site where the research was conducted within the Edendale Mall. Only participants that gave consent to be interviewed took part in the study after being informed about the research. They were aware that they could choose to opt out of the interview at any time if and should they so desire. That setting provided the researcher with an easier means of accessing the participants for the study, thus providing convenience sampling (Ilker *et al.,* 2015). Even though the researcher tried to get variety by inviting one participant after two or three had gone past the research site, the findings could not be generalised to the rest of Pietermaritzburg community. The research could not establish whether the sampled women had any NCDs such as diabetes and high blood pressure because the participants would not know without a diagnosis from a medical practitioner.

1.5 Assumptions

When the researcher undertook the study, the assumption was that the selection of the sample would generate degrees of obesity as measured by the BMI, where underweight is BMI of less than 18.5 kg/m²; normal weight is 18.5 kg/m² to 24.9 kg/m²; overweight is 25.0 kg/m² to 29.9 kg/m² and obesity with a BMI of ≥30 kg/m² (Hammond & Litchford, 2012). Seeing that data of a sensitive nature such as HFI was determined, it was assumed that participants were truthful in their responses. However, the results indicated that the prevalence of obesity was significant, thus presenting a more homogenous trend that could not provide the normal distribution curve, making the findings not generalisable to other communities.

1.6 Rationale for the study

The study assisted towards investigating the cultural influences and the importance of knowledge regarding obesity and its adverse effects as a public health problem. It also assisted in exposing gaps in terms of people's understanding of what constitutes nutritious foods and the important role of indigenous foods. This study built on the researcher's previous research experience on childhood obesity, and therefore wished to determine whether the trend was also valid for adults.

1.7 Chapter overviews

The current study consisted of nine chapters. In the current chapter (chapter one) the author introduced the problem of obesity and its risk factors. The chapter was set out under the subheadings of the background information, the problem statement for the thesis, the research objectives, the methods followed, delineations and limitations, assumptions, the significance for the study and the chapter overviews.

The second chapter, literature review, gave an overview of nutrition transition and its various facets, including its historical origins and subsequent nutrition related non-communicable diseases (NR-NCDs.) The role of nutrition transition in the prevalence of obesity globally, regionally and nationally was explored through literature reviews.

The third chapter - methods and materials, focused on the methods, techniques and specific research instruments employed in the present study to explore the

prevalence of obesity among the sampled women. The contribution of chapter three was in utilising the research objectives to investigate if nutrition transition existed in Pietermaritzburg, and how it could have influenced the dietary patterns of the participants.

Chapter four presented the research findings using descriptive stats and various means such as graphs and tables. That information had been gathered using questionnaires following the order presented in Chapter three, beginning with Anthropometric and Socio-demographic questionnaires, the HFIAS and the HDDS as well as the Focus Group participants complemented by in-depth Key informant interviews.

The fifth chapter focused on the first objectives of the study viz. the Anthropometric status and the Socio demographic variables as the possible determinants of obesity to the sample. Utilising those research objectives, that chapter contributed in finding out what was unique about Black African women in PMB that could possibly expose them to obesity more than other race groups within the country.

Chapter six focused more on examining the extent of food security or insecurity at household level among the sampled women in Pietermaritzburg, to assess if food insecurity could have contributed in the increase of obesity in the sampled population.

Chapter seven assessed the extent of nutrition insecurity among the households of the sampled women to find out if that exacerbated the problem of obesity.

Chapter eight evaluated the nutritional knowledge of the Black South African women and their perceptions of obesity. It further evaluated if they could associate obesity with ill-health in the form of NCDs and other diseases.

Chapter nine presented the summary and discussion of the findings of the entire study.

Chapter 2
Literature Review

2.1 Introduction and Background

The study examined the associated impact of nutrition transition on obesity and the possibility of distorted food choices and dietary patterns. It sought to achieve that by scrutinising some works on the nutrition transition and how it was linked to obesity and associated NR-NCDs). Popkin *et* al. (2012) stated that obesity and the associated chronic NR-NCDs was a global epidemic affecting people worldwide, and that the trend was predicted to increase.

Metabolic syndrome includes obesity as one of its criteria, which is a collection of the most dangerous heart attack risk features, such as diabetes, abdominal obesity, high cholesterol and high blood pressure (Alberti *et al.,* 2006). Motillo *et al.*, (2010) concurred that metabolic syndrome was associated with increased risk of cardiovascular disease (CVD) risk factors.

The increasing incidence of obesity was consistently coupled with a growing danger of other NR-NCDs such as some types of cancers, stroke, hypertension (Hofman, 2014; Micklesfield *et al.,* 2013; Dalal *et al.,* 2011). The Global Burden of Disease studies intimated that the age-standardised death rates from NR-NCDs was progressive in four Sub-Saharan African (SSA) countries (Democratic Republic of Congo, Nigeria, Ethiopia and South Africa), compared to some developed countries (Abegunde *et al.,* 2007). That confirmed that the global trends on the spread of obesity and its associated diseases were also affecting South Africa (SA). Micklesfield *et al.* (2013) asserted that SA was undergoing a rapid epidemiological transition. Black women were the most affected, as characterised by the significant dietary shifts and body composition (Micklesfield *et al.,* 2013).

According to Popkin (2011) there have been extensive changes in the global body mass index (BMI) distribution towards reduction of undernutrition in exchange for increasing body fatness. Popkin (2011) illustrated what he called collision between human biology and contemporary expertise, globalisation, state rules and food industry practices, simultaneously producing far-reaching imbalances worldwide.

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Those have been evidenced by dramatic shifts the world over such as replacing water and breastmilk by a vast array of calorific beverages (Vorster and Bourne, 2016).

Ervin (2014) asserted that those movements from developing to developed and from rural to urban areas impacted other transitions such as changes in what people ate, leading to extensive modifications in the design of their nutrition. Those shifts in global dietary patterns had been rapid and led to generalised oversupply of highly processed foods and drinks (Monteiro *et al.*, 2013; Popkin, 2011). They had also been associated with changes in food sources, methods of processing and distribution, and concurrent surges in obesity in virtually all countries (Ervin, 2014; Monteiro *et al.*, 2013; Popkin, 2011; Swinburn *et al.,* 2011).

Those multinational food corporations that dominated the worldwide food environment ensured that a global food system with highly processed foods and drinks was entrenched (Nazmi and Monteiro, 2013; Swinburn *et al.* 2011). In that food system, highly processed products were effectively marketed and made affordable to safeguard availability and accessibility, subsequently entrenching the global nutrition transition (Nazmi and Monteiro, 2013; Swinburn *et al.*, 2011).

2.2 The Nutrition Transition

Nutrition transition is a phenomenon related to changes in the pattern of food regime and nutrient intakes by individuals, households, communities or even whole populations in urban as well as rural areas, when their food environment changed (Ervin *et al.*, 2014; Vorster and Bourne, 2016). Nutrition transition tended to be evident with rapid urbanisation and people adopting 'western' diet and lifestyles, while forsaking their traditions and cultures (Vorster and Bourne, 2016).

According to Popkin *et al.* (2012) and Drewnowski and Popkin (1997) nutrition transition was universally associated with increasing rates of obesity and various nutrition related non-communicable diseases (NR-NCDs). They confirmed its association with shifts from traditional to contemporary forms of food consumption and reduced physical activity (Popkin *et al.,* 2012; Drewnowski and Popkin, 1997). NR-NCDs associated with nutrition transition impacted every socio-economic group

at every level of macro-economic development. Nevertheless, discrepancies occurred as it seemed to disproportionately impact the poorest sections of society, particularly females in disadvantaged groups (Nazmi and Monteiro, 2013; Sartorius *et al.,* 2015; Swinburn *et al.,* 2011).

Nutrition transition therefore implied overall dietary shifts from indigenous traditional staples such as pulses, including dry beans, peas, lentils and chickpea, which could be nutrient-dense (Curran, 2012). The historically nutrient-dense staples - [enhancing longevity and reducing disease risk] could have been ideal as opposed to diets that were high in fats, sugar and salt content associated with a 'western' diet (Curran, 2012).

One of the chief protagonists of the nutrition transition theory Popkin (1993), heralded the existence of the nutrition transition (originally formulated by Omran 1971) as he postulated the existence of two other historic transitions. Those were the demographic and the epidemiological transitions that affected and were affected by nutrition transition (Popkin, 1993). Omran (1971) proposed that the epidemiological transition grew out of the demographic transition model (Santosa *et al.,* 2014).

The demographic transition theory could be associated with modernity and shifts from traditional to the western-type diet and lifestyle which had also been detected in developing countries like South Africa (SA) (Annan *et al.,* 2015; Ervin *et al.*, 2014; Popkin *et al.,* 2012). Characteristically, demographic transition happened when populations migrated often from rural to urban settings, exposing them to the western lifestyles and dietary patterns (Collinson *et al.,* 2014).

The epidemiological transition theory on the other hand could be characterised by shifts in type of illness from high prevalence of communicable illnesses, to persistent NR-NCDs commonly associated with high-income countries (Collinson *et al.,* 2014). Obesity could be regarded as one of the most obvious non-communicable disease including cardiovascular diseases, some cancers, hypertension and other chronic diseases of lifestyle presenting major health problems in many developing countries including SA (Blaauw *et al.,* 2016; Ervin *et al.*, 2014).

The concern about nutrition transition could be its adverse effects on people as it distressed poorer communities the most, where under-nutrition and over-nutrition coexisted in the same households (Ghattas, 2014; Vorster *et al.*, 2011; Kimani-Murage *et al.*, 2010). Such co-existence, often labelled the '*double burden*' of disease, could often be expressed through *stunting* in children and adolescent obesity, both conditions occurring in same households (Ghattas, 2014; Kimani-Murage *et al.*, 2010). In SA that double burden of disease was said to persist despite it being a middle-income country, as food insecurity was said to remain a problem with some 35% of households considered food insecure (Ghattas, 2014; Kimani-Murage *et al.*, 2010).

The nutrition transition evolved through five distinct stages namely: (1) food gathering, (2) famine, (3) receding famine, (4) degenerative diseases and (5) behavioural change towards a healthy balanced diet (Ervin, 2014; Ervin *et al.*, 2014; Popkin, *et al.,* 2012). Most of the world's populations remain trapped in the third (receding famine) and fourth (degenerative diseases) stages (figure 2.1), characterised by dietary shifts and NR-NCDs such as obesity (Ervin *et al.*, 2014; Popkin, *et al.,* 2012). The pervasive nature of stage-3 receding famine and stage-4 regenerative diseases of the nutrition transition seem to be dominating the world stage, enabling the nutrition transition theory to overlap academic fields including medicine, public health, epidemiology, biological anthropologists, nutritional scientists, geography and demography including Agriculture (Dufour and Piperata, 2017; Ervin *et al.,* 2014).
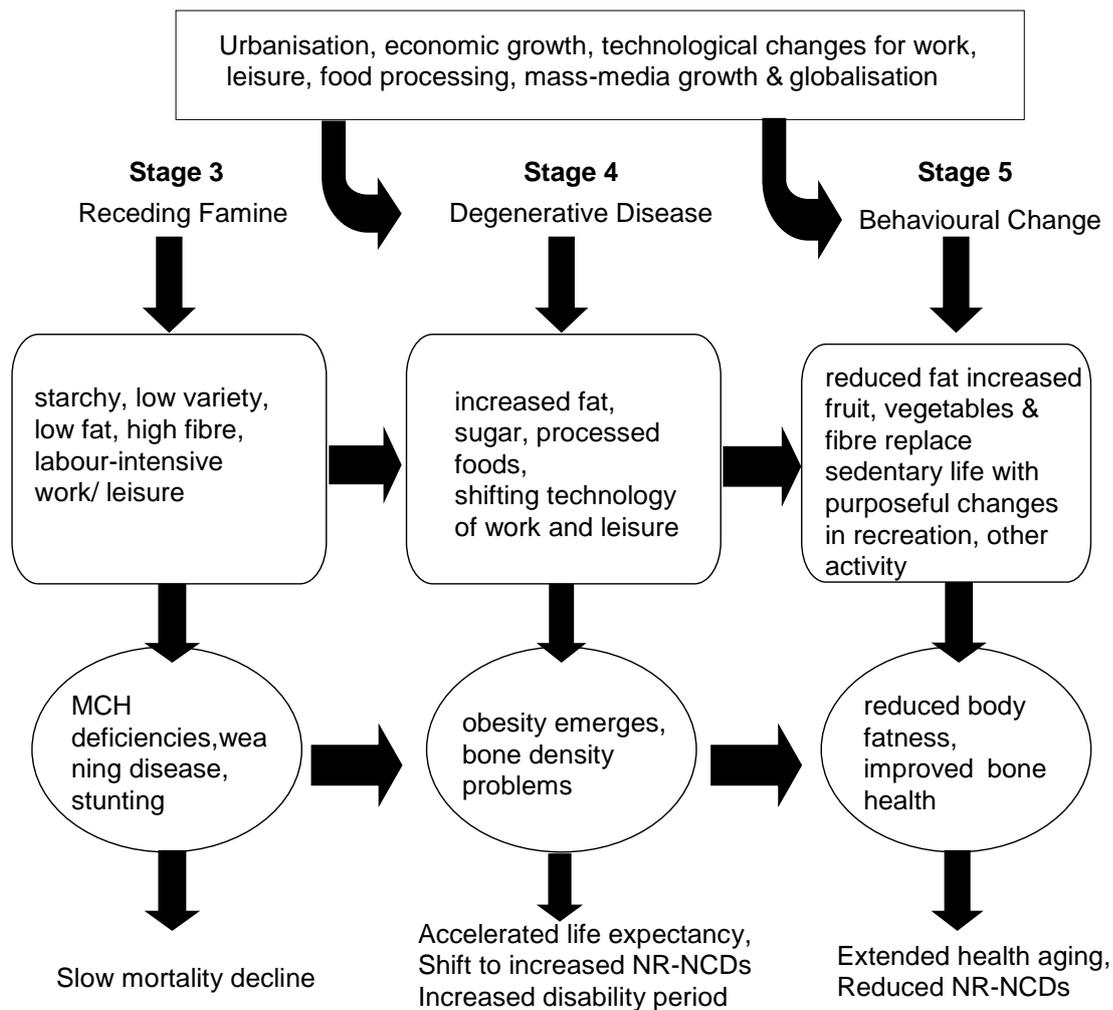
Figure 2.1 Stages of Nutrition Transition (Popkin, 2002)

The challenges of lack of data directly linking the nutrition transition, globalisation of trade and market integration to variations in anthropometric status and ill-health reveal the complex nature of the nutrition transition (Dufour and Piperata, 2017). There is nonetheless extensive body of literature associating the nutrition transition with NR-NCDs and their co-morbidities. The magnitude of the negative health outcomes associated with nutrition transition exposed substantial intra-population heterogeneity of how nutrition transition affects mostly the poor (WHO, 2011; Faber and Wenhold, 2007; Ghantas, 2014). As stated earlier, nutrition transition combines malnutrition including undernutrition, and overnutrition (figure 2.2), in what got called the double burden of disease (World Health Organisation (WHO); (Ghattas, 2014; WHO, 2011; Faber and Wenhold, 2007).

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                    ┌─────────────────────┐
                    │    Malnutrition     │
                    └──────────┬──────────┘
          ┌────────────────────┴────────────────────┐
┌───────────────────┐                    ┌───────────────────┐
│   Over-nutrition  │                    │   Under-nutrition │
└─────────┬─────────┘                    └─────────┬─────────┘
┌───────────────────────┐          ┌──────────────┴──────────────┐
│ Energy Macronutrients │  ┌─────────────────┐         ┌─────────────────────┐
└───────────────────────┘  │  Protein-energy │         │   Micron-nutrient   │
                           │   malnutrition  │         │    deficiencies     │
                           └─────────────────┘         └──────────┬──────────┘
                                                              ├── Iron
                                                              ├── Vitamin A
                                                              ├── Iodine
                                                              └── Zinc
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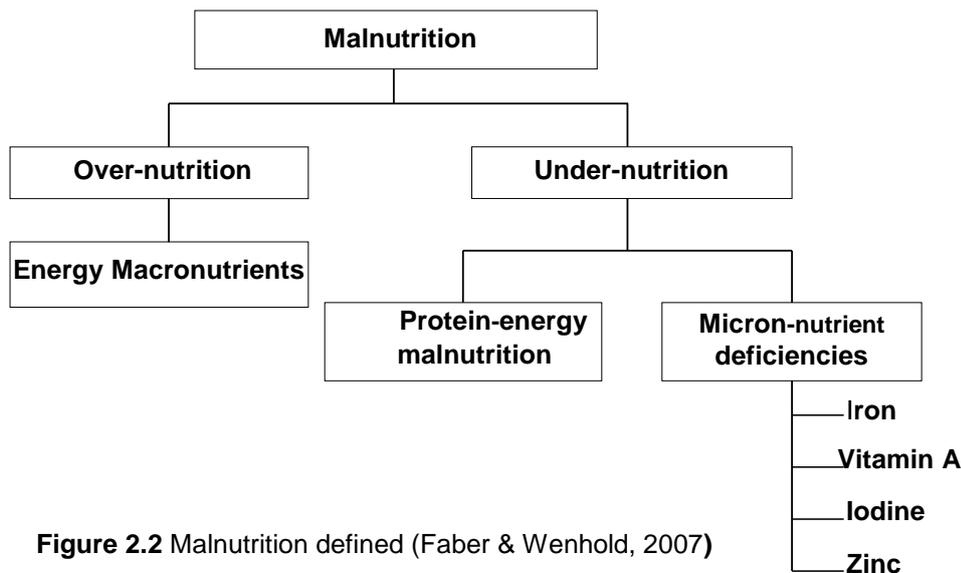
Figure 2.2 Malnutrition defined (Faber & Wenhold, 2007**)**

Malnutrition (representing underweight, wasting and stunting), or over-nutrition (representing overweight and obesity) had been observed to be present in SA, as seen in the rural communities in KwaZulu-Natal (KZN) (Tathia et al., 2013). They referred to data from the National Planning Commission (NPC) of the National Development Plan Vision 2030 (2011) that found that SA was one of the top 20 countries with the biggest problem of undernutrition where one in ten children was malnourished whilst one in five was undersized. Their study reported that those symptoms were evident in female learners from 31 primary schools in rural KZN, using anthropometric data collected in 2011. Those data were some of the indicators of the existence of the nutrition transition as well as food and nutrition insecurity, as shown by micronutrient deficiencies of iron, Vitamin A, Iodine and Zinc in figure 2.2. The detailed discussion of micronutrient deficiencies could be read in greater detail in Chapter 7, in the '*Background about the household dietary diversity scores (HDDS)'* section.

Re-emphasising the paradoxical cohabitation of food insecurity and obesity, Stuckler and Nestle (2012) asserted that the international food organisations were not coping with the world's food requirements, and were not prioritising to distribute the best nourishing food more than they focused on the financial yields. That scenario could have serious implications for poorer households with limited disposable income to purchase nutritious food. Such households would be excluded from advancement

and pushed into subsequent household poverty and food insecurity, or eat low-cost, highly processed and energy dense foods lacking in nutrients whilst high in sugar, salt and fat content linked to overweight and obesity (Stuckler and Nestle, 2012). That was typically the case with energy dense and highly processed products marketed by Big Food corporations (Stuckler and Nestle, 2012).

2.3 Ultra-Processed Products and the Food System

The tendency to consume highly processed, energy-dense foods with poor nutrients, could be partly due to promotional marketing that made those products quite dominant within industrialised food systems (Monteiro, 2010). The issue was the association of ultra-processed diet and beverage items with the upsurge in obesity and the accompanying illnesses all over the world (Monteiro and Cannon, 2012; Monteiro, 2010). Subsequently, the recognised traditional food regimes and eating forms had been replaced by some highly treated products (Igumbor, *et al.,* 2012; Monteiro and Cannon, 2012). That seemed to be the characteristic patterning of the impact of transnational food corporations, the so-called 'Big Food', as they entrenched their consumption culture of '*ultra-processed products'* (to be dealt with in more detail in section 2.5 of the current chapter) (Igumbor *et al.,* 2012; Monteiro and Cannon, 2012).

2.4 The Role of 'BIG FOOD' in the Nutrition Transition in South Africa

The name "Big Food" referred to large food retailers that control the diet and drink milieu and are implicated in unhealthy eating globally and in SA (Igumbor, *et al.,* 2012; Monteiro and Cannon, 2012; Stuckler and Nestle, 2012). Those corporations increased the market share of their products globally by displacing the traditional food systems and dietary patterns by ultra-processed products (Igumbor *et al.,* 2012; Monteiro and Cannon, 2012). In SA Big Food involved big retail and wholesale companies, some of which are administered by head-quarters in North America and Europe (Igumbor *et al.,* 2012). Some tactics by those corporations included increasing the availability, affordability, and acceptability of their products and possibly contributed towards such dietary changes in SA and the associated increase in obesity and NR-NCDs (figure 2.3) (Igumbor *et al.,* 2012).

The activities and influence of the big food and beverage companies in the public health sphere in South Africa were examined by scholars from various health related sectors who focussed on the financial gains of their packed foods (Igumbor *et al.,* 2012). The bulk of transactions of choice categories in their packed food was illustrated by sales in the years 2005 – 2010. The ready meals grew by 43.1%; snack bars by 42.6%; noodles by 44.5 %; oils and fats by 14.9 % (Igumbor *et al.,* 2012:2). Tiger Brands (see table 2.1) topped the list of the top ten packaged food companies in SA with a contribution of total packaged food sales of 17.2% (Igumbor *et al.,* 2012: 3).
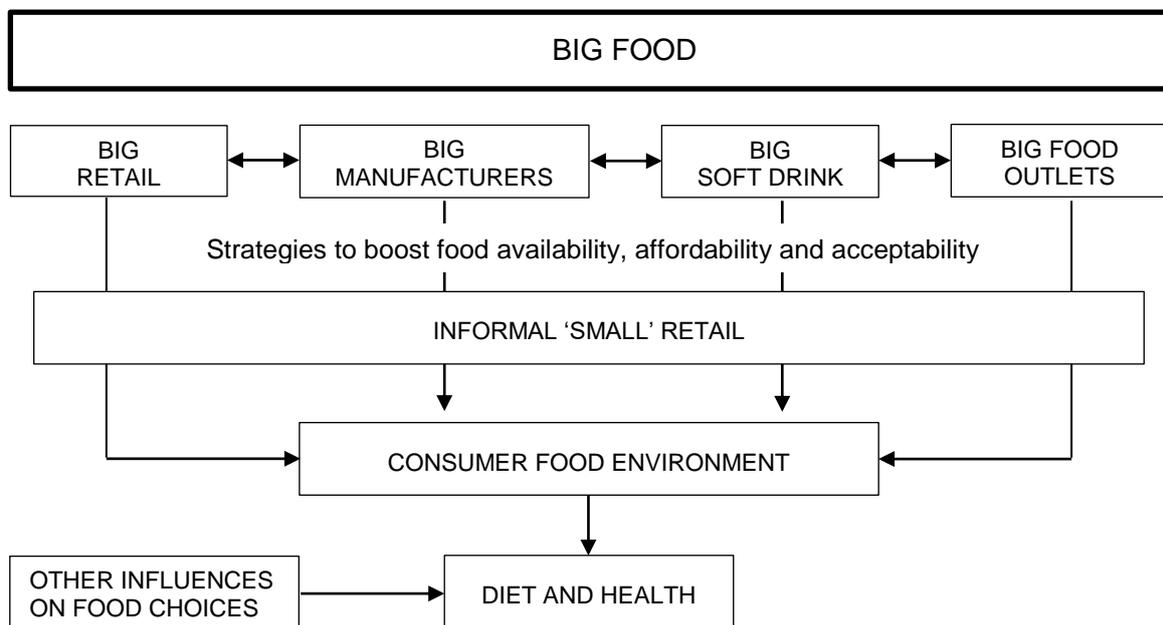
Figure 2.3.
The hypothesized link between Big Food and the consumer Food environment.
Adapted from Igumbor *et al.*, 2012.

The largest top ten Big Food manufacturers in SA accounted for a disproportionate 51.8% of food produced, while the top ten soft drink companies accounted for 79% of the total drink sales (Igumbor *et al.,* 2012). The top three, led by Coca-Cola Co, followed by PepsiCo Inc., then Danone Group, account for 64.7% of the market, with Coca-Cola as market leader holding 49.8% to themselves as a dominant player (Igumbor, *et al.*, 2012).

Table 2.1 Packaged Food Company Shares in SA (Adapted from: Igumbor *et al.,* 2012)

Rank	Company	Location of Company Headquarters	Contribution to Total Packaged Food Sales (%)	Examples of Product Types
1	Tiger Brands Ltd	South Africa	17.2	Milling & baking, groceries, confectionery, beverages, value added meat products, fruit & vegetables, products for the food service sector.
2	Unilever Group	UK/Netherlands	4.9	Spices, sauces, dressings, margarine, teas, syrup and food solutions.
3	Parmalat Group	Italy	4.8	Dairy products including milk, yoghurt, ice cream and cheese, fruit juices.
4	Nestle SA	Switzerland	4.6	Baby foods, drinks, breakfast cereals, chocolate, confectionery, coffee, dairy products, ice cream.
5	Clover Ltd	South Africa	4.6	Dairy products, desserts, beverages such as fruit juices, nectars & ice teas.
6	Dairybelle (Pty) Ltd	South Africa	4	Dairy products, fruit juices.
7	Pioneer Food Group Ltd	South Africa	3.7	Baking aids, tea/coffee, breakfast cereals, biscuits, condiments, juices & acidic drinks, dried fruits, eggs.
8	Cadbury Plc (bought by Kraft in 2011)	UK/US	2.8	Chocolate, candy, gum, biscuits, coffee, other grocery.
9	AVI Ltd	South Africa	2.8	Coffee, tea, biscuits, potato chips, frozen fish, and seafood products.
10	PepsiCo Inc.	US	2.4	Drinks, savoury snacks.

Source: Derived from Euromonitor*, 2011(17) Inc: Alexander *et al.*, 2011[18]: company websites.
*Euromonitor does not collect data on the informal sector (defined as sales that are not taxed)
doc 10.1371 / journal pmed. 1001253.t002

The stated percentages (table 2.2) demonstrated the extent of infiltration and the market dominance that Big Food had in the South African food and beverage industry. Big Food was reputed for selling the ultra-processed products which were known to increase the incidence of obesity and other major chronic diseases (Igumbor *et al.,* 2012; Monteiro and Cannon, 2012).

Table 2.2 Volume of sales of select categories of packaged foods, 2010 and rates of increase.

Category of Packaged Foods	Subcategory	Sales Volume*	Rates of Change of Sales Volume (%), 2005 - 2010
Bakery		2009.3	16.2
Meal solutions		547.2	18.5
	Canned /preserved food	241.8	16.2
	Frozen processed food	102.1	18.2
	Chilled processed food	95.9	**2.8
	Sauces, dressings & condiments	88.1	27.0
	Ready meals	70.1	43.1
	Soup	11.1	32.6
Impulse & indulgence products			
	Confectionery	119.4	16.3
	Sweet & savoury snacks	87.9	27.5
	Snack bars	1.9	42.6
	Ice cream	76.0	14.7
Dried processed food		345.4	**2.8
Pasta		62.9	35.0
Noodles		7.4	44.5
Oils and fats		343.6	14.9
Meal replacement		0.6	9.6
Spreads		28.8	23.9

Table 2.2
Volume of sales of select categories of packaged foods, 2010, and rates of increase.
(Adapted from: Igumbor *et al.,* 2012). Source: Euromonitor 2011(17) Inc.: Alexander *et al.*, 2011[18]: company websites.
*In thousand tonnes, except for ice cream, which is million litres. doi: 10.1371 / journal pmed. 1001253.t001

The growth in supermarket food sales share at 50-60% in SA, with nearly two-thirds of households in rural areas buying their food from supermarkets, illustrated the impact Big Food has on those communities.

2.5 Ultra-Processing and Food Security

Monteiro *et al.* (2013:21) indicated that ultra-processing created attractive, hyper-palatable, cheap, ready-to-consume food products that were characteristically energy-dense and generally obesogenic. The global food system was thus designed by those transnational food corporations. They were also involved in manufacturing, retailing and fast food service, generally known to be highly profitable (Monteiro *et al.,* 2013).

The extent of threat from ultra-processing was such that the UN General Assembly declared the period from 2016 to 2025 the decade of Nutrition, forming part of the UN Sustainable Development Goals initiative (Monteiro *et al.,* 2017). Participants at that initiative were concerned that ultra-processed foods and drinks posed multiple threats to diets and food security, subsequently to human wellbeing (Monteiro *et al.,* 2017). Also, the Global Panel on Agriculture and Food Systems for Nutrition (2016), an autonomous skilled group, published a 'Foresight' report on ultra-processed foods and drinks. Its findings cautioned all countries that if no changes happened in terms of the growth of ultra-processed products, estimates suggested that by 2030 the numbers of obese individuals might rise from 1.33 billion in 2005 to 3.28 billion.

While highlighting the extent of dominance and influence by the multinational food and beverage companies in nation states, Monteiro et al. (2017) stated that those corporations do not represent the entire food industry. Food industry incorporates various other stakeholders like farmers, and other food and drink manufacturers who are not part of those big corporations. Reference to the food industry should therefore isolate those conglomerates whose revenues largely depended on highly processed foods and drinks (Monteiro *et al.*, 2017). Those corporations tended to be recognised as '*the food industry'* even though "they do not and cannot represent the interests of the food industry as a whole" (Monteiro *et al.*, 2017:4).

The key issue with the domination of the consumer food and beverage environment by those multinational companies was the proliferation of ultra-processed and energy-dense products, creating obesogenic food environments (Monteiro, 2010). Those food and drink products tend to have low satiety levels often with high

quantities of fat, sugar, salt, and other cosmetic additives, making modest consumption unlikely (Igumbor *et al.,* 2012).

The recent outbreak of listeriosis in SA where 978 laboratory confirmed cases were reported to the National Institute for Communicable Diseases (NICD), bore testimony to Monteiro's cautioning against the consumption of highly processed products (WHO, 2018). The outcome of the illness was known for 674 patients, of whom 183 (27%) died. According to the WHO (2018) report, 91% of the strains belonged to '*Listeria monocytogenes Sequence Type 6* (ST6). That ST6 sequence type was identified in a widely consumed ready-to-eat processed meat product called '*Polony'.* Nine percent of the reported cases in that recent outbreak was infected with different strains of Listeria than the predominant ST6 which might suggest that more than one outbreak was ongoing (WHO, 2018). That outbreak provided a strong case for the concerns raised in connection with the highly processed products and their dangers to public health. That also confirmed the view that ultra-processed products might not necessarily improve food and nutrition security.

2.6 Nutritional Values of some Traditional Foods

The nutritional values and content of traditional staple foods, most commonly consumed by Africans in SA, were to be examined for their potential role in nutrition transition or health features. The three main foods to be considered as examples were: (1) maize meal (2) Amaranthus (wild spinach) and (3) Sweet potatoes. The role of food preparation and the impact thereof in nutrition transition was to be explored:

2.6.1 Maize meal

The most common staple food eaten in Southern Africa was maize meal porridge or mealiepap (Mbenyane *et al.,* 2017). The study by Mbenyane *et al.* (2017) concurs that maize meal porridge was consumed by almost all participants in their study, and that was the case with the current study. The preparation of the maize meal porridge varies from a stiff variety to soft varieties of drinks such as 'idokwe' or 'amageu' which are non-alcoholic beverages from maize meal (Mbenyane *et al.,* 2017). The table (table 2.) suggests various ways that could help ameliorate the high carbohydrate content of foods like maize meal porridge.

2.6.2 Amaranthus

Amaranthus belongs to a diverse type of vegetables with names such as wild amaranth, wild spinach, pigweed, green amaranth, African spinach (Alegbejo, 2013). Amaranthus, particularly the grain, was highly nutritious while the vegetable form as leaves could provide some protein and some essential amino acid (Alegbejo, 2013). Leaves and stem of the entire plant could be eaten raw or blanched to retain the vitamin C content. In SA amaranthus is cultivated and prepared for canning and sold in supermarkets, but is not used as a cereal (Alegbejo, 2013).

2.6.3 Sweet potatoes

Not all potatoes belong in the same category as they differed in their taste, flavour, texture and nutrients (The World's Healthiest Foods, 2001). As the name suggests, this type is sweet and belonged to another type other than yams or common potatoes, and has several nutrient benefits such as anti-oxidants (The World's Healthiest Foods, 2001). The orange-fleshed sweet potato variety from within Africa was found to have 100-1,600 micrograms of pro-vitamin A and beta carotene A in every 3.5 ounces, sufficient to provide 35% of all vitamin A requirements (The World's Healthiest Foods, 2001:1). Sweet potatoes originated from Central and South America and were brought to Africa by Spanish explorers (The World's Healthiest Foods, 2001).

The nutrient-rich way of preparing sweet potatoes was boiling or steaming them, thus preserving the bioavailability of beta carotene of sweet potatoes (The World's Healthiest Foods, 2001).

Table 2.3 GI and GL values of South African Staple Foods per Standard Portion (Low GI-GL cereal and bread are included for comparative purposes)

Name of Food	GI	Portion size	Weight	Carb-content	GL
Maize meal/ Mieliepap/ Pap/ Phuthu					
Maize meal/ Mielie-pap/ Pap/ Phuthu, crumbly, HOT	74	1 cup	140 gm	46.9	35
Maize meal/ Mielie-pap/ Pap/ Phuthu, crumbly, COOLED	50	I cup	140 gm	46.9	23
Maize meal/ Mielie-pap/ Pap/ Phuthu, stiff, HOT	74	1 cup	250 gm	49.0	36
Maize meal/ Mielie-pap/ Pap/ Phuthu, stiff, COOLED	50	1 cup	250 gm	49.0	25
Maize meal/ Mielie-pap/ Pap/soft, no sugar, HOT	83	1 cup	250 gm	28.5	24
Low-GI Breakfast Cereal, All-Bran, Hi-Fibre, Kellogg	43	1 cup	90 gm	40.5	17
Breads					
Brown bread, Sasko	81	1 slice	44 gm	18.6	15
White bread, Sasko	72	1 slice	44 gm	20.3	15
Whole wheat bread, homemade	70	1 slice	50 gm	22.1	15
Low-GI Bread, Brown Low-GI, Blue Ribbon	48	1 slice	44 gm	22.0	11

Adapted from**:** (Steenkamp G & Delport L (2007). The SA Glycaemic Index & Load Guide)

2.6.4 The role of food preparation and its contribution to the obesity pandemic

The three traditional foods above, (1) maize meal porridge or mealie pap (2) Amaranthus and (3) sweet potatoes had been shown to have the potential to counter the high incidence of obesity (Mbenyane *et al,* 2017).

2.7 Conclusion

The pervasiveness of obesity was not abating. Also noted was that death rates from NR-NCDs were higher in four Sub-Saharan African (SSA) countries that included South Africa. Those countries were undergoing nutrition transition. Nutrition transition was often associated with common availability of highly processed products from multinational food and drink companies known as Big Food. As Big Food dominated the consumer food environment, they adopted various strategies to increase the sales of their ultra-processed products by boosting their availability,

affordability and acceptability. That consumer food environment can be associated with the absence of genuine food security as normally measured by the presence of the four basic elements that are said to exist when there is food security viz. - food availability, access to food, food utilisation and stability of food security (Faber and Wenhold, 2016).
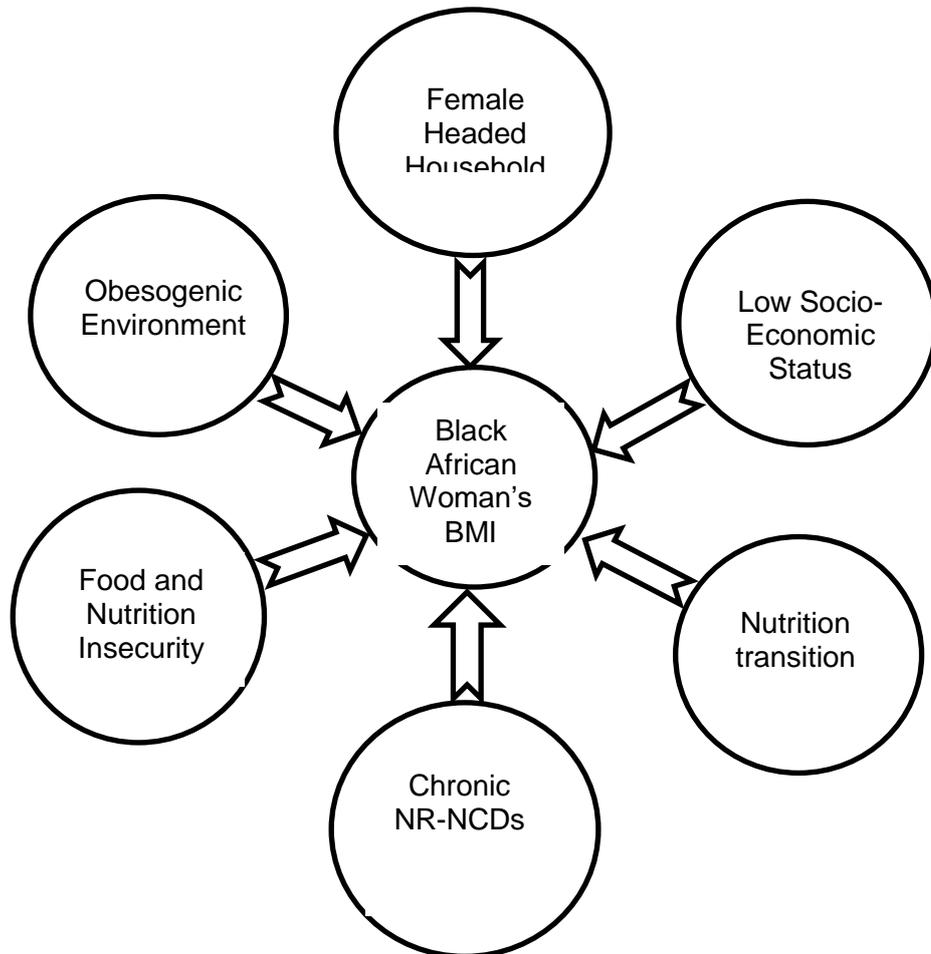
Figure 2.4 Conceptual Framework of Influences of Diets on Black Woman

The conceptual framework (figure 2.4) sought to show how the prevalence of obesity among the sampled women evolved. The framework suggested that the sample might be at the centre of the consumer food environment. It was based on literature and was generated to capture the situations that the Black woman found herself in, which could be defined as the obesity determinants. They included increased BMI levels; individual factors (e.g. ethnicity, gender, and socio-economic status); social factors within households, such as family structure (e.g. female headed households); environmental factors, such as rural and urban and food environments (e.g.

obesogenic or healthy food environments) and lifestyle and behavioural factors (Sartorius *et al.,* 2015; Shisana *et al.,* 2013; Solomon *et al.,* 2014; Vorster *et al.,* 2011). Besides those factors and determinants Black African females were also socio-economically disadvantaged, living with both under- and over-nutrition (Faber and Wenhold, 2016; Shisana *et al.,* 2013).

Chapter 3
Methods and Techniques

3.1 Introduction and Background

The highly publicised prevalence of overweight and obesity among Black African women in South Africa (SA), where 56% were either overweight or obese, (Micklesfield *et al.,* 2013; Shisana *et al.*, 2013), made the current study of interest to the author.

Studies abound on the association of obesity with chronic non-communicable diseases (NCDs), especially type-2 diabetes, some cancers, hypertension, stroke and cardiovascular diseases (Kimani-Murage *et al.,* 2010; Shaw *et al.,* 2010; Shisana *et al.,* 2013; World Health Organisation (WHO), 2012). Those trends had become a public health issue, since the NCDs, especially the cardiovascular diseases, were implicated as leading causes of death (WHO, 2010). Notably, a report on the global status on NCDs established that 80% of the burden from NCDs was carried by low-and middle-income countries such as SA (WHO, 2010).

3.1.1 The purpose of the study
The purpose of the study was to highlight the problem of obesity. Then the author undertook to probe obesity by asking the question: Does nutrition transition distort people's food choices and dietary patterns contributing to obesity among the Black African women? – A case of African women from Pietermaritzburg. The purpose of the current study therefore was to investigate the prevalence of obesity among the sampled Black African women from Pietermaritzburg.

Prevailing evidence suggested that globally overweight and obesity were increasing at about 0.7% per year (Popkin *et al.,* 2012). Shaw *et al.* (2010) using the World Health Organisation (WHO)'s global estimates for diabetes for 2010 and 2030, suggested that there would be an increase of 69% in numbers of adults with diabetes in developing countries like South Africa (SA). They based their submission on the obesity and sedentary lifestyles becoming more common (Shaw *et al.,* 2010).

1.2 An overview of the structure of this chapter

The description of data collection provided the methodology and the techniques that the study adopted as it explored whether nutrition transition might be implicated in the prevalence of obesity among the Black African women of Pietermaritzburg. The objectives for the study were used to scrutinise the sampled women's food choices and dietary patterns. The results from such investigations provided data that were analysed to determine whether those women were undergoing nutrition transition that might have contributed to their obesity.

The research objectives provided the structure of the dissertation chapters including the sample choice, research instruments and analyses according to the order in the table provided (Table 3.1). Given the association of obesity with the chronic nutrition-related non-communicable diseases (NR-NCDs), the study objectives sought:

1. To determine the anthropometric and socio-demographic status of the sampled Black African women from Pietermaritzburg;
2. To measure the level of food security or insecurity of those women at household level;
3. To assess the status of their nutrition security or insecurity at household level, and
4. To determine the women's nutritional knowledge and assess their perceptions and understanding of obesity as a public health issue and see if they associated nutrition to ill-health.

The current chapter outlined in brief detail: a) The *introduction*; b) the *research design* employed and the rationale for it; c) the *methodology* which outlined the: *research instruments; data* on the target population and sample; and the *analysis* which outlined the techniques used; d) Limitations; e) ethical considerations and f) conclusions.

3.2 Research Design

The design for the current study was informed by the nature of the research problem statement, (3.1.1) that *'nutrition transition distorts people's food choices and dietary*

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patterns'... leading to the overweight explosion and the obesity epidemic and their attendant NR-NCDs'. The survey-based research design adopted for the study was used to elicit information from the sampled women from Pietermaritzburg. Those who took part in the study had been approached and informed about the study and their rights to participate or not to. The participants were presumed to have the information the researcher was seeking, able and willing to communicate and were assumed to be representative of a larger community (Hofstee, 2013).

3.3 The Methodology

Participants/subjects for the study

The target population for the study were Black South African women from households in rural and urban areas (Townships). They were a mixture from rural areas like Mpendle, Kwa-Qanda and Elandskop. The urban group was predominantly from the Townships of Pietermaritzburg, such as Mbali, Sweetwaters and Edendale. The researchers managed to interview 452 women excluding the 12 interviewed in the pilot study. The participants were between 18 and 65 years of age. The research also involved data collected from a sample of 73 women organised into six focus groups from rural and urban areas that were complemented with key informants. They were a separate group from the main study sample.

The main purpose for the current survey-based research was to test the thesis statement to arrive at reliable and well-argued conclusions. The methodology for the investigation began with a pilot study that was conducted in ten households at Mbali Township in Pietermaritzburg. Thereafter, the researcher and the research assistants refined the research instruments before using them for data collection. The data collection method used was the in-depth interview technique which involved the face-to-face researcher-administered questionnaires (Shepherd and Achterberg, 2000). Each objective for the study was interrogated using the appropriate questionnaire as the research instrument in the order as seen in table one (see Table 3.1) in this chapter.

Table 3.1 Outlining the research objectives, methodology, research instruments and analysis

Objectives	Methodology	Research instruments	Analysis
1. To determine the Anthropometric and Socio-Demographic status of the sampled black South African women in Pietermaritzburg. **This facilitated the investigation to:** - determine the women's anthropometric status - assess whether lifestyles were sedentary/active - determine the applicable key variables – such as: - marital status; gender; race; grant recipient etc. **Sedentary lifestyles are linked to:** **-** raised BMI - overweight/obesity - ownership of assets like television (TV) - access to electricity, - drinking water and toilet facilities. - whether food is bought or produced from gardens - whether food supplies are sourced from supermarkets, local shop/market. **Various research findings indicate:** - shift of traditional food systems and - change of dietary patterns - high ingestion of ultra-processed products - ultra-processed food/drink products the key issue - Big Food dominate food & beverage environment - Big Food implicated in unhealthy eating globally and - concurrent rapid rise in obesity and related NCDs.	**Qualitative Research Methodology:** - Survey-based research to elicit information - semi-structured questionnaires - researcher administered questionnaires - focus group research technique - interactional discussion to gather complex perceptions **Target Population and sample:** - Black South African women of child-bearing age -18 years and older residing in Pietermaritzburg - 452 women sampled excluding the pilot study - rural, urban and peri-urban areas or Townships - ten households from Mbali township for the pilot study - plus 73 black women in focussed group discussions **Research site:** Edendale Shopping Centre, Pietermaritzburg. **Sampling:** **-** Non-probability useful for exploratory research **-** non-probability purposive method adopted - purposive sampling seeks specified participants - participants be deemed relevant to research goals - participants to generate data on research question	**The Anthropometric data sheet for BMI, WHR, WC and the Socio-demographic questionnaire.** Provide indicators of the severity of overweight and obesity. **The standard BMI measures are:** -below 18.5 - Underweight -18.5 to 24.9 - Normal/healthy weight -25.0 to 29.9 – Overweight -≥30.0 and above - Obese (Redden, 2017; WHO 2010) **The waist-hip ratio (WHR) is:** - an important measure of central obesity - ratio of the circumference of waist to that of the hips **The Socio-demographic questionnaire:** - to determine the applicable key variables - such as race, gender, grant recipient etc. - to determine sedentariness of lifestyle	**For the Anthropometric analysis:** Descriptive statistics including means and standard deviations using SPSS were used, to measure the anthropometric status. The chi-square goodness of fit test was used to see if a significant number of the sample fell into any category of overweight and obesity. **For the socio-demographic analysis:** Frequencies were presented in tables and graphs for the key socio-demographic variables such as marital status, gender and race. Binomial test was used to test for a theoretical probability and making assumptions so that on the basis of the distribution one can make inferences.

2. To assess the status of food security/insecurity at household level among the sampled women. **Food insecurity is associated with:** - inadequate food availability - inadequate access to food - inappropriate food consumption/utilisation - unhealthy eating habits - increased >BMI levels and overweight/obesity	- Women of child bearing age, from 18 years and above -From rural, urban and peri-urban areas -Convenient selection of participants - Research site: Edendale shopping centre.	**The Household Food Insecurity (Access) Scale (HFIAS) questionnaire**, for measuring the three generally accepted domains of food security viz.: 1. Adequate food availability at household level. 2. Adequate access to food by all people. 3. Assess appropriate food consumption or utilization by all using a 30-day recall period	For HFIAS analysis, frequencies were presented in tables and graphs. The chi-square goodness of fit test was used
3. To assess the nutrition security/ insecurity at household level of the sampled women. **Nutrition insecurity is associated with:** **- restricted economic access to healthy food.** **- limited dietary diversity** **- distorted dietary patterns** **- price dependent food choices** **- unhealthy eating habits** **- increased >BMI levels and overweight/obesity**	Same as above	**The Household Dietary Diversity Score (HDDS)** is a survey instrument based on 12 food-groups administered to determine household economic access to food. -It is based on a 24-hour recall	For HDDS analysis, descriptive statistics including means and standard deviations and percentages were used.
4. To determine the women's nutritional knowledge by assessing their perceptions and understanding of obesity and its association to ill health **Western diet is characteristically:** - highly processed - energy-dense with high fat, sugar & salt content. - low nutrient value and long shelf-life - often promoted to ensure affordability and appeal **Traditional African diet is associated with:** - mostly coarse grains from the garden - mostly has high fibre content	A series of six focus group discussions with black African women: -rural youth 18-35 years of age -between 6 & ten people in each focus group -both rural youth groups were from Elandskop. -One group of over 35-year-old women from KwaQanda. -Three urban focus groups from Maykhethele Youth Community service programme. -homogenous group all with matric or more.	**Focus Group Interview Guide (Annexure E)** to determine women's perceptions towards obesity. Main aspects discussed were: -traditional Zulu words for obesity -perceptions about obesity -what it means to be obese -what makes people obese? -Anything bad about obesity? -Anything good about obesity?	The focus group discussion schedule was used for analysis

*FOOD AND NUTRITION TECHNICAL ASSISTANCE

The qualitative and quantitative research approaches generally employ their respective 'research protocols' including the tools and techniques employed according to each disciplines (Lues and Lategan, 2006). Those research methodologies, whether it is a qualitative research approach or quantitative approach, should endeavour to objectively achieve the aims and objectives of the study (Lues and Lategan, 2010).

Qualitative research methodologies often adopt methods of data collection such as indepth interviews, content analyses, participant observation and focus group interviews (Sheperd and Achterberg, 1991).

Quantitative research approaches on the other end rely mostly on statistical data and measuring variables to assess the magnitude (Leus and Lategan, 2006).

The main research instruments, their description and justification were as detailed in the (Table 3.1) outline of the research objectives, methodology, instruments and the analyses.

3.3.1 The research instruments

The study employed the survey-based research design from individuals who were able, willing and nearly representative of the larger population (Hofstee, 2013). Data were obtained by using existing research instruments which were mainly questionnaires that had been used previously to conduct interviews in similar studies (Hofstee, 2013).

The researcher-administered questionnaires and the semi-structured focus group interview guide were the main research instruments used in the current study. Those tools were used to interrogate the research question which is an assertion that: *'nutrition transition distorts people's food choices and dietary patterns, leading to overweight explosion and the obesity pandemic.* The four main research instruments used in the study were: a) The Anthropometric data sheet and the Socio-demographic questionnaire; b) Household Food Insecurity (Access) Scale (HFIAS); c) The Household Dietary Diversity Score (HDDS) and d) The Focus Group dicussionP Guide.

a) The Anthropometric data sheet and the Socio-demographic questionnaire

The Anthropometric data sheet provided tools for measuring different measures of obesity using the body-mass index (BMI), the waist-to-hip ratio (WHR) and the waist circumference (WC) (Yin Lee *et al.,* 2008; Yang, *et al.,* 2017). The BMI was recognised by the World Health Organisation (WHO) as a measure to define the severity of overweight and obesity as well as measuring of waist circumference (WC) and waist-to-hip ratio (WHR) (Ying Lee, 2007). Nevertheless, the ideal end-points for gauges of overweight and obesity and measures of abdominal obesity differ according to ethnicity and population groups, making it difficult to have cut-off points that could be applied worldwide (Qiao and Nyamdorj, 2010).

Despite discrepancies and controversies about which anthropometric measure was best, the recommendations of the WHO Expert Consultation (2011) were that the anthropometric measures (BMI, WHR and WC) were predictive of the risk of chronic diseases. The WHO Expert Consultation (2011) also pointed to the positive association between obesity and the risk of developing type-2 diabetes and cardiovascular (CVD).

BMI referred to current weight in kilograms, divided by height² (m²), thus Metric BMI Formula is BMI = weight (kg) / height² (m²) (Redden, 2017). The international references for BMI measurements were: underweight as BMI of less than 18.5 kg/m²; normal weight is 18.5 kg/m² to 24.9 kg/m²; overweight is defined as BMI of 25.0 kg/m² to 29.9 kg/m² and obesity was defined as a BMI of ≥30 kg/m² (Hammond & Litchford, 2012).

On completion of the interview, each research participant was measured for the waist-hip ratio (WHR), which was the ratio of the circumference of waist to that of the hips, to get the measure of central obesity. Besides calculating how much weight one is carrying, WHR could also indicate susceptibility to several health issues including high blood pressure, heart disease and diabetes (Redden, 2017).

The WHR results (Table 3.2) serving as an indicator chart, adopted the standards used by the German Society for Sports medicine and Prevention (DGSP) (Redden, 2017). WHR was calculated thus:
- Taking a measurement from the normal waist-line and the broadest part of the hips.
- Divide the perimeter of the waist by that of the hip.
-Equate to the results chart to determine the anthropometry of the participant.

Table 3.2 Waist-to-hip ratio Standard

Men	Women	
<9.90	<0.80	normal weight
0.90 to 0.99	0.80 to 0.84	overweight
1.0+	0.85+	obesity

Adapted from: Redden, (2017:2/3)

The Socio-demographic questionnaire provided some key variables such as race, gender marital status, information on government grant recipients and lifestyles of the women (Peer *et al*., 2014). Those variables could also suggest the socio-economic status of women which would determine their economic access to nutritious food.

b) The Household Food Insecurity (Access) Scale (HFIAS)

This instrument measured the adequacy and availability of food at household level (Coates *et al.,* 2007; Ghebreyesus *et al.,* 2015; Knueppel *et al.,* 2009). It was developed by the Food and Nutrition Technical Assistance (FANTA) of the United states Agency for International Development (USAID) (Swindale and Bilinsky, 2006). As a tool commonly used for measuring food insecurity at household level, the intention was to capture the experience of food insecurity through the administration of a set of questions about different 'domains' of food insecurity (Chaparro, 2012). The main domains of food insecurity examined were: adequate food availability, adequate access to food by all people and appropriate food consumption/utilisation by all people (Chaparro, 2012).

HFIAS was administered using structured questionnaires with nine occurrence and nine 'frequency-of-occurrence' questions. Participants were asked how often the occurrence happened in the previous four weeks, with three response options for frequencies (1= rarely, 2 = sometimes, 3 = often) (Chaparro, 2012). The responses to the questions in the 9-item questionnaire scale were used to create a continuous numeric food insecurity 'score', which was then computed to establish cut-points to categorise the level of food insecurity experienced by the household (Chaparro, 2012).

As a research tool HFIAS had been shown to have explored relations of food insecurity and obesity, and confirmed that food insecurity and obesity continue to be strongly and positively associated in women (Franklin *et al.,* 2012). Nonetheless there are some

studies that maintained mixed evidence of positive association between food insecurity and obesity across age and gender groups (Franklin *et al.,* 2012). Also, some research on whether there was a statistically significant relationship between food insecurity and obesity provided mixed results, as some found positive associations, while others found no relationship (Food Research and Action Centre (FRAC), 2015). Despite those controversies and contradictions, variances were often mediated by gender, age, and race or ethnicity, with the strongest and most consistent evidence being a higher risk of obesity among food insecure women (Food Research and Action Centre (FRAC), 2015).

HFIAS was established for developing country settings such as Pietermaritzburg, enquiring about the anxiety and uncertainty of household food supply, insufficient quality, insufficient food intake and physical consequences (Chaparro, 2012). It was also easy to administer as people could determine if they had adequate food, access to food and had access to appropriate consumption over the previous month period. As no one would like to be seen to be poor, the researchers had to be sensitive and empathetic in asking the questions, so as not to embarrass the respondents.

As a research tool HFIAS was therefore useful for measuring food security at household level. Household food insecurity negatively affected food consumption, either through reduced quality or quantity of food, and could potentially worsen the nutritional status within households (Chaparro, 2012).

c) The Household Dietary Diversity Score (HDDS)

The Household Dietary Diversity Score (HDDS) questionnaire is a research tool that was used to determine a household's economic access to diet quality (Leroy *et al.,* 2015). It was also employed for individual dietary diversity scores for women or children to assess their micronutrient adequacy (Leroy *et al.,* 2015).

The HDDS survey instrument was developed by the Food and Nutrition Technical Assistance (FANTA) and the Food and Agriculture Organisation of the United Nations (FAO) (Kennedy *et al.*, 2013). Because of significant challenges encountered in measuring household food access for reporting purposes, there was need to build consensus on appropriate household food access impact indicators (Swindale and Bilinsky (2006). The HDDS, as an indicator guide, provided an approach to measure

household dietary diversity (DD), a proxy measure of household food access and the socio-economic level of the household (Swindale and Bilinsky (2006). This was a simple food group diversity indicator advocated for wide population-level use, in resource-poor settings (Food and Agriculture Organisation of the United Nations (FAO) and FHI 360, (2016), which made it suitable for the current research in Pietermaritzburg.

The HDDS survey instrument was based on 12 food-groups administered to get information related to household economic access to food, targeting persons under the same roof who share meals (Standing Committee on Nutrition (SCN), (no date). The DD indicator was recognised as a key measurement of diet quality and was reflected in the food-based dietary guidelines (Arimond *et al.,* 2011). It reflected the concept that, increasing the variety of foods and food groups in the diet ensured adequate intake of essential nutrients (Arimond *et al.,* 2011). HDDS as an instrument focussed on the '*utilisation'* aspect of food insecurity, to check if there had been occurrences of inappropriate food consumption during the 24-hour recall period of the study.

The HDDS also exposed the extent of nutrition insecurity experiences at household level, using dietary diversity (DD) as a proxy indicator for food insecurity (Ghattas, 2014). During the administration of the questionnaire, households included foods eaten by any member of the household and excluded foods purchased and eaten outside the home (Kennedy *et al.,* 2011).

The HDDS was therefore a proxy indicator for food insecurity, as it reflected the extent of household economic access to a diet with higher dietary energy, which was one dimension of household food security (FAO and FHI 360, 2016; Ghattas, 2014). As a proxy measure, it was suitable enough for a community such as the one under investigation to assess the socio-economic status at household level (Swindale and Bilinsky, 2006). The rationale for choosing HDDS questionnaire was to gain in-depth information about the socio-economic levels of households regarding the economic access to food (Swindale and Bilinsky, 2006).

Some probing helped to elicit more information, especially on mixed dishes such as stews where items such as tomatoes, onions, condiments and oils could be omitted by default (Swindale and Bilinsky, 2006).

d) Focus group Interview Guide

The researcher collected data to determine the women's perceptions of obesity by using an original Focus Group Interview Guide as a research instrument. It was a short semi-structured questionnaire used for gathering the participants' subjective definitions, understanding and interpretations of a phenomenon (e.g. obesity), to elicit their personal perceptions. Given the high levels of obesity and the association of obesity to risk factors such as diabetes and cardiovascular diseases, it was critical to find out whether the participants could associate obesity with ill-health (Creswell, 2009; Shepherd and Achterberg, 1992).

As a qualitative data collection research technique, the focus groups helped the researcher to glean the demographic information that might be uniquely Black African and to understand their perceived culturally acceptable norms of obesity. This was done in relaxed settings (Kitzinger, 1995). The semi-structured Focus Group Interview Guide was also used to provide guidance and focus on the topic (Gill *et al.*, 2008), whilst allowing for flexibility in discussing it. It also provided the researcher with a guided, interactional discussion platform as a means of generating details of the women's perceptions of obesity.

3.3.2 Data

The data had been obtained by interviewing the research participants using the research instruments, as outlined in section 3.3.1 above (The Anthropometric data-sheet and the Demographic Questionnaire; the HFIAS Questionnaire; the HDDS Questionnaire and the Focus Group Interview Guide). That raw data were captured into a spread sheet and computed for statistical analysis using the Statistical Package for the Social Sciences (SPSS) programme (George and Mallery, 2011). The purpose of analysing that raw data using the quantitative statistical analysis was to allow for description and inferences. Thus, the study had adopted the mixed methods of qualitative and quantitative approaches. The computed data were used to describe the characteristics of the sample and values of important variables (e.g. the percentage of grant recipients, which might be an indicator for food insecurity at household level).

a) Population sampling

Sampling is a means of obtaining a portion of the survey population (Finn *et al.,* 2000; Henning *et al.,* 2010). A sample is thus a sub-set of the population selected for investigation (Finn *et al.,* 2000). The main objective of sampling was to get a representative selection (e.g. a woman member of the household in the current study was selected as a unit), identified from households within the survey population for the reliability of data obtained (Finn *et al.,* 2000).

Population sampling was also the process of selecting research participants who would be willing to take part in the study (Henning *et al.,* 2010). The sampling approach was based on non-probability purposive sampling (Shepherd and Achterberg, 1992). That approach generally sought participants with specified characteristics (e.g. Black woman), and behaviours that were deemed relevant for the research (Shepherd and Achterberg, 1992). As the study was exploratory, the non-probability sampling approach was appropriate in determining whether nutrition transition distorted the sampled women's food choices and dietary patterns.

Non-probability sampling suggested that not all people in the target population had an equal chance of being selected (Finn *et al.,* 2000). In that instance, only Black African women were eligible for selection as they provided a population pool from which a sample that was assumed to be representative of the population could be chosen. In that sampling approach, the interviewer asked the next but one Black African woman to participate in the survey as they went past (Finn *et al.,* 2000). Only the willing participants were interviewed.

Other sampling techniques that could be used for the study included:
1. The theoretical sampling, also used for qualitative research when initial findings suggest the need for additional input (Shepherd and Achterberg, 1992). With the theoretical approach, sampling continues until additional interviews fail to provide any fresh insights into what was being investigated (Shepherd and Achterberg, 1992).
2. The probability sampling was often associated with quantitative research and was a technique which ensured random sampling, where every person had equal chance of being interviewed in the study (Finn *et al.,* 2000).

3. The non-probability sampling described earlier had varieties such as the convenience sampling, where researchers use whatever sample was available within the target population, often aimed at cutting costs (Finn *et al.,* 2000; Henning *et al.*, 2010; Wisniewski, 2006). The non-probability sampling could also include varieties like the strategic informant sampling such as the expert choice sampling, which asked judgements of experts (Finn *et al.,* 2000). The snowball sampling, a technique whereby the next person would be pointed out by the previous participant if there was need for further data (Finn *et al.,* 2000; Henning *et al.,* 2010).

b) Defining the target population

The target population identified by the researcher was from the rural and urban areas of Pietermaritzburg. They had been asked to participate in the current study as they went shopping at the Edendale Shopping Mall (henceforth the Mall). The participants involved were only those who consented and signed the informed consent form. They had to be in charge or responsible for running the household. They were predominantly from around Pietermaritzburg, of child-bearing age, from 18 years and older.

c) The sample size and the research site

1. The sample size was 452 participants from rural, urban and peri-urban areas of Pietermaritzburg. Sampling had continued until it seemed to be repetitive, which indicated that saturation point had been reached.

2. Data collection took place at the main entrance of the Edendale Shopping Mall during the week and some month-ends. The Mall was the central point, where most people from various communities came to replenish their monthly household supplies. It provided the researcher with a suitable research site with proximity from the bus and taxi rank, the Edendale Hospital and various fast-food outlets. The Mall also had an outside amphitheatre with a big television screen (potentially for advertising purposes) but also provided some form of entertainment for the people hanging around. The centre also attracted government grant-recipients (old-age and child-grant) to replenish their monthly household supplies from the two supermarkets within the Mall and to use the banking facilities and other convenience stores.

3.3.3 Analysis

As earlier stated, data were analysed using the SPSS programme (George and Mallery, 2011) which was identified as a powerful tool for conducting data analysis in the social sciences. At the end of the data collection period, data were captured, checked and results computed, using the SPSS which suited the mixed methods of qualitative and quantitative approaches employed in the study. The qualitative technique had been adopted in terms of the instruments and information gathering approaches. Information was captured into the spread-sheet for each instrument and statistical analysis done. To convert the captured raw data into information appropriate for analyses, various tests were done such as descriptive statistics, chi-square and binomial tests.

Descriptive statistics including means and standard deviations: helped the researcher to determine typical variations on the issues measured. The use of percentages in summarising quantitative data in well-constructed tables or graphs helped in achieving clarity. Rather than including raw scores in tables or graphs, percentages clarified and facilitated comparisons, particularly if the table or graph included more than one variable or option (Finn *et al.,* 2000). The issues such as the percentages of those households that had someone getting the government grant were determined and frequencies were represented in tables or graphs (Figure 4.1 in Chapter 4).

Chi-square was used for goodness-of-fit-test: This was a univariate test used on a categorical variable to test whether any of the response options were selected significantly more or less often that the others. The examples where the HFIAS questionnaire assessed whether there was '*ever worry about the household not having enough food'* or there was never any worry about insufficient food.

Binomial test: Those tests use common theoretical probability for analysing a distribution of whether a substantial quantity of respondents nominated one of the likely two answers - e.g. a significant proportion indicated that in the past 4 weeks they worried that there was sometimes not enough food (65%, $p<.0005$). If those results showed a probability of p which is small and therefore the result is not likely to be due to chance, the meaning was that the result (65% or $p<.0005$) in a sample is likely to exist in the population (Finn *et al.,* 2000). Thus, if the inferential statistics yield a value of 0.05 or less, then the result was said to be significant, and unlikely to have occurred by chance (Finn *et al.*, 2000).

3.4 Limitations

Some of the limitations in the study were the inability to measure and test if the participants had any of the NR-NCDs. In addition, because the research site was in a public place at the Edendale Shopping Mall, near the taxi rank with people moving in all directions, it would not have been possible to conduct such tests. Within the research team (six post-graduate students from the University of KwaZulu-Natal who were trained in Dietetics), there was no skilled technician who could have tested the participants, even if the space for testing was available. As the research site was in an open place, the researchers had to be sensitive and show compassion when asking questions about food and nutrition insecurity at household level. That included the *'tone of voice'*, which had to be lowered to show understanding of their plight. That sometimes interfered with the interview as someone known to the participant would distract or try to eavesdrop on the conversation between the researcher and the interviewee. The researchers were always vigilant to avoid that.

3.5 Ethical Considerations

The Ethical Clearance Certificate (Protocol reference number: HSS/0518/016D) for the current research had been approved by the UKZN's Humanities and Social Sciences Research Ethics Committee (Annexure G, Ethical Clearance Approval Certificate).

Those who consented to undergo interviews were invited to the research site. The research would be explained to the participants, and that in no way would their names feature in the study, to protect and respect their confidentiality. Then, the informed consent letter would be given, and signed by those willing to undertake the interview. The participants were aware that they were at liberty to decline undergoing the interview. Those who participated were interviewed at their own volition. While there was minimal potential for harm in the current study, all reasonable attempts had been made to counteract any harm whatsoever.

3.6 The elements associated with the nutrition transition *(Figure 3.1)*

The nutrition transition could be drawn from the global food environment and its core elements such as transnational food companies (TNCs) together with the workings of the foreign direct investments (FDI) with the nation states like SA. The strategy of the TNCs or Big Food within the host country would often involve FDI where TNC or Big Food open mega stores where they aggressively market and promote ultra- processed products such as vegetable oils, sweetened calorific beverages and other products with cosmetic additives with high salt content and long-shelf life such as ready to consume meat-like products with various names. The in-store promotions would make those products available, accessible and affordable to all, hence the high consumption of those highly processed products. When settled in the host country Big Food promoted high consumption of those highly processed products and general adoption of the so-called western diet.

The observable signs of nutrition transition tended to be upward trends in the BMI development and the growth of NR-NCDs such as obesity. The most affected by the nutrition transition tended to be the poor, both urban and rural dwellers, mostly Black women. Their lifestyles tended to be sedentary as they watch television more than before. Their diets often changed as they tended to abandon their indigenous foods for the highly processed products made accessible by Big Food at affordable rates and available to all.

3.7 Conclusion

The current chapter sought to outline and present the research tools and techniques that the entire study adopted in its quest to respond to the problem statement which highlighted the problem of obesity and the role played by nutrition transition in people's food choices and dietary patterns. The major focus was on the research design and methodology, outlining the research objectives and how the research instruments would be used to interrogate each of those objectives. All those activities were undertaken to highlight and raise awareness about obesity and the linked NR-NCDs associated with the global nutrition transition. The diagram (Figure 3.1) demonstrates how the nutrition transition evolved globally and locally.

Most affected by Nutrition Transition

The poor; rural/urban dwellers; mostly black women; ownership of consumer durables like TV; sedentary lifestyles; abandonment of indigenous foods

NR-NCDs

Cardio-vascular diseases; obesity; type-2 diabetes; some cancers; high blood pressure

Elements Associated with Nutrition Transition

High consumption of energy-dense low nutrient diets

High oil content, sugar and salt in food and drinks

Easy availability of affordable highly processed products

Adoption of western diet; Sedentary lifestyle; Traditional foods abandoned

Global Food Environment Nutrition Transition

Transnational Food Companies

Foreign Direct Investments (FDI)

Marketing and promoting foods with long shelf-life

Ultra-processed products with high salt/oil/sugar content

Energy-dense foods and drinks

Calorific sweeteners

Figure 3.1 The Nutrition Transition Framework as captured by the Author

Chapter 4

Results

4.0 Introduction

This chapter presented the findings of the research, by means of graphs and tables from the data captured, in the sequence of table 3.1. The order was: The Anthropometric Data Sheet and the Socio-demographic questionnaires, the Household Food Insecurity (Access) Scale (HFIAS), the Household Dietary Diversity Score (HDDS) and the Focus Group Discussion Guide complemented by Key informant interviews.

The anthropometric data sheet provided information on the status of body composition of the research participants, using the body mass index (BMI), the waist-to-hip ratio (WHR) and waist circumference (WC) to measure the severity of obesity among participants in the current study. The socio-demographic questionnaire provided information on some key variables of the research participants such as socio-economic status and general lifestyle. They ranged from marital status, government grant recipients, and ownership of consumer goods such as television (TV) set.

The HFIAS questionnaire was used to measure food insecurity at household level by posing questions that explored if there was adequate food availability; adequate access to food by all people and appropriate utilisation and consumption of food (Chaparro, 2012). It was based on a 30-day recall period.

The HDDS questionnaire was meant to reflect the economic ability of a household to access a variety of foods using dietary diversity (DD) which is a qualitative measure of food consumption that could reflect household access to a variety of foods (Kennedy *et al.*, 2011). HDDS was based on 12-food groups administered to get information on household economic access to food, over a 24-hour recall period. A lower socio-economic status within a household suggested a higher probability of food and nutrition insecurity at household level.

A Focus Group discussion guide was used to conduct interviews to collect data. They were complemented by traditional key informants' perspectives.

4.1 The Anthropometric and Socio-Demographic Information

The anthropometric data helps to inform on the extent of body fatness using BMI (Yin, Lee *et al.,* 2008), the waist-to-hip ratio (WHR) and waist circumference (WC). The WHR and the WC are important measures of central obesity and could also indicate the person's susceptibility to several health issues including high blood pressure, heart disease and diabetes (Redden, 2017). (Yang *et al.,* 2017). The socio-demographic information, on the other hand, provided information of the key variables such as gender, the marital status of participants, grant recipients and ownership of consumer durables, and how those were associated to the anthropometric status.

4.1.1 The anthropometric status using BMI, WHR and WC

The anthropometric status of the sampled Black African women was measured using:

1) The body mass index (BMI): As a measure, it generally provided details about the body composition levels and presented information on the anthropometric status. Despite challenges about its universal applicability and usefulness, BMI "*has been shown to correlate closely with body fat, irrespective of age, sex and ethnicity*" (Muralidhara, 2008:97). It had been used in the classification of obesity, also because it is easy to calculate, non-invasive and could be used on large numbers of subjects in population studies (Muralidhara, 2008).

The results of the BMI for the current study were calculated by using the international recommendations where the participants' current weight in kilograms was divided by the height in metres squared (kg/m²) (Case *et al.,* 2003). According to those international calculation standards, the BMI below <18.5kg/m² indicated underweight; >18.5kg/m² to 24.9kg/m² was normal or healthy weight; from >25.0kg/m² to 29.9kg/m² was overweight; whilst a BMI of more than ≥30.0kg/m² was obese (Hammond & Litchford, 2012: 166).

The BMI values were calculated from the measured data. The findings reflected significantly high levels of obesity, at 90.7% among the sampled women (Figure 4.1).
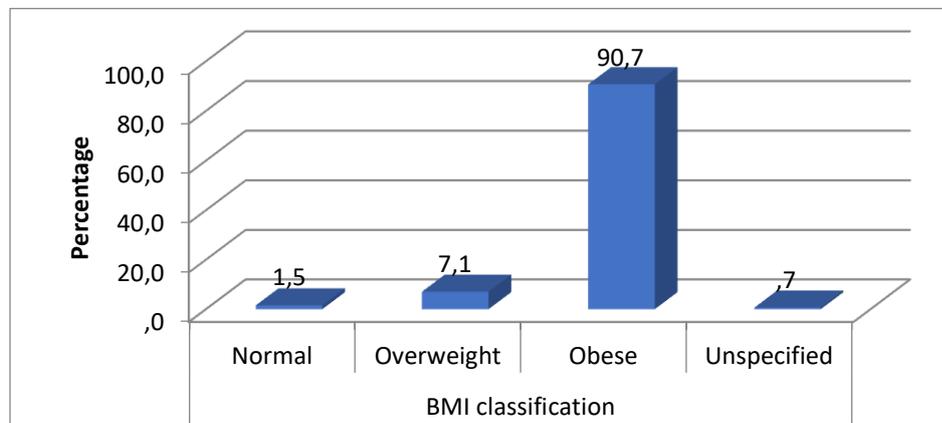
Figure 4.1 BMI Result

2) The waist-to-hip ratio (WHR) and waist circumference (WC):

The WHR is the ratio of the circumference of waist to that of the hips, to get the measure of central obesity. The Redden (2017) chart (Table 4.1) presented a standard to assess both the WHR and the WC to determine the extent of the abdominal fat mass. They can also indicate the person's susceptibility to several illnesses associated with obesity (Redden, 2017).

Table 4.1 Redden' s Waist-to-hip Ratio Chart

Men	Women	
<9.90	<0.80	normal weight
0.90 to 0.99	≥0.80 to 0.84	overweight
1.0+	≥0.85+	obesity

Adapted from: Redden, (2017:2/3)

The WHR and the WC both measured the excess fat in the abdomen of participants, using a non-stretch metal tape-measure. The standard measures adopted were the ethnic specific values for Sub-Saharan Africans, to which the sampled

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Pietermaritzburg women belonged (Alberti *et al.*, 2006b). Those measures were adopted from the European and North American cut-points of ≥ 80cm for overweight and obesity in women (Alberti *et al.*, 2006b).

According to the data on the sampled Black African women, the average for waist circumference (WC) was 106.74cm (Table 4.2), which was even higher than the ethnic specific waist circumference values of ≥ 80cm cutoff-points for women from the European and North American cutoff-points (Alberti *et al.*, 2006b). The 106.74cm mean values for women in the current study were comparable to the values of overweight and obesity on the Redden (2017) chart.

Table 4.2. Results for BMI & Waist Circumference

	N	Minimum	Maximum	Mean
weight(kg)	451	59.00	180.00	99.3312
height(cm)	450	134.00	179.10	159.1660
waist(cm)	**452**	**68.00**	**180.00**	**106.7438**
hip(cm)	452	88.00	187.00	125.8496
Valid N (list wise)	449			

The BMI averages, as reflected in figure 4.1 at 90.7 %, were found to fall on the obese category, 7.1% were on the overweight category and only 1.5 were of normal weight.

4.1.2 The Socio-demographic status

The socio-demographic information generally referred to the characteristic features that describe and distinguish groups of people as unique and homogenous. In the case of the current study, the participants were women of child-bearing age, who oversaw food preparation in their households. The sample was fairly homogenous as they were of the same race or ethnic group, the same culturally, linguistically and geographically from the rural and urban areas of Pietermaritzburg.

Selected socio-demographic variables of the women and their interactive association to food and nutrition insecurity and overweight and obesity prevalence, were analysed. Some of the key variables examined were marital status, receiving of social grants and ownership of consumer durables.

a) Marital status or gender as a socio-demographic variable

The significance of marital status or gender of women was analysed as a possible predictor for food poverty and food insecurity at household level. The proportion of female-headed households in the current study was 66.1%, made up of 57.3% unmarried women, while 8.8% were separated (Table 4.3).

A study by Rose and Charlton (2002) found that over half of female-headed households in their study lived in food poverty compared with 39% of male-headed households. The higher rates of food poverty seen among female-headed households were highest among those headed by Africans at 56%, and lowest among households headed by Whites at 3% (Rose and Charlton, 2002).

Another study observed that the concentration of poverty was more pronounced among Blacks, particularly Africans at 61% (May, 1998). These findings were collaborated by a study of poverty in SA, which emphasised that some groups of South Africans experienced poverty more intensely than others (Armstrong *et al.,* 2008). Those groups "are Blacks, female-headed households … and the inhabitants of rural areas, Kwa-Zulu-Natal …" geographically where the current study was conducted in Pietermaritzburg] (Armstrong *et al.,* 2008: 23). A study on poverty, inequality and deprivation in SA was of the view that poverty had a very strong racial dimension, concentrated among the African population, much higher in rural areas and among female-headed households (Klassen, 1997).

The diets of female-headed households were often associated with low cost, energy-dense foods, closely related to poverty, poor education, and lack of access to productive resources and heavily dependent on remittances and social grants (Klassen, 1997).

Table 4.3 Marital Status of participating African women

		Frequency	Percent
Valid	unmarried	259	57.3
	Married	152	33.6
	Separated	40	8.8
	Traditional marriage	1	.0.2
	Total	452	100.0

Drewnowski (2009) presented a hypothesis of how poverty might be linked to obesity and primarily attributing it to financial variables, where unhealthy foods charge less whilst the endorsed better foods cost more. Highly processed, energy dense foods tended to be chosen by the poor, often in female-headed households with limited budget allocations. The married women might be benefitting from the additional income generated by the male partner or spouse.

b) *Social grants as a socio-demographic variable*

Social grants are meant to improve standards of living and to redistribute wealth in order to generate a more equitable social system, in line with Sections 24 and 29 of the bill of rights of the South African Constitution (Kelly and GoundUp Staff, 2017).

Having a social grant recipient in a household is an indicator of a low socio-economic status and a possible predictor of food insecurity at household level. Social grant systems could be viewed as targeting the poor in an attempt to redress the past injustices that affected the African people the most (Leibbrandt et al., 2007).

The system of social assistance, previously called the State Maintenance Grant, had been awarded by the previous government to mothers without partners to support them and their children (Case *et al.,* 2003). Before 1994, the programme excluded African women and only opened later to Africans living in some parts of the country, until reconfigured in 1996 by the new government, and in 1998 the State

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Maintenance Grant was phased out (Case *et al.,* 2003)*.* That was replaced with a means-tested Child Support Grant awarded to primary care givers of poor children up to the age of seven years [now up to18 years] (Case et al., 2003). The uniqueness of the government social grant system in SA was that it provides a non-contributory means-tested pension to all women and men over the age of 60, as well as social grants to children in poor households (Schatz *et al.,* 2011).

The graph (Figure 4.2) showed that 65.5% of the research participants got a government grant of some kind, which indicated that such families had been means tested for poverty and found to need support. That scenario might portray a possible vulnerability to food poverty. Poverty could adversely affect food security, which occurred when there was adequate food availability, adequate access to food by all people, and appropriate food utilisation and consumption (Chaparro, 2012).
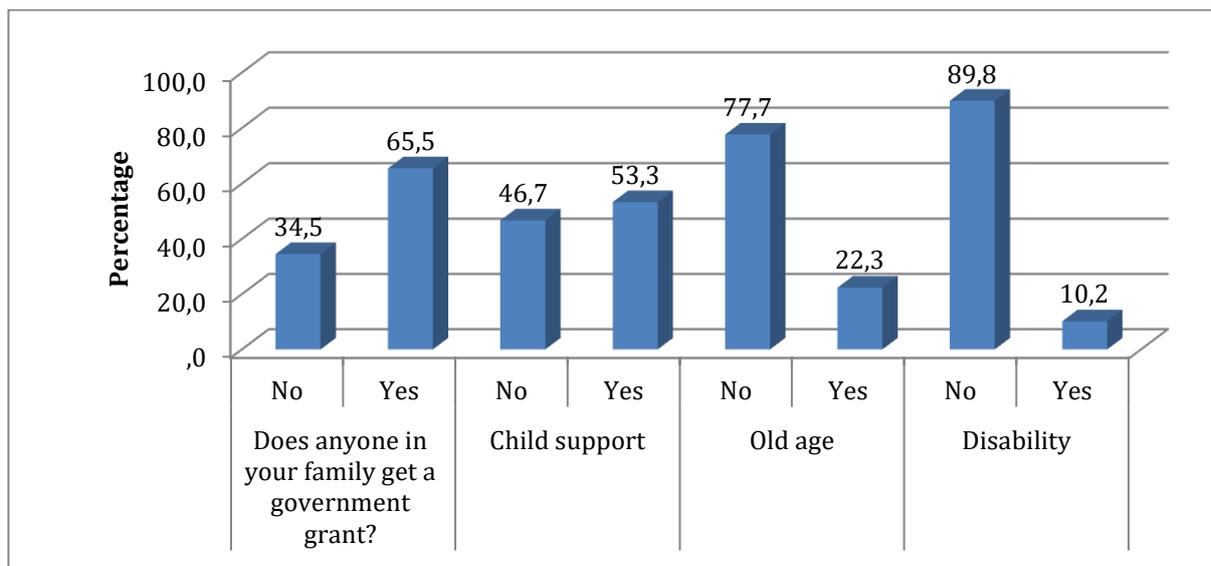
Figure 4.2 Information on Government grant recipients.

c) Ownership of consumer durables as a socio-demographic variable

The ownership of consumer goods like refrigerators, electric stoves and television sets (TV) reflected shifts from traditional African life to a modern one that embraces 'western' lifestyles and diets. Urbanisation and the global nutrition transition are associated with modern industrial society, linked to shifts from traditional diets in favour of the western type (Hawkes, 2007).

The graph (Figure 4.3.) represented the extent of the possession of consumer durables characteristic of the modern lifestyle. The high percentage of TV ownership had often been associated with sedentary lifestyles, as TV advertisements influence lifestyles, including the food types in both rural and urban areas. That seemingly extended to the adoption of the western diet with its high fat and sugar content, and is highly implicated in the global overweight and obesity epidemic. While 60.6% of the participants had a vegetable garden in their homes, most of them said they could not use it productively for a variety of reasons, including lack of funds for fencing it, lack of water for the vegetable garden, and neighbour's animals and chickens invading their gardens.
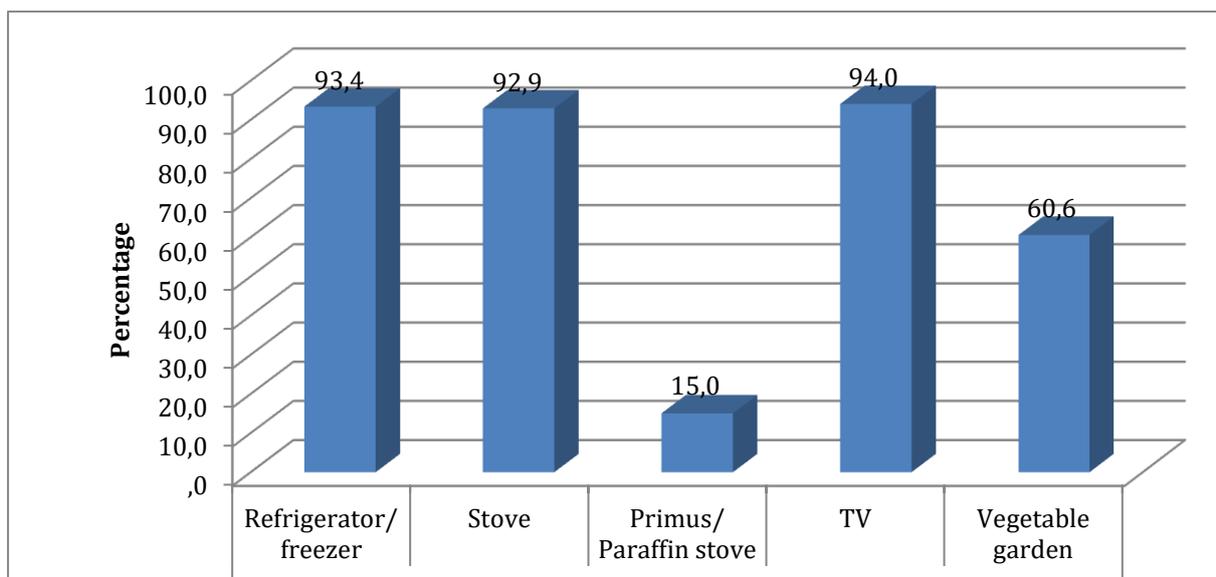
Figure 4.3. Consumer goods ownership reflecting lifestyles.

4.2 The Household Food Insecurity (Access) Scale (HFIAS)

The Household Food Insecurity (Access) Scale (HFIAS), as a household food insecurity instrument, was designed to be used cross-culturally. It had been developed by the US Agency for International Development (USAID)-funded Food and Nutrition Technical Assistance (FANTA) Project (Knueppel *et al.,* 2009: 360). That instrument helped to pose nine occurrence- and nine frequency of occurrence-

questions to measure the level of food insecurity in the past 30 days (Medanth, 2015).

Among the sampled women 65.9% reported the occurrence of food insecurity in the past 30 days, where they were anxious that their households did not have enough food. Almost half (41%), reported that it happened sometimes (i.e. three to eight times in the past four weeks), whilst 9.3% reported that it happened often (more than ten times in the past four weeks).

Table 4.3. The occurrence and frequency occurrence of food insecurity

Occurrence	Valid		Percent
In the past four weeks, did you worry or get anxious that your household/family would not have enough food?	No	154	34.1
	Yes	298	65.9
	Total	452	100.0
Frequency of occurrence			
How often did this happen?	0	154	34.1
	Rarely	68	15.0
	Sometimes	188	41.6
	Often	42	9.3
	Total	452	100.0

Question 2. of HFIAS, asking whether the household could not eat the kinds of food they wanted because of lack of resources, 76.1% reported 'yes' on the inability to eat the kinds of foods they wanted to eat because of lack of resources (Table 4.4).

On the frequency of the occurrence, 14.6% reported it rarely happened, 48% reported the incidence happened sometimes, while 13.5% reported 'often'.

Table 4.4 The occurrence and frequency of occurrence of lack of resources (e.g. money)

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Occurrence	Valid		Percent
In the past four weeks were you or any of your household or family members not able to eat the kinds of food you preferred because of lack of resources?	No	108	23.9
	Yes	344	76.1
	Total	452	100.0
Frequency of occurrence			
How often did this happen?	0	108	23.9
	Rarely	66	14.6
	Sometimes	217	48.0
	Often	61	13.5
	Total	452	100.0

The 76.1% reporting the existence of lack of resources (table 4.4), suggested a possibility of food insecurity at household level.

On the occurrence of eating a limited variety of food due to lack of resources, 69.9% reported the occurrence of such an incidence with varying levels of frequency of occurrence.

Table 4.5 The occurrence and frequency of limited variety of food

Occurrence	Valid		Percent
In the past four weeks did you or any household/family member have to eat limited variety of foods due to lack of resources?	No	136	30.1
	Yes	316	69.9
	Total	452	100.0
Frequency			
How often did this happen?	0	136	30.1
	Rarely	69	15.3
	Sometimes	189	41.8
	Often	58	12.8
	Total	452	100.0
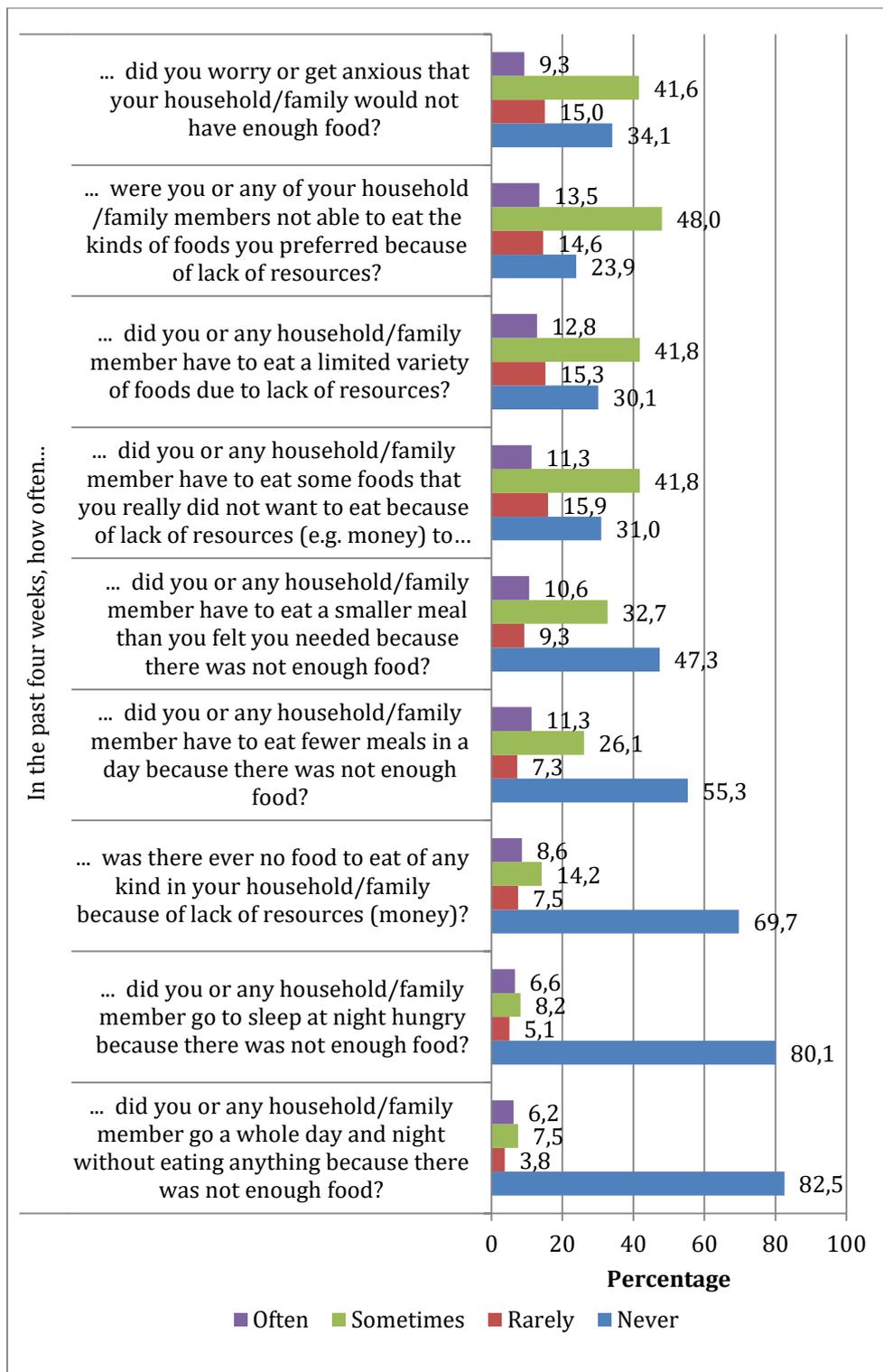
Figure 4.4. HFIAS results which are described in the following page.

The summary of the HFIAS findings as presented in the graph (Figure 4.4):

Figure 4.4 is the graphic image of food insecurity using the HFIAS. Where there was an occurrence, it was summed up (e.g. often, sometimes, rarely) into one incidence represented by a percentage.

In the past four weeks because of lack of resources:

- 65.9% worried that their households would not have enough food.
- 76.1% were not able to eat the kinds of food they preferred.
- 69.9% had to eat a limited variety of foods.
- 69% reported eating some foods that they really did not want to eat.
- 52.7% at varying levels, ate smaller meals.

Significantly, 30.3% had experienced '*not having' food of any kind*', 19.9% experienced *'going to bed hungry'* while 17.5% '*had gone day and night without eating'* all because of lack of resources (totalling 67.7%). That was serious given that food security existed when *"people always have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life* (Labadarios *et al.,* 2011).

The HFIAS results provided pointers regarding the possibility of food insecurity among the sampled women because of lack of resources at household level, like money. Poverty might have compelled women to consume highly processed products with long shelf life, often sold at promotional prices by supermarkets. Highly processed products tended to be energy-dense with a high fat, sugar and salt content associated with western diets and nutrition transition and highly implicated in the global overweight and obesity epidemic and its related NR-NCD like diabetes, cardio-vascular diseases, some cancers and more.

Nonetheless, the results of the current study found no link between obesity and food insecurity because the food secure participants as well as the food insecure ones were equally obese.

4.3 The Household Dietary Diversity Score (HDDS)

The HDDS was a tool for assessing access to food and its utilisation over a 24-hour recall period (Swindale and Bilinsky, 2006). It is a nutrition insecurity indicator that could reflect in a snapshot, the economic ability of a household to access a variety of foods (Kennedy *et al.,* 2013).
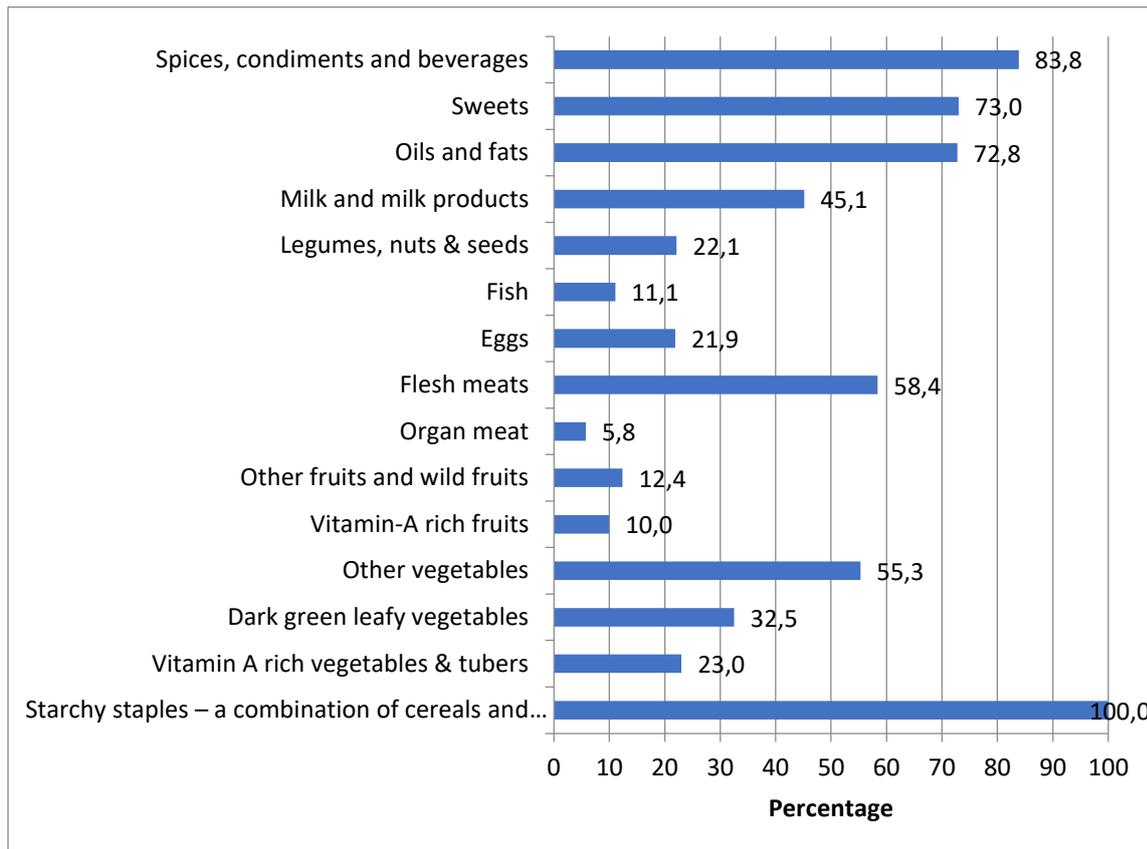
Figure 4.5 Summary of HDDS results

The graph (Figure 4.5) represented a summary of the foods the households had consumed over the 24-hour recall period. The HDDS results showed that the sampled women had easier access to certain significant food groups:

a) 100% of the sampled women ate a combination of starchy staples,
b) 83.8% had consumed beverages, spices and condiments,
c) 73% had consumed sweets, and
d) 72.8% had consumed oils and fats.

Notably, the sampled women's starchy staples' diet such as corn/ maize, rice, wheat and potatoes portrayed a typical '*monotonous' diet* with inadequate dietary diversity (DD) (Arimond *et al.,* 2010). The other three significant food groups they had more consumed, were the ultra-processed, energy-dense food groups, associated with the nutrition transition and the global overweight and obesity epidemic. Those were the beverages such as tea (with sugar) spices and condiments (high salt and sugar content) and fats and oils associated with the global obesity epidemic and the attendant NR-NCDs.

It is important to note that not all fats and oils are unhealthy, as some like Omega-3 fatty acids, have a lot of good derived from their protective effects against some of the NR-NCDs such as heart diseases (Sinclair, 2000). The Omega-3 fatty acids play key roles such as being the precursors of chemical messengers which control important biochemical actions, including blood pressure and clotting, immune reactions and inflammation. On the other extreme, the high consumption of unhealthy fats which could be classified as saturated and trans fatty acids from animal fat, was always associated with the risk of coronary heart diseases and other NR-NCDs (Corbett, 2003).

The energy-dense foods were some of the main risk factors for obesity as such foods comprised highly refined grains, added sugars and fats, and highly palatable, but with diminished satiation, resulting in 'passive over-consumption' and overall high energy intakes (Drewnowski and Specter, 2004). It might be that the low satiety levels of energy-dense foods could be implicated of indirectly encouraging overconsumption of those foods associated with overweight and obesity globally and locally.

4.4 Focus groups

The perceptions of obesity among the focus groups seemed to be influenced by their traditional and cultural beliefs. Such a view seemed to be collaborated by key informants. Seemingly, the word 'obesity' did not exist in their language. The notion of obesity would be a descriptive word that was admired as signifying either beauty or wealth. That was notwithstanding the well-publicised global obesity epidemic and its association with NR-NCDs.

4.5 Conclusion

The research findings indicated the possibility of the presence of food and nutrition insecurity among the sampled women from Pietermaritzburg. The subsequent chapters (5, 6, 7, and 8) would present a detailed analysis of each set of the findings in the order of: a) Anthropometric and the Socio-demographic information, 2) the Household Food Insecurity (Access) Scale (HFIAS) and 3) the Household Dietary Diversity Score (HDDS) as well as 4) the Focus Group Discussion Guide complemented by key informants and, lastly 5) the conclusion, as chapter 9.

Chapter 5

The Anthropometric status and the Socio-Demographic Factors as Determinants of Overweight and Obesity

Abstract

Objectives: To measure the anthropometric status and the socio-demographic factors as determinants of overweight and obesity among the sampled women.

Methodology: The anthropometric data sheets to measure the body-mass index (BMI), the waist-to-hip ratio (WHR) and the waist circumference (WC) were used to assess the anthropometric status. For the socio-demographic factors, socio-economic variables such as government grant recipients, female-headed households and ownership of consumer durables were used.

Results: Results showed that: 90.7% of the sampled women had BMI ≥ 30.0kg/m² (obese); 7.1% had BMI >25.0kg/m² - 29.9kg/m² (overweight) and 1.5% had BMI >18.5kg/m² - 24.9kg/m² (normal or healthy weight). Data on the sampled women showed the average WC of 106.74cm.

Conclusion: The prevalence of overweight and obesity could be associated with the behavioural factors of individuals adopting the western lifestyles and diets associated with energy-dense food consumption as well as sedentary lifestyles.

Keywords: Obesity; nutrition transition, sedentary lifestyle; highly-processed products

5.1 Introduction and Background

The fact that obesity is a major risk factor for chronic NCDs had been well established in literature (Flegal *et al*., 2013; Shisana *et al*., 2013). In South Africa (SA) the trends were growing by 25% for overweight and 40.1% for obesity in females (Shisana *et al.,* 2013: 9). The study further sought to find out what was unique about the Black Pietermaritzburg women (henceforth, Black/sampled women), that made them to be more susceptible to BMI ≥ 30.0kg/m² (Hammond &

Litchford, 2012: 166) than other race groups within the country. The current chapter used the anthropometric status and the socio-demographic variables to explore the determinants of overweight and obesity among the sampled women, and further investigated if nutrition transition had a role through sedentary lifestyles.

In SA, overweight and obesity, characterised by high BMI levels in both adults and children, were rapidly becoming a public health concern (Igumbor *et al.,* 2013). There was also a coexistence of underweight, overweight and obesity in same households, commonly known as the burden of malnutrition, which was prevalent in SA (Ghattas, 2014). The seemingly paradoxical undernutrition and overweight could emerge from the same root causes namely, poverty and food insecurity (Ghattas, 2014).

Whilst the BMI is commonly used by the World Health Organisation (WHO) to express the extent of body fat across communities (Barba *et al.,* 2004; Lee *et al.,* 2008), its universal applicability was challenged by some scholars (Bhurosy and Jeewon, 2013; Zhu *et al.,* 2002). Potential pitfalls identified (WHO, 2004) were the relationship between BMI and body fat percentage that could be altered by environmental influences such as physical activity levels, gender and ethnicity (Bhurosy and Jeewon, 2013). Regardless of such challenges, which might even seem contradictory, BMI continued to be commonly used for anthropometric evaluation and "has been shown to correlate closely with body fat, irrespective of age, sex and ethnicity" (Muralidhara, 2008:97).

5.2 Materials and Methods

5.2.1 Study area and subjects

The study area comprised various communities from and around Pietermaritzburg. The surveys were conducted at the Edendale Shopping Mall, which was one of the main and easy-to-access shopping centres for the surrounding townships and rural communities. It was frequented by communities such as, Mbali, Edendale, Sweetwaters, Elandskop, Kwa-Qanda, Mpendle and Maykhethele Community and beyond. Appropriate permission from the Edendale Shopping Mall Management was applied for and granted before the research could commence. A specific spot just outside one of the main entrances to the mall was identified as the research site.

That area provided the research team with a constant flow of potential participants. The shopping centre also attracted government grant-recipients who came for their monthly purchases at the two supermarkets, banking facilities and other amenities within the Mall. They formed part of the potential participants.

5.2.2 Data collection procedures

The research instruments for the study were the anthropometric data sheet to measure the BMI status of the participants and the socio-demographic questionnaire. The waist-to-hip ratio (WHR) and the waist circumference (WC) measures were taken to determine the extent of the abdominal obesity. The abdominal obesity was usually a predictor for metabolic syndrome associated with chronic diseases. The WHR and the WC in conjunction with the BMI measures assessed the overall anthropometric status of the research participants. The participants who agreed to be interviewed were requested to sit with a research assistant to go through the interviewer administered questionnaires. They had been informed that they were free to withdraw at any time and they had signed an informed consent form to show their willingness to take part in the research.

The research team consisted of six post-graduate students from the University of KwaZulu-Natal (UKZN), who had been trained by the researcher and introduced to the research topic and the research instruments. The instrument was refined numerous times during the training of the research assistants. Thereafter, the team went to pilot the study in ten households at Mbali Township where the research teams went from house to house conducting the interviews with consenting participants within those households. After that initial survey period, there was need for further refining of the research instrument before it could be used for data collection.

One of the key observations after the pilot study was the need for control of sensitive influence in answering questions. Participants seemed reluctant to relate their state of poverty and food insecurity when someone else could overhear the conversation. That would ensure that participants were not listened to by outsiders when responding to the questions. That was particularly the case when questions about food and nutrition insecurity at household level were asked. At first participants were

embarrassed by their food and nutrition insecurity status and the researcher devised a strategy of lowering the tone of voice to mitigate their unease. The researchers' 'tone of voice' was lowered to show empathy to their plight and enabled them to freely share their food and nutrition insecurity status.

5.2.3 Statistical analysis

After data had been captured, descriptive statistics, including means and standard deviations, were used to determine the BMI levels of the sampled women and the variations on the measured socio-demographic variables, such as the percentages of households with some government grant-recipients. Frequencies were presented in tables and or graphs (graph 5.1).

5.3 Results

The results for the assessment of the anthropometric status and the socio-demographic factors were presented to determine the prevalence of overweight and obesity among the sampled women. They (the results) would also be assessed to see if they (the sampled women) were undergoing a nutrition transition.

5.3.1 The Anthropometric status

The anthropometric status was assessed using the indicators and measures that had been used before, namely body mass index (BMI), waist – hip ratio (WHR) and waist circumference (WC), regarded as predictive of the risk of chronic diseases (World Health Organisation (WHO), 2011). WHO stated that any of the two measures (WHR and WC), could be used alone or in conjunction with BMI in situations adhering to the WHO recommendations. In the current study the anthropometric status of the sampled women was determined by applying those three measures of assessment.

The BMI was adopted in conjunction with the WHR and WC, as anthropometric measures that were recommended by WHO (2011). The BMI was also suitable for the study because it was less invasive and one of the most commonly used measures of weight-related health risks (Bhurosy and Jeewon, 2013). It is also one of the least expensive measures and was quite easy and practical to use in most settings (Bhurosy and Jeewon, 2013; Zhu *et al.,* 2002).

BMI was generally calculated by using the participant's current weight in kilograms, divided by height in metres squared (kg/m²) (Case *et al.,* 2003; Bhurosy and Jeewon, 2013). The classification of BMI, according to WHO's (2013) recommendations, was thus: the BMI below <18.5kg/m² = underweight; >18.5kg/m² to 24.9kg/m² = normal or healthy weight; from >25.0kg/m² to 29.9kg/m² = overweight and BMI of ≥30.0kg/m² is obese (Bhurosy and Jeewon, 2013; Hammond and Litchford, 2012:166).

In the current study the BMI data were computed and analysed to provide information on the anthropometric status of the sampled women (Table 5.1.)

Table 5.1 Anthropometric Data

	N	Minimum	Maximum	Mean	Std. Deviation
weight(kg)	451	59.00	180.00	99.33	19.47572
height(cm)	450	134.00	179.10	159.16	6.04307
waist(cm)	452	68.00	180.00	106.74	14.55657
hip(cm)	452	88.00	187.00	125.84	14.41322
BMI	452	≤ 24	≥ 40	≥ 37	
WHR	452	0.77	0.96	0.85	
Valid N (list wise)	449				

Descriptive statistics, including means and standard deviations, were also used as part of methods to measure the anthropometric status of the sampled women. Another test used to see if a significant number of the sample fell into any category, was the chi-square goodness of fit test. The results showed that a significant proportion of the sample could be classified as obese, ($\chi^2(2)$ = 681.332; 90.7%, p<.0005). The prevalence and trend in obesity shown by the current results seemed consistent with data from three different studies on adult Black women in the 1990's which showed that the prevalence and trend were on an upward trajectory (Bourne *et al.,* 2002). Those studies revealed the prevalence of obesity (BMI ≥30 kg m⁻²) of 34.4%, 53.1% and 53.4% (in Bourne *et al.,* (2002).

Alternative methods for assessing anthropometric status such as WHR and WC which assisted in reflecting central obesity, were also highly recommended as potentially superior to BMI in predicting disease risk (Browning *et al.*, 2010; Huxley *et al.,* 2009). Both the WHR and the WC are important measures of abdominal obesity. The International Diabetes Federation (IDF) adopted the WC and the WHR as more precise predictors of obesity-related cardiovascular risks, even challenging the BMI in diagnosing metabolic syndrome (Huxley et al., 2010).

In the current study both WHR and WC were measured in the results that showed the average waist circumference (in cm) for the sampled women as 106.74 (Table 5.2.). Both the WHR and WC were significantly higher ($p \leq 0.0005$) than the accepted standard, and this was to be expected, considering the BMI levels. The ethnic specific values for waist circumference for Sub-Saharan Africans, to which the sampled women belonged, use both the European and North American cut-points of ≥ 80cm for women (Alberti *et al.*, 2006b) because of lack of appropriate data in African populations (Crowther and Norris, 2012). They challenge the usage of values for waist circumference cut-points of ≥80cm that were derived from European subjects, and that they should be increased to 91.5cm for Black women. They provided data from 1251 African females from Soweto in Johannesburg where the prevalence of obesity was 50.1%, type-2 diabetes 14.3% and metabolic syndrome 42.1% (Crowther and Norris, 2012).

Table 5.2. Descriptive Statistics for Central Abdominal Obesity

	N	Minimum	Maximum	Mean
waist(cm)	452	68.00	180.00	106.7438
hip(cm)	452	88.00	187.00	125.8496
Valid N (list wise)	449			

5.3.2 Socio-demographic variables

The socio-demographic variables that could be associated with the overweight (BMI ≥25) and obesity (BMI ≥30) epidemic were selected. Some of them were: marital status, social grant recipients and ownership of some consumer durables that were associated with sedentary lifestyles and westernisation.

1) Marital status as a socio-demographic determinant of overweight and obesity.
The marital status of women was viewed as a predictor for food poverty and food insecurity, as indicated by studies that showed that the concentration of poverty was more pronounced among female-headed households of Africans (Woolard 2002). Ivers and Cullen (2011) highlighted the issues of poverty and low income and the likely adverse implication for the health and nutrition in those households, and their disproportionately deprived economic status (Ivers and Cullen, 2011). Further concurring with that view, Caesar *et al.* (2013) found that on average the household income in most female-headed households was R24, 420 per annum from social grants (Caesar *et al.,* 2013). Given that people got means tested to qualify for social grant, the implication was that those households might have been dependent on government social support, an indicator for possible household poverty.

Given the low income levels among female-headed households (Caesar, 2013) the significance of marital status could be a proxy predictor for food poverty, a state of financial inability to afford and access nutritious food, rendering the household food and nutrition insecure. Woolard (2002) asserted that in general the deprivation levels indicated that more Africans, rural dwellers and members of *de facto* female-headed households tended to have the most concentration of poverty. Rose and Charlton (2002) concurred, pointing that food poverty rates were highest among households headed by Africans, affected by decreasing income, increasing household size, in rural areas or households that are headed by females. Data from the current study showed that out of the 452 Black women in the sample, 57.3% were unmarried, and thus less likely to be food secure (given Rose and Charlton as well as Woolard's assertions), while 8.8% were separated, making the total number of female-headed households to be 66.1% of the sample (Table 5.3.).

Table 5.3. Marital Status of African women

		Frequency	Percent
Valid	unmarried	259	57.3
	Married	152	33.6
	Separated	40	8.8
	Traditional marriage	1	.2
	Total	452	100.0

In a poverty report by Statistics South Africa (2017), 55.5% of the population were estimated to be living at below the upper-bound poverty line (UBPL) which was less than R992 South African Rands per month (Abrahams *et al.,* 2018). Consistently, the proportion of females living below the UBPL did not decline, even though fluctuations in the prevalence of living below the UBPL existed, e.g. – in 2006 it was 68.9%; in 2009 it was 63.9%; in 2011 it got to 54.9% and in 2015 that prevalence of living below the UBPL went up to 57.2% (from 54.9% in 2011) (Statistics South Africa (StatsSA), 2017). That finding lent credence to the earlier stated R24, 420 per annum finding by Caesar *et al.* (2013) among female-headed households. Those findings equally exposed that most of those single female-headed households were prone to poverty, given their dependence on the government social grant for their income.

The diets of female-headed households were often associated with the low-cost energy-dense foods, attributable to economic factors within such households (Drewnowski, 2009; Moodie *et al.,* 2013; Monteiro *et al.*, 2013). Sartorius *et al.* (2015) also asserted that SA was undergoing a rapid epidemiological transition, as confirmed by the increased magnitude of obesity estimated at 31.8% for Black women. Other studies (Micklesfield *et al.,* 2013; Kruger *et al.,* 2005), reported a much higher prevalence of obesity among African women. Also, the national survey of 1998 that was done in all population groups in SA, reported that more than half of women were overweight or obese, with increases more observable among Black urban African women (Kruger *et al.,* 2005). Yet another study of 554 economically

active South African adults, showed that 56.4% of White men studied were overweight or obese, 49.3% of Black men and 74.6% of Black women were overweight or obese (Kruger *et al.,* 2005).

2) Receiving social-grant as a socio-demographic variable

Out of the 452-sampled women, a significant proportion indicated that someone in their family got a government grant of some kind (65%, p<.0005) which was a precursor for poverty within a household. Armstrong *et al.* (2008), in their study, asserted that grants were a very important source of income for the poor households. Confirming the significant role of the grants, Armstrong *et al.* (2008: 21), stated that:

> *"… 69.4% of the households in the first quantile and 69.9% of those in the second quantile reported that they earned income from grants; the main source of income for 47.7% and 51.0% of the households in these quintiles"*

The maximum age of Child Support Grant beneficiaries had been increased from 15 to 19 years (Makiwane, 2010). The then value of the Child Support Grant was increased from R70 to R250 per child, per month (Makiwane, 2010). The eligibility for the Child Support Grant was based on specific demographic and socio-economic criteria (Makiwane, 2010). The members who received some form of social grant had been graded by a means test to assess their vulnerability to poverty, a likely precursor to food insecurity at household level.

3) Ownership of some consumer goods as a socio-demographic variable

The ownership of the consumer goods such as refrigerators, electric stoves, and television sets (TV) indicated shifts from traditional ways of life to the western life-styles. Bourne *et al.* (2002) supported the view that with urban exposure, South Africans were abandoning traditional diets associated with low prevalence of degenerative diseases, in favour of a western diet.

The results found that a significant proportion indicated that in their family they owned a refrigerator or freezer (93%, p<.0005); a significant proportion owned and

used an electric stove (93%: p<.0005). The ownership of the fridge, freezer and electric stove were pointers to urban lifestyles which might have inadvertently propelled people to follow the western ways of diet away from their traditional staples, and towards diets with high fat, sugar and salt content as results in Chapter 7 showed.

The study also found that a significant 85% did not use primus or paraffin stoves (85%: p<.0005), an indicator that they used electric stoves more often. The electricity usage, as opposed to paraffin, was an indicator of the western influence among the sampled women.

A significant proportion owned a television (TV) (94% p<.0005), which was often associated with sedentary lifestyles exposing them to advertisements from television, and which tend to promote highly processed food items and energy-dense beverages.

Whilst a significant number (61%; p<.0005) said they owned vegetable gardens at their homes, nonetheless most of the participants reported that they could not plant any vegetables, citing various reasons, ranging from not being properly fenced, lack of water, not having time to do gardening as well as not having funds to buy seedlings.

5.4 Discussion

The race or ethnicity of the study participants had been defined from the target population classified as Black within the South African context. This group represented 80.9% distribution according to the mid-year population estimates for SA by population group and sex for 2018 (Statistics SA, 2018). Also, this grouping tended to live in impoverished neighbourhoods, according to Bourne *et al.* (2002).

The author's assertion is that the anthropometric results that indicated high levels of BMI could be associated with poverty levels within households. Lack of financial means to purchase nutritious food leaves them with no option, but to purchase whatever they could afford.

The socio demographics, such as marital status, often leave female-headed households with one source of income compared to households with a male partner who could bring home additional income. Their main source of income from social grants suggested that they belonged to a lower socio-economic status and, therefore, are likely to be food and nutritionally insecure.

The ownership of consumer goods could be associated with 'western' lifestyles as the urban and rural communities similarly acquire household goods like TV, electric stoves and fridges. Such lifestyles tend to be associated with the global nutrition transition characterised by changes in the food eaten, and implicated in the obesity prevalence globally.

The presence of socioeconomic disparities in the prevalence and spread of obesity in SA was said to be a well-established finding and had been previously confirmed (Alaba and Day (2014; Cois and Day, 2015). The concentration of poverty and lower socio-economic status (Stuckler *et al.,* 2012; Caesar *et al.,* 2013), were consistent with the pattern of obesity trends that followed a socioeconomic gradient and racial ethnicity (Drewnowski and Specter, 2004). Caesar *et al.* (2013), suggested that marital status of household members in their study indicated that nearly 70% of the participants were unmarried.

5.5 Conclusion

The anthropometric measures in the current study indicated that a significant proportion of the sample had high BMI index. That position might expose them to adverse risk factors aggravated by unhealthy behaviours which are associated with limited financial resources within households and subsequent consumption of unhealthy diets linked to overweight and obesity.

Chapter 6

Assessment of Food Insecurity as a Determinant of Overweight and Obesity

Abstract

Objectives: The study sought to assess the extent of food insecurity at household level among the sampled Black African women, and to determine if that had an impact on their anthropometric status.

Methodology: A structured interview technique for a 30-day recall period to gather information on the occurrence and the frequency of the incidence of food insecurity, using the Household Food Insecurity (Access) Scale (HFIAS) questionnaire.

Results: The results showed no correlation between food insecurity and BMI as almost all women had very high anthropometric measurements. That was confirmed by the results that showed that the *'food secure'* (≥39.46 BMI) and the *'severely food insecure'* (≥39.61 BMI) had the highest BMI values, even though all groups had very high anthropometric values (≥39 BMI; p<.643).

Conclusion: Food insecurity and obesity could be complex and multifactoral, as it might be determined by the economic variables at household level, including lack of access to financial resources, subsequently opting for the affordable, energy-dense and highly processed products renowned to be obesogenic. That context of nutrition transition characterised by the adoption of western lifestyles and associated with NR-NCDs such as obesity and others might have occurred concurrently with food insecurity among the sampled women.

Keywords: food insecurity, nutrition transition, obesity.

6.1 Introduction and Background

Food insecurity had been declared a global crisis with more than 814 million people in developing countries undernourished, of that, 204 million were in Sub-Saharan Africa, including South Africa (SA) (Labadarios *et al.,* 2005). SA as a middle-income country had adequate food supplies at national level to feed the country's inhabitants (Altman *et al.,* 2009; Modirwa and Oladele, 2012). Nonetheless, food insecurity was evident among large segments of the population, resulting from multiple structural household food insecurity problems including widespread chronic poverty (Altman *et al.,* 2009). That was confirmed as Modirwa and Oladele (2012) stated that SA ranked among countries with the highest rate of income inequality in the world with extremely high levels of poverty.

Food insecurity affected households' ability to afford nutritious food (Provincial Health Services Authority (PHSA) and PROOF Food Insecurity Policy Research, 2016). The female-headed households and those reliant on social assistance were particularly vulnerable to, and experienced food insecurity (PHSA and PROOF Food Insecurity Policy Research, 2016). The association of female–headed households with poverty came in various guises including the fact that they were disproportionately represented in the poorer areas of the city (Caesar *et al.*, 2013).

The government of SA tried to engage in various integrated approaches to ensure delivery of food security programmes (RSA, 2014) that had been through the implementation of Integrated Food Security and Nutrition Programmes and approval of the National Policy on Food and Nutrition Security and the Household Food and Nutrition Strategy in 2013 (RSA, 2014).

Nutrition transition generally indicated shifting of food preferences from indigenous traditional diets characterised by high fibre and low-fat content to the so-called 'western' diet associated with nutrition-related non-communicable diseases (NR-NCDs), the most obvious being obesity (Ervin *et al.,* 2014). In developing countries like SA, shifts were rapid, and communities also faced the diseases of malnutrition, such as stunting, whilst obesity was also prevalent, resulting in a double-burden of disease (Bourne *et al.,* 2002).

Farrell *et al.* (2017) also emphasised how, in recent decades, food insecurity was also linked to overweight and obesity and not only the well-known cause of undernutrition and stunting. They referred to what they called the five '*mechanisms*' (M) and '*contextual*' factors (C) that potentially influenced the '*outcome*' (O) which was the development (or not) of overweight and obesity. The five CMOs were viz.:

M1) the affordability of the energy-dense foods;

M2) quantity and diversity of food consumed;

M3) spatial-temporal access to nutritious food;

M4) Interpersonal distribution of food, e.g. marital status of women in households and gender; and

M5) non-dietary behaviour (that could be a sedentary lifestyle).

Those CMOs, as advocated by Farrell *et al.* (2017), provided insights into how some people consumed more ultra-processed and energy-dense foods despite their known association with obesity, particularly in the low and middle income countries (LMICs) like SA. They referred to the interplay of social and circumstantial factors that determined whether food insecurity lead to underweight and or obesity, stressing that the outcome relied on '*mediators*' (socio-demographic factors), such as gender and marital status. Thus, the contribution and the role of transnational corporations (TNCs) or 'Big Food' in the spread and increased consumption of ultra-processed products became an issue (Monteiro and Canon, 2012).

Some of the context-mechanism-outcomes (CMO), as articulated by Farrell *et al.* (2017), seemed to be aligned with the socio-demographic factors and the nutrition transition that disproportionately impacted the poorest sections of society, particularly females in disadvantaged communities (Nazmi and Monteiro, 2013; Sartorius *et al.,* 2015; Swinburn *et al.,* 2011). In SA the high consumption of ultra-processed products in the context of nutrition transition characterised by dietary shifts from traditional staples had become an economic and affordability option that provided quantity and diversity [except that such energy-dense food tended to be detrimental to health, predisposing people to overweight and obesity] (Farrell *et al.,* 2017; Monteiro and Canon, 2012).

The problem of ultra-processing and its association with overweight and obesity deserved some brief explanation. Monteiro (2010) and Monteiro (2009) differentiated between three forms of processing: - Group One related to minimal processing of whole foods, where food remained recognisable and its nutritional values not altered. Group Two was of substances extracted from whole foods including oils, fats, flours, pastas, starches and sugars, most of those were not consumed by themselves, but often used as ingredients in domestic food preparation. In Group Three, Group Two foods become transformed to become raw material bases for ultra-processed foods (Monteiro, 2009). Thus, Group Three is made up of Group Two substances to which either no, or relatively small amounts of minimally processed food from Group One was added, plus salt and other preservatives and cosmetic additives for flavour and colour (Monteiro, 2009; Moodie *et al.,* 2013). Transnational corporations (TNCs) were said to be major drivers of those ultra-processed products which were reported as highly implicated in the obesity epidemic worldwide (Moodie *et al.*, 2013; Monteiro, 2010).

Most ultra-processed products had a high energy-density including hyper-palatability, that tended to confuse the human appetite regulation mechanisms and energy-balance, leading to passive overconsumption and obesity (Monteiro, 2010). Issues of food insecurity and affordability might potentially lure some communities in low- and middle-income countries (LMIC) like SA to opt for those highly processed, energy-dense products as TNCs ensured their affordability (Farrell *et al.,* 2017). The problems of ultra-processed products on health led to the World Health Organisation (WHO) (2012) at the (2011) United Nations (UN) high-level meeting to present a case for the need to prevent NCDs in LMIC.

Transnational corporations were thus major drivers of NCD epidemics as they profited from increased consumption of ultra-processed food and drink products classified as unhealthy commodities (Moodie *et al.*, 2013). Communities in LMIC like SA were often exposed to ultra-processed food and drink products which were precursors to the increased risks of chronic NCDs such as obesity (Moodie *et al.*, 2013). The World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) (2007) provided evidence that in 2001, chronic disease accounted for 53.9% of deaths in SA with infectious diseases, maternal, perinatal, and nutritional

conditions accounting for 40.2% while 5.9% of deaths were due to injuries. Those data illustrated the extent of the impact of nutrition transition and its associated highly processed products implicated in the global overweight and obesity epidemic.

6.3 Materials and Methods

6.3.1 Methodology and design

Food insecurity was measured by the Household Food Insecurity (Access) Scale (HFIAS), which was previously developed based on validation studies in eight countries including the United States (Coates *et al.,* 2007). The current study adopted qualitative approaches through researcher administered interviews, using the HFIAS questionnaire to assess the status of food insecurity at household level among the sampled Black women. The methodology used the HFIAS instrument which consisted of nine occurrence questions and nine frequency of occurrence questions. The questionnaire enquired if households had any problems with food access, availability and utilisation in the 30-day recall period.

6.3.2 Study area and subjects

The study focused on Black African women from households in rural, urban and peri-urban areas of Pietermaritzburg. The sample size was 452 participants who were females, 18 years and older.

Data collection took place at Edendale Shopping Centre, where most people from those communities went for their household and shopping supplies. The shopping centre was near the taxi rank, Edendale Hospital and drew local people to the centre from rural, urban and peri-urban areas or townships.

6.3.3 Statistical analysis

The HFIAS survey instrument was used to create indicators that provided information on food insecurity (access) at household level over the previous four weeks (30-day recall period), calculated for each household by summing the codes for each frequency-of-occurrence question (Coates *et al.,* 2007). The nine occurrence questions related to the three domains of food insecurity (access) and the nine frequency questions determined the extent of food insecurity, to assign to categorical designations of either *food secure,* or *mildly, moderately or severely food*

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insecure (Coates *et al.,* 2007). The binomial test and the Chi-square goodness-of-fit test were used for analyses. The binomial tested whether a significant proportion of respondents selected one of the possible two responses. The Chi-square goodness of-fit-test was used on a categorical variable to test whether any of the response options were selected significantly more/less often than the others.

6.4 Results

6.4.1 Analyses of the three different domains of food insecurity (access)

a) Inadequate access to food: A significant proportion (66%) indicated that in the past four weeks they worried and were anxious that their households or families would not have enough food (p<.0005).

b) Inappropriate food utilisation: In the past four weeks, a significant 76% of the sampled women were not able to eat the kind of foods they preferred because of lack of resources (p<.0005), while a significant 70% had to eat a limited variety of foods due to lack of resources (p<.0005). A significant 69% had to eat some foods that they really did not want to eat because of lack of resources (p<.0005).

c) Inadequate food availability: In the past four weeks, a significant 55% reported that they never had to eat fewer meals in a day because there was not enough food (p<.027), while a significant 69.7% reported that there had never been no food of any kind because of lack of resources (p<.0005). Also, a significant 80% reported that they never went to bed hungry because there was not enough food (p<.0005), while a significant 83% reported that they never went a whole day and night without eating anything because there was not enough food (p<.0005).

6.4.2 Household Food Insecurity Access Scale Score

The household food insecurity (access) score was assessed using the responses from the household food insecurity (access) measures that were computed using SPSS, to provide values for the extent of food insecurity (access).

The HFIAS was consolidated so that each person had an insecurity score calculated, and the average of the Household Food Insecurity Access Scale Scores established.

Average HFIAS Score for the sample:

$$= \frac{(Q1a \ + \ Q2a \ + \ Q3a \ + \ Q4a \ + \ Q5a \ + \ Q6a \ + \ Q7a \ + \ Q8a \ + Q9a)}{Total\ number\ of\ households}$$

$$Average\ HFIAS\ Score \ \ = \frac{4016}{452}$$

Average HFIAS Score = 8.9

Maximum HFIAS Score = 27

HFIAS occurrence questions had to determine the three different domains of food insecurity (access), which were: *adequate access to food*, which related to anxiety and uncertainty about the household food supply; *adequate food availability*, relating to insufficient food intake and its physical consequences, and *appropriate food consumption and utilisation,* which related to insufficient quality, including variety and preferences of the type of food (Coates *et al*., 2007).

6.4.3 Measuring the occurrence of adequate access to food

It was established that a significant 66% of the sampled women indicated that in the past 4 weeks they worried that there was sometimes not enough food for their household (X^2 (3) = 127.186, p<.0005); household members were sometimes worried that they would not have enough food to eat. The question on the occurrence of anxiety about "adequate access to food" was computed thus:

"In the past four weeks, did you worry that your household would not have enough food?

$$Worry\ about\ food = \frac{Number\ of\ households\ with\ response \ = \ 1\ to\ Q1}{Total\ number\ of\ households\ responding\ to\ Q1}\ X\ 100$$

$$"Worry\ about\ food" \ \ = \frac{298}{452}\ X\ 100$$

"Worried about food" = 65,9% of the sampled women.

6.4.4 Measuring adequate food availability

Overall, the results on the domain of *'adequate food availability'* from the current study seemed to suggest that there were consistently some quantities of food for a significant 69.7% of the sampled women. That percentage reported that in the previous recall period there was never no food to eat of any kind in their household.

6.4.5 Measuring appropriate food consumption and utilisation

The current study found that a significant 76% of the sampled population indicated that in the past four weeks' recall period, their household members were not able to eat the kinds of foods they preferred because of lack of resources (X^2 (3) = 139.416, p<.0005); whilst a significant 70% of households had to eat limited variety of foods due to lack of resources (X^2 (3) = 99.699, p<.0005). Also, a significant 69% of family members had to eat some foods they really did not want to eat because of lack of resources such as money (X^2 (3) = 106.460, p<.0005). The results from *'appropriate food consumption or utilisation'* indicated that even though there might have been adequate food availability, the quality and variety of such food, including preferences, might have rendered it of 'insufficient quality or inappropriate food consumption'.

6.4.6 Categories of food insecurity

The Household Food Insecurity Access Prevalence (HFIAP) is the indicator of food insecurity status which could be used to report the household food insecurity (access) prevalence (Coates *et al.,* 2007). In the current study, the HFIAP was used to determine the food insecurity prevalence and helped to categorise households into four levels of household food insecurity (access) viz.: the food secure, and mild, moderately and severely food insecure (Coates *et al.,* 2007). The status of the prevalence of food insecurity among the sampled Pietermaritzburg women was computed, as tabulated in table 6.1, which reflected the prevalence of the severely food insecure households.

Table 6.1: Household Food Insecurity Access Prevalence

Household Food Insecurity Access Prevalence	Frequency	Percent
Food secure	78	17.3
Mildly food insecure	63	13.9
Moderately food insecure	120	26.5
Severely food insecure	191	42.3
Total	452	100.0

6.4.7 The link between obesity and food insecurity

The current study also explored whether there was any association between the anthropometric status as represented by body mass index (30kg/m² ≥BMI) and food insecurity. The data in the current study were computed and results seemed to indicate that there was no significant relationship between the sampled women's food insecurity status and the levels of BMI, as shown in Table 6.2. The *'food secure'* (≥39.46 BMI) and the *'severely food insecure'* (≥39.61 BMI), had the highest BMI values. However, all groups had a very high body mass index (≥39 BMI; p<.643) values with little to distinguish between groups. While a different outcome might have been expected for the severely food insecure, some literature suggested (Farrell *et al.,* 2017) a link between food insecurity and overweight and obesity. That could be deducted from the accessibility, availability and affordability of highly processed foods as both 'severely food insecure' and 'food secure' could access the reasonably priced highly processed products.

Table 6.2: The effect of food security on obesity

Food security status	BMI	P Value
	Mean ± SE	
Food secure	39.46 ± 0.92	
Mildly food insecure	39.10 ± 0.96	
Moderately food insecure	38.63 ± 0.67	0.643
Severely food insecure	39.61 ± 0.56	
Total	39.25 ± 0.36	

The implication was that there was no correlation between food insecurity and the BMI, as both the food secure women as well as the severely food insecure were obese, as indicated in Table 6.3.

Table 6.3 BMI and Food insecurity correlation

		BMI	Insecurity
BMI	Pearson Correlation	1	.065
	Sig. (2-tailed)		.167
	N	449	449
Insecurity	Pearson Correlation	.065	1
	Sig. (2-tailed)	.167	
	N	449	452

6.5 Discussion

Poverty has been established as an important predictor of food insecurity, and in SA hunger has a definite gender dimension, as some groups of South Africans experienced poverty more intensely than others such as Black, female-headed households and others (Armstrong *et al.,* 2008). Wells *et al.* (2012) similarly concurred as they pointed at obesity and associating it with poverty, attributed to energy-imbalances and high consumption of energy-dense diets, linked to westernisation (Wells *et al.*, 2012). The nutrition transition, as characterised by the adoption of western lifestyles and the associated non-communicable diseases such as obesity, seemed to exist among the sampled women.

Overall, the reviewed studies generated mixed evidence of a positive association between food insecurity and obesity across age and gender groups (Franklin *et al.,* 2012). Similarly, the research on whether there was a statistically significant relationship between food insecurity and obesity again provided mixed results, as some found positive associations, while others found no relationship (Food Research and Action Centre (FRAC), 2015). Irrespective of associations or lack thereof, variances were often mediated by gender, age, and race or ethnicity, with the strongest and most consistent evidence being a higher risk of obesity among food insecure women (FRAC), 2015).

Farrell *et al.* (2017) highlighted the '*food insecurity-obesity*' relationship in low and middle-income countries like SA and the need to address the diet quality. The relationship between food insecurity and obesity was also associated with the economic costs or the unaffordability to purchase the desired and healthy food options, compelling households to acquire what food was affordable, which was often low-cost ultra-processed products (Farrell *et al.,* 2017; Stuckler and Nestle, 2012). The global food system dominated by the energy-dense and ultra-processed products was implicated in the obesity epidemic (Monteiro *et al.,* 2010; Moodie *et al.,* 2013). Such a global food environment, associated with nutrition transition, might have adversely impacted the food choices and dietary patterns of the sampled women in the current study.

Evidence from the current study showed that in the area of the *three domains of food insecurity,* namely:

a) *Worrying or anxiety* that food would not be enough, it was found that a significant 66% indicated that they worried that there was sometimes not enough food for their household. That scenario could be associated with the existence of food insecurity as there was worry about not enough food.

b) *For inappropriate food utilisation*, 76% could not eat what they would have preferred, with 70% eating a limited variety while 69% had to eat food they really did not want to eat. Similarly, these findings are indicators of the existence of inappropriate food consumption as they sometimes ate food they really did not want to eat, suggestive of the existence of food insecurity.

c) *On the inadequate food availability*, 55% never had to eat fewer meals while 70% reported that there was never no food to eat of any kind. This position suggests that there is food, but it might not be adequate or balanced to fulfil all the three domains of food security that have to be met for people to be said to be food secure.

Also, the average on the HFIAS for the sampled women was 8.9 against the maximum of 27 score. Again, the score of 8.9 in the HFIAS was derived from the responses of the foods that had been eaten and computed to provide the value of the extent of food insecurity.

On the Food Insecurity Access Prevalence, 17.3% of the sample were food secure. That result might not be surprising given that 76% of the sample could not eat what they would have preferred, with 69% that had to eat what they really did not want to eat.

6.6 Conclusion

The results showed that there was no correlation between food insecurity and BMI as almost all women had very high anthropometric measurements. That was supported by the results that showed that the *'food secure'* (≥39.46 BMI) and the *'severely food insecure'* (≥39.61 BMI), had similar high BMI values.

The association of food insecurity and obesity could be complex, as it might be determined by the economic variables, including lack of access to financial resources, compelling them to consume food that might not provide them with the necessary nutrients. Lack of financial resources could compel households to choose what food was available, subsequently opting for the affordable, energy-dense and highly processed products renowned to induce overeating linked to overweight and obesity. That was what seemed to have taken place among the sampled women who seemed to have limitations in the three domains of food security, namely the access, inappropriate food utilisation and inadequate availability of food, as most of them depended on social grants as their main source of income.

Chapter 7

Assessment of Nutrition Insecurity as Contributing to Overweight and Obesity

ABSTRACT

Objectives: To assess if the nutrition insecurity contributed to the overweight and obesity prevalence of the sampled women from Pietermaritzburg.

Methodology: A structured researcher-administered dietary questionnaire to recall all foods and beverages consumed over a 24-hour period using the Household Dietary Diversity Score (HDDS) as a survey instrument. HDDS was a qualitative measure of food consumption that reflected households' economic ability to access a variety of foods, therefore, a proxy indicator for food insecurity.

Results: A significant 84% had consumed salty spices and beverages; 73% had consumed sweetened fruit juices and 73% had oils and fats ($p<.0005$), all three were energy-dense food types implicated in the obesity epidemic. They also consumed predominantly starchy foods (100%) that lacked micronutrients, except for those foods such as maizemeal and iodised salt whose nutrient values have been improved through fortification.

Conclusions: The diets of the sampled women lacked the requisite dietary diversity, but rather, had a monotonous diet consisting of starchy staples that was often associated with micronutrient deficiency. They also consumed energy-dense foods with high fat, sugar and salt content, associated with nutrition transition and highly implicated in the global obesity epidemic.

Keywords: dietary-diversity, micronutrients, nutrition transition, obesity.

7.1 Introduction and Background

The Household Dietary Diversity Score (HDDS) survey instrument was developed by the Food and Nutrition Technical Assistance (FANTA) and the Food and Agriculture Organisation of the United Nations (Kennedy *et al.,* 2013). Given the significant challenges encountered in measuring household food access for reporting purposes, the need arose to build consensus on appropriate household food access impact indicators (Swindale and Bilinsky, 2006).

The HDDS was a simple food group diversity indicator advocated for wide population-level use, in resource-poor settings (Food and Agriculture Organisation of the United Nations (FAO) and FHI 360 (2016). It was a qualitative measure of food consumption that reflected households' economic ability to access a variety of foods, and an easily administered low-cost assessment tool (Kennedy et *al.,* 2011). Using the HDDS questionnaire, households could enumerate foods eaten by members of the household, and exclude foods purchased and eaten outside the home (Kennedy *et al.,* 2011). The HDDS survey instrument was based on 12 food-groups targeting persons under the same roof who shared meals (UN System SCN, no date).

HDDS reflected the extent of financial means and exposed the levels of nutrition insecurity experienced at household level using dietary diversity (DD) as a proxy indicator for food insecurity (Ghattas, 2014). The Dietary Diversity (DD) was recognised as a key measurement of diet quality and was reflected in the food-based dietary guidelines (Arimond *et al.,* 2011). The DD scores were defined as the number of foods or food-groups consumed by any member of a household over the 24-hour recall period (United Nations (UN) System Standing Committee on Nutrition (SCN), no date). DD thus reflected the concept that increasing the variety of foods and food groups in the diet ensures adequate intakes of essential nutrients (Arimond *et al.,* 2011). Thus, nutrition insecurity was assessed by focusing on the '*utilisation'* aspect of food insecurity, to check if there had been occurrences of inappropriate food consumption during the 24-hour recall period.

The DD indicator guide related to *two* of the main components of diet quality:

1) the '*nutrient adequacy'*, which ascertained the coverage of basic needs in terms of macro- and micro-nutrients, and

2) *'diet variety or balance'* (UN System SCN, no date).

The terms *'nutrient adequacy', 'diet variety', 'dietary diversity', 'dietary quality'* were frequently used to describe the diet of an individual or a population (Steyn *et al.,* 2013). A healthy diet that could provide household food security ought to contain sufficient water, energy, macro- and micronutrients, sustainably met to ensure adequate dietary intakes and influence nutritional security (Steyn *et al.,* 2013). Thus, *'dietary variety'* or *'balance'* influenced household food security, either compromising it if dietary variety was poor or ensuring nutrition security, if diet quality had variety and was balanced (Steyn *et al.,* 2013; UN System SCN, no date).

Quality diets could be identifiable by the different foods or food-groups consumed over recall periods, revealing if diets provided diversity in terms of micro-nutrients (Swindale and Bilinsky, 2006). Therefore, consuming different food-groups provided dietary variety which was regarded as synonymous with dietary diversity (Steyn and Ochse, 2013). Those theorists asserted that dietary diversity score (DDS) was best calculated by means of different food groups consumed.

Steyn and Ochse (2013) and Faber and Wenhold (2006) stated that in South Africa (SA) micronutrient deficiencies were still rife despite the government's efforts to curb them; the most serious being iron, vitamin A, iodine, folate and zinc. That assertion was supported by Labadarios *et al.* (2005), cited in Steyn *et al.* (2013:14) and Faber and Wenhold (2006), as they also indicated serious micronutrient deficiencies experienced by the South African population where:

> *"The prevalence of iron deficiency anaemia was 28.9% in 2005 in children under 5 years of age. Iodine deficiency was 19.2%, zinc deficiency 45.3% and vitamin A deficiency was 63.6% in children aged 1-9 years … And the prevalence of iron deficiency anaemia was 28.9%, iodine deficiency 26.8%, and vitamin A deficiency 27.2% in adult women".*

The extent of vitamin A deficiency among preschool children and women of reproductive age was a problem of enormous magnitude, and a major public health nutrition issue in the developing world (West Jr. [3], 2002), including a country like SA. According to Labadarios *et al.* (2005) some challenges limited the government

efforts from achieving the nutrition policy which could have effectively addressed malnutrition through strategies such as the Integrated Nutrition Programme (INP) which focussed on the following aspects:

a) *The contribution to household food security:* whereby the INP placed considerable emphasis on the development of community-based nutrition projects (CBNPs), which aimed at addressing malnutrition in SA. The hope was that such projects would be food-based, income generating, and would subsequently improve food security whilst solving the household nutritional problems.

b) *The school feeding*: focussed on the Primary School Nutrition Programme (PSNP) which, despite some shortcomings, the feedback from teachers, parents, community representatives, and children was unanimous that *"it made a major social contribution to schools in terms of difficult-to-measure qualities such as more alert children who seemed to benefit intellectually and emotionally"* (Labadarios *et al.,* 2005:103).

c) *Micronutrient malnutrition control:* with the focus on the micronutrient deficiencies, malnutrition was tackled through a combination of strategies such as:
d) *Vitamin A supplementation programme* - for children as a primary prevention strategy through routine immunisation and focusing on maternal health and integrated management of childhood illnesses.
e) F*ortification of staple foods* - that was according to the recommendations of the National Food Fortification Task Group (2000), and it ensured that maize and wheat flour were fortified from October 2003 to combat micronutrient deficiencies in the diet of children and adults.
f) *Iodisation of salt* – that was aimed at addressing the iodine deficiency in SA by encouraging effective use of iodised salt in households.

A large proportion of children were found to have inadequate intakes of folate, vitamin A and E, riboflavin, niacin, and vitamins B6, B12 and C (Labadarios *et al.,* 2005). Overall, Labadarios *et al.* (2000), cited in Labadarios *et al.* (2005), referred to the National Food Consumption Survey (NFCS) results that reported that in SA most children consumed a diet that was deficient in energy and poor in nutrient density.

7.1.1 Dietary diversity levels in South Africa:

The diet of South Africans generally did not have enough variety according to Steyn and Ochse (2013), an assertion seemingly supported by Drimi and McLachlan (2010). Drimi and McLachlan (2010) estimated that 40% of the South African population was dietary-diversity deficient, indicating that they ate from 0-3 food-groups; 50% regarded as reasonably sufficient ate from 4-6 food-groups; with only 10% as food-diverse, as they ate 7–9 groups. Micronutrient deficient diets hindered the optimal micronutrient acquisition that was essential for women of reproductive age (Arimond *et al.*, 2010; Kennedy *et al.*, 2010; Torheim *et al.*, 2010). Steyn and Ochse (2013) stated that, overall, South Africans did not have enough variety in their diet, as indicated by Drimi and McLachlan (2010).

Steyn and Ochse (2013:15) found that four provinces with the highest prevalence of poor DDS (<4) were the Eastern Cape (59.6%); KwaZulu-Natal (40.8%); North West (44.1%) and Limpopo (61.8%). That study showed the differences in DDS that indicated that the Black ethnic group had the lowest mean DDS of 3.6, an indicator that their diets were the least diverse. Oelofse *et al.* (2002), cited in Iversen *et al.* (2011), concurred that micronutrient deficiency was reportedly more common among the Black population group compared with other ethnic groups, especially vitamin A deficiency, long recognised as a major problem among disadvantaged South Africans. They argued that Black children did not consume food sufficient in zinc, iron, vitamin D and total energy, pointing that 47% and 31% of them consumed less than the 67% of the recommended daily allowance (RDA) for iron and zinc, respectively (Oelofse *et al.,* 2002). Their predominantly starch-based diets were micronutrient deficient and lacked dietary diversity, as they were often without vegetables, fruits and animal source foods, rich in bioavailable micronutrients (Ruel *et al.,* 2010).

7.1.2 Impact of micronutrient deficiency in households:

In SA nationally representative data showed that among young children, poor growth and micronutrient deficiencies, especially of Vitamin A, persisted and remained a public health concern (Wenhold and Faber, 2016; Shisana *et al.,* 2013). Those findings underscored the seriousness of a compromised Vitamin A status as it affected the most vulnerable, especially rural and resource-poor communities in SA

(Wenhold and Faber, 2016). Vitamin A deficiency was associated with increased mortality and morbidity, including susceptibility to infections, poor growth and '*xerophthalmia',* which was the abnormal dryness of the eye, typically associated with Vitamin A deficiency (McLaren and Kraemer, 2012, cited in Wenhold and Faber, 2016). The Vitamin A rich vegetables and fruits were typically yellow flashed, such as carrots and pumpkin (Wenhold and Faber, 2016).

7.1.3 Diets previously consumed by most traditional African people:
The cuisine types of Africans in South Africa (SA) tended to follow the linguistic cultures of the people where some food groups were known to be consumed predominantly by certain linguistic groups, e.g. *amadumbe,* mainly consumed by the Zulus (South African Food and Cuisine; African Cuisine of SA, no date). Prior to exposure to the Western lifestyles, Africans lived off the land and used a wide variety of bulbs, leaves, berries, roots, grains, fruit and vegetables, as well as game meat from hunting (South African Food and Cuisine; African Cuisine of SA, no date).

The Zulu grouping, which was the largest among the Nguni, also relied on the land for sustenance, with a diet consisting mainly of maize, cooked in various ways, including grinding and stamping it, to produce dishes (South African Food and Cuisine: Zulu Cuisine of SA, no date). They made varieties of stiff and softer porridge and, whether ground or stamped, maize was sometimes combined with some vegetables like amaranthus or pumpkin leaves or beans to create varieties of dishes.

Another key food item was *amasi,* which was curdled cow's milk allowed to sour in a gourd, and considered a delicacy, steeped in tradition as only family members could consume it (Zulu Culture – Zulu Food, Amazi and Beer, no date). The common vegetables that were consumed were *amadumbe* (a form of yam or taro), maize, pumpkins and potatoes (South African Food and Cuisine, no date). Whilst they loved beef, but it was exclusively preserved for ceremonies, including weddings and coming of age ceremonies (Zulu African Culture: Siyabona Africa, no date). Jansen van Rensburg *et al.* (2007) captured it as they referred to the well-known Pedi proverb that: *"Meat is a visitor, but morogo* [African leafy vegetables] *is a daily food".*

The *'African leafy vegetable'* species provided micronutrients in the culinary repertoire of African cuisine, collectively called *imifino* by both the Xhosas and Zulus (Jansen van Rensburg *et al.,* 2007). The most popular species from among seven are the soft, fast-cooking pumpkin leaves and varieties of amaranth, known as *imbuya, isheke* and *indwabaza* in IsiZulu, as well as nightshade known as umqumbane in IsiZulu (Jansen van Rensburg *et al.,* 2007).

7.2 Materials and Methods

7.2.1 Methodology and design

Researchers used the HDDS survey instrument, adopting a qualitative 24-hour recall method to ask a series of standard probing questions to ensure the respondents recalled all foods and beverages consumed the previous day and night (FAO and FHI 360, 2016). The researchers ensured that ingredients in mixed dishes such as fats, oils, sweets, condiments and all beverages were included and coded into appropriate predefined food groups (FAO and FHI 360, 2016).

The HDDS survey instrument was one of the most frequently used indicators of dietary diversity (DD) at the household level and was used to evaluate the nutrition insecurity levels of the sampled women (Standing Committee on Nutrition (SCN), no date). The recall was open, as the researcher did not read predefined foods or beverages to respondents, but rather circled the specific item consumed (FAO and FHI 360, 2016).

The participants who represented households were asked to describe foods and drinks (meals and snacks) that had been eaten or drunk the previous day, during the day and night, and exclude food eaten outside home, beginning with food or drink in the morning (Kennedy *et al.,* 2011). Atypical consumption, such as celebrations or feasts would be avoided in the recall period (Kennedy *et al.,* 2013). Households included foods eaten by any member of the household, but excluded foods purchased and eaten outside the home (Kennedy et al., 2013). The interviewer probed for any food-groups not mentioned.

7.2.2 Study area and subjects

The study focused on Black African women from rural, urban and peri-urban areas or townships of Pietermaritzburg. Rural samples included communities from Elandskop, Kwa-Qanda and Mpendle. The urban and peri-urban communities were from Edendale, Imbali and Maykhethele Youth Group in Pietermaritzburg. The size of the sample was 452 women of child-bearing ages, from 18 years and above, mainly Zulu in culture and language.

7.2.3 Statistical analysis

Data were collected from the sampled women. The DD values were collated and calculated by summing up all food-groups included in the HDDS of food groups consumed over the 24-hour recall period. All values per food-group and per household were either 0 if not consumed, or 1 if consumed, and there could be no values >1.

Because there were no established cut-off points in terms of the number of food-groups to indicate adequate or inadequate DD for the HDDS, the approach (Kennedy *et al.,* 2013) was:

1) To use the mean DD scores of all 12 food groups aggregated as it allowed for comparison (e.g. socio-economic status) of sub-populations such as families getting some form of government grant compared to families with no grant recipients.

2) To use percentage of households consuming energy-dense foods such as fats and oils and calorific sweeteners, or carbohydrates with few nutrients.

3) Looking at the percentage of households consuming individual food-groups was another important analytical tool such as proportions of households consuming food groups with good sources of individual micronutrients such as vitamin A or iron, iodine and other micronutrients.

4) In addition to calculating the mean DD scores, it was important to know the food - groups predominantly consumed at different levels of the scores, such as those with lowest DD and those with higher scores. Dietary patterns could be used for comparisons of specific food groups and their subsequent BMI.

The HDDS were summed to get the average household dietary diversity score thus:

$$\text{Average HDDS}(0-12) = \frac{Sum\ (HDDS)}{Total\ number\ of\ households}$$

$$\text{"Average HDDS } (0-12)\text{"} = \frac{2890}{452}$$

Average HDDS (0 to 12) = 6

7.3 Results

Dietary diversity scores

The graph (figure 7.1**)** provided the results of the dietary diversity (DD) of the sampled women at a glance, indicating whether their diets had enough DD in terms of foods and food-groups they had consumed during the 24-hour recall period.

The results showed that the sampled women had consumed mostly three important food-groups that were highly implicated in the global overweight and obesity epidemic, viz., oils and fats - 72.7%; sugary or sweet food stuffs - 73%; and the salty foods in the form of spices, condiments and beverages – 83.8%. It was also notable that those three food-groups were known to be highly processed products. Equally important was the finding that the sampled women's diet revealed what Arimond *et al.* (2010) classified as a typically monotonous diet of 100% starchy staples, which had been consumed over the recall period, signifying the lack of diversity in their diet.

The role of each food item and its link to the anthropometric status as well as its contribution to the nutrition security and the possible distortion in their dietary choices was also examined. The information on those scores (figure 7.1) also reflected the economic access or lack thereof, to the food-groups that were nutrient-dense. Even the smallest quantities of a food-item would reflect the economic ability of the household to purchase that food-item (Kennedy *et al.,* 2011).

The food-groups consumed in the 24-hour recall period were discussed in the chronology as they appeared in figure 7.1. thus:
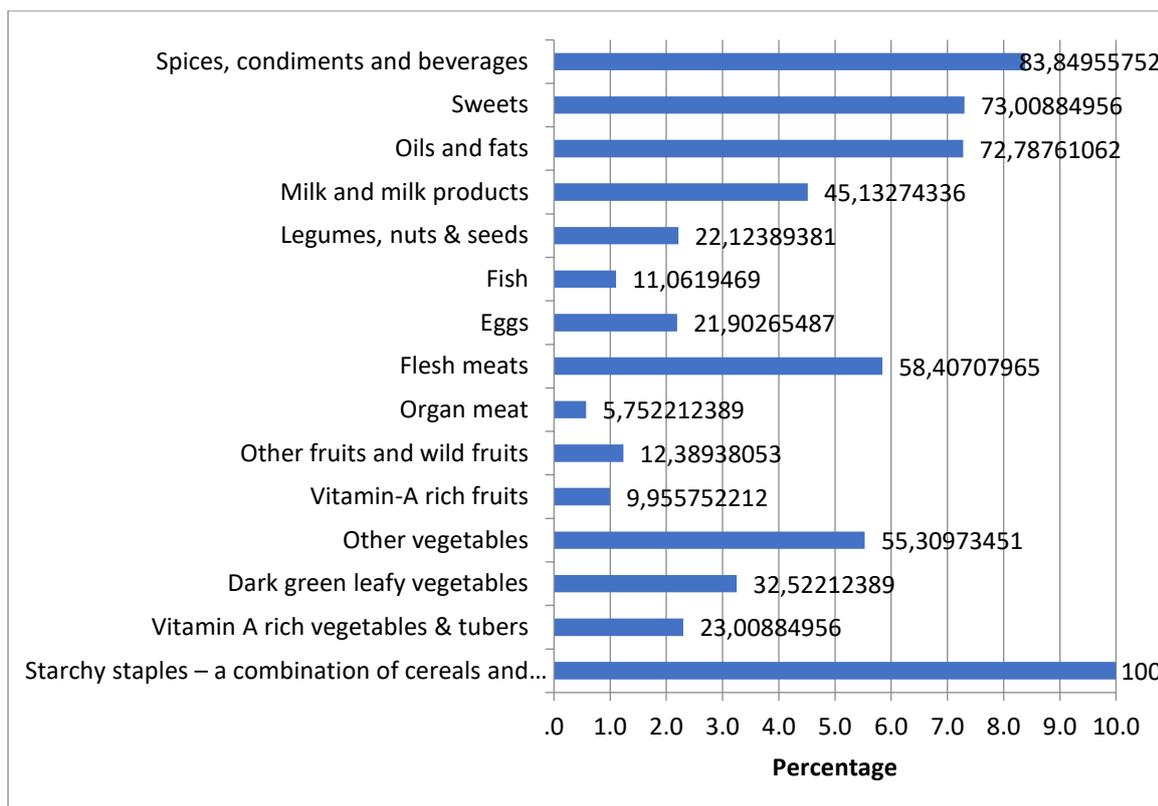
Figure 7.1: Dietary Diversity of Sampled Households

- *Spices, condiments and beverages:*

As reflected in figure 7.1 for the dietary diversity scores, 83.8% (p<.0005) of the sampled women acknowledged consuming and using the items such as Maggi soup varieties (e.g. oxtail, chilli beef) and Knorrox cubes, tomato sauce and aromat classified as spices (Table 7.1). Those had been used as condiments to enhance the flavour of savoury foods such as mealie-pap and rice at most households. The beverages within that food group mainly related to coffee, tea and alcoholic beverages. But most of the women related to tea and coffee which were generally taken with white sugar when eating bread.

Table 7.1 Spices, condiments and beverages

Spices, condiments and beverages		Frequency	Percent
Valid	No	73	16.2
	Yes	379	83.8
	Total	452	100.0

- *Sweets:*

Sweets, as a food-group, combined the consumption of sugar, honey, sweetened soft drinks, sweetened fruit juice and sugary foods such as chocolates, ice-cream, cakes and biscuits. More like the spices and condiments, sweets were commodities that were micronutrient deficient, and were highly implicated in the global overweight and obesity epidemic.

Table 7.2 Sweets – food group consumption of the sampled women

Sweets – food group consumption		Frequency	Percent
Valid	No	122	27.0
	Yes	330	73.0
	Total	452	100.0

Results from the current study (table 7.2) showed that a significant 73% of the sampled women had consumed some foods from that food-group (p<.0005).

- *Oils and fats:*

Most types of oils were energy-dense and, therefore, offering more dietary energy for the lowest cost, hence the attraction for lower-socio-economic groups. The results (table 7.3) suggested extensive use (72.8%), (p<.0005), of edible oils and fats such as margarine on foods like bread and in other cooking as well as extensive use of cooking oil in the food preparation of the sampled women. Like the other highly processed commodities, the food and beverage environment ensured that those products were affordable to boost sales of such food groups. Some of the contributing causes of obesity related to the high consumption of energy-dense

products whilst expending less energy in physical activities, causing imbalance in terms of energy intakes and energy expenditure (Arimond *et al.,* 2010).

Table 7.3 Oils and fat consumption

Oil and fat consumption		Frequency	Percent
Valid	No	123	27.2
	Yes	329	72.8
	Total	452	100.0

- *Milk and milk products:*

The milk products as a food-group related to food items such as milk, cheese, yoghurt or other dairy products such as sour milk. Dairy products that were accessible to the sampled women were mainly the type of fermented milk curds known as *'amasi'* **(**table 7.4**)** sour milk, which formed part of African traditional cuisine (7.1.3). That food group was highly valued as nutrient-dense.

Table 7.4 Milk and milk products consumed

Milk and milk products		Frequency	Percent
Valid	No	248	54.9
	Yes	204	45.1
	Total	452	100.0

Results from the current study showed that 45.1% of the sample had consumed some form of dairy product over the 24-hour recall period (p=0.43), which showed no significance.

- *Grains, legumes, nuts and seeds:*

Dry grains, legumes, nuts and seeds belonged to a food group known as 'course grains' and are highly regarded as a source of fibre that traditional diets used to be known for. High consumption of those coarse grains was abandoned for the highly processed foods associated with the nutrition transition. Nutrition transition was

perceived to have contributed to the abandonment of traditional foods for highly processed products with high fat, salt and sugar content made available by commercial retailers in both urban and rural areas. Highly processed products were implicated in the global overweight and obesity epidemic.

Table 7.5 Legumes, nuts and seeds consumed

Legumes, nuts and seeds		Frequency	Percent
Valid	No	352	77.9
	Yes	100	22.1
	Total	452	100.0

The results from the current study, (table 7. 5), where 77.9% (p. <.0005) reported never eating any course grain foods such as legumes, nor had they consumed any nuts or seeds during the recall period. Such a diet was consistent with that of people undergoing nutrition transition who often consumed highly processed products.

- *Fish:*

Fish, as a food group, could be consumed fresh, dried or tinned as a form of animal source food. It could have both positive and adverse health effects. Results from the sampled women in the current study (table 7.6) showed that a significant 88.9% did not consume any fish (p<.0005) during the previous 24-hour recall period. Fish consumption could improve the micronutrient profile as a source of protein, whether tinned, dried or fresh. Accessing fish may be determined by a household's socio-economic status, although tinned pilchards are usually reasonably priced.

Table 7.6 Fish that the sampled women consumed

Fish		Frequency	Percent
Valid	No	402	88.9
	Yes	50	11.1
	Total	452	100.0

- *Eggs:*

Eggs, as a food group, were classified among animal source foods wherein shifts in intakes had occurred in the developing world. Results from the current study (table 7.7) showed that a significant 78.1% had **not** consumed eggs (p<.0005) in the past 24 hours of the recall period.

Table 7.7 Eggs consumed by the sampled women

Eggs		Frequency	Percent
Valid	No	353	78.1
	Yes	99	21.9
	Total	452	100.0

As animal source food group, eggs could improve a micronutrient deficient diet and advance the dietary diversity of a household.

- *Flesh meats*

Flesh meats referred to a combination of chicken, beef, pork and lamb. As a food group, eaten in moderation, flesh meat was animal sourced food which could provide nutrients like protein. The quality of the meat the women purchased depended on what they could afford. Flesh meats accessible to them were mainly the fatty chicken off-cuts with more fatty pieces of chicken skin, pieces like neck and gizzards which they purchased from supermarkets or spaza shops, known as '*soup pack*' predominantly fatty skin tissue. (This was personally experienced by the researcher in one of the rural areas).

The results of the current study showed that a significant 58.4% of the women had consumed flesh meat (p<.0005) during the 24-hour recall period, but referring mainly to fatty portion such as the 'soup pack' described earlier.

Table 7.8 Flesh meats consumed by the sampled women

Flesh meats		Frequency	Percent
Valid	No	188	41.6
	Yes	264	58.4
	Total	452	100.0

- *Organ meat:*

As a food group, organ meat comprised liver, kidney, heart, any organ or blood-based foods and derived from animals and sometimes referred to as offal (Seymour, 2017). Offal is often associated with intestines and stomach from a beast such as a cow, goat or sheep which would be thoroughly cleaned for consumption. That food group was very high in vitamins and nutrients, including vitamin B, iron, phosphorus, copper, magnesium, and vitamins A, D, E and K (Seymour, 2017). Because this food group tends to be fatty, it also increases the risks of elevated cholesterol levels which are associated with obesity and should be consumed in moderation. The results from the current study (table 7.9) showed that a significant 94.2% had not consumed organ meat ($p<.0005$). The limited dietary diversity of the sampled women reflected a significant lack of variety in their diets, as they could not afford to purchase even the offal which was often reasonably priced. That seemed to suggest the extent of the low socio-economic status and household poverty of the sampled women.

Table 7.9 Organ meat consumed by the sampled women

Organ meat		Frequency	Percent
Valid	No	426	94.2
	Yes	26	5.8
	Total	452	100.0

- *Other fruits and wild fruits:*

Other fruits, as a food group, showed lack of access to fruit among the sampled women. The results showed (table 7.10) that a significant 87.6% of the women had not had any fruit (p<.0005) during the 24-hour recall period.

Table 7.10 Other fruit consumption

Other fruit		Frequency	Percent
Valid	No	396	87.6
	Yes	56	12.4
	Total	452	100.0

The inability to access fruit was in keeping with the reported micronutrient deficiency in the diets of South Africans, especially iron, Vitamin A, iodine, and zinc deficiencies (Steyn and Ochse, 2013).

- *Vitamin-A rich fruits*

That was the food group that comprised yellow flesh such as ripe mango, apricots and ripe peaches. The value of the vitamin A rich fruits was significant in a country known for citizens that lacked important micronutrients such as iron, vitamin A, iodine and zinc. Results from the current study (table 7.11**)** indicated that a significant 90% of the sampled women had not eaten any vitamin A rich fruit (p<.0005) in the past 24-hours of the recall period.

Table 7.11 Vitamin A rich fruit consumption

Vitamin A rich fruit		Frequency	Percent
Valid	No	407	90.0
	Yes	45	10.0
	Total	452	100.0

The seemingly limited dietary diversity of the sampled women's diet indicated that they would be unable to access a micronutrient-adequate diet. Their predominantly

starch-based diet suggested a micronutrient-deficient diet, reminiscent of the well documented micronutrient deficiencies in SA (Steyn and Ochse, 2013).

- *Other vegetables*

The food group comprising other vegetables mostly incorporated vegetables such as tomatoes, onion and wild vegetables that were enhancers in main dishes and sometimes could not be identified by themselves, e.g. when tomatoes or onions are added in a curry dish or some stew. They were included in the HDDS as indicators of a household economic access to acquire them, as not all households could afford to buy enhancers of food as they wanted to ensure that the basic food stuffs were available. The results of the current study (table 7.12) indicated that 55.3% had consumed some of such vegetables over the recall period (p =.017).

Table 7.12 Consumption of other vegetables

Other vegetables		Frequency	Percent
Valid	No	202	44.7
	Yes	250	55.3
	Total	452	100.0

Some wild vegetables from that food group such as varieties of amaranthus leaves had potential for improving the micronutrient profile of households. The nutrition transition with its abundance of reasonably priced highly processed products, readily available from supermarkets and spaza shops, seemed to influence the sampled women's food choices and dietary patterns away from such vegetables. Another problem could be that fresh vegetables do not keep in comparison to the highly processed products renowned for their long shelf-life.

- *Dark green leafy vegetables*

The range of dark green leafy vegetables, some renowned for providing vitamin A rich leaves (Kennedy *et al.*, 2011) could benefit the sampled women. But, results from the current study (table 7.13) showed that a significant 67.5% of the sampled women had not consumed (p<.0005) any foods from this food group.

Table 7.13 Consumption of dark green leafy vegetables

Dark green leafy vegetables		Frequency	Percent
Valid	No	305	67.5
	Yes	147	32.5
	Total	452	100.0

Like other vegetables and fruits, the results exposed the levels of micronutrient deficiencies and lack of dietary diversity among the sampled women's diets. The results indicated that only 32% had consumed dark green leafy vegetables such as spinach, kale and pumpkin leaves or amaranthus leaves.

- *Vitamin-A rich vegetables and tubers*

Like vitamin A rich fruits, the vitamin A rich vegetables and tubers are yellow fleshed and rich in vitamin A. The results (table 7.14) showed that a significant 77% had not consumed vegetables (p<.0005) from this food group. That was despite the reported vitamin A deficiency in the country among young children with poor growth and micronutrient deficiencies (Wenhold and Faber, 2016 and Shisana *et al*., 2013).

Table 7.14 Vitamin A rich vegetables and tubers

Vitamin A- rich vegetables		Frequency	Percent
Valid	No	348	77.0
	Yes	104	23.0
	Total	452	100.0

Overall, the results were consistent with other health contributing fruits and vegetable deficiencies that might exacerbate the micronutrient deficiencies of the sampled women.

- *Starchy staples:*

That was a food group composed of a variety of starchy staples such as corn, maize, rice, wheat and other grains and white tubers, like potatoes. The consumption of those food groups dominated at 100%. The sampled women's diet depicted what was regarded as a typically '*monotonous' diet* with inadequate DD and dependent on starchy staples from various cereals from white maize meal, white rice and white tubers (Arimond *et al.,* 2010).

According to the results from the current study, dietary diversity, regarded as a crucial dimension of diet quality, was lacking in the sampled women's diet, as a significant proportion (100%), (p<.0005), had consumed a diet mostly composed of starchy staples, as shown (table 7.15).

Table 7.15 The starch-based diet of the sampled women

Starchy staples		Frequency	Percent
Valid	Yes	452	100.0

The most common starchy food consumed from maize-meal was called '*stiff-pap'* and mostly served with a sauce made of stewed potatoes which were also part of the starchy staples. The maize-meal was the highly refined version of ground maize, bought from the shops, as opposed to the original maize-meal with high fibre content, manually ground from home-grown maize.

7.4 Discussion of results

Through the HDDS, the extent of nutrition insecurity experienced at household level was exposed using the dietary diversity (DD). The DD also reflected the extent of the lack of financial means for the household to access a diet that had higher dietary energy which was one dimension of household food security (FAO and FHI 360, 2016; Ghattas, 2014).

The findings from the current study portrayed that most households consumed diets lacking dietary diversity, thus exposing them to the potential of malnutrition or

overnutrition. Tathia *et al.* (2013) indicated that malnutrition or overnutrition had been observed to be present in SA, as seen in rural communities in KwaZulu-Natal (KZN). That finding seemingly concurred with the data from National Planning Commission (NPC) of the National Development Plan Vision 2030 (2011), which reported that SA ranked among the top 20 countries with the highest burden of undernutrition with the prevalence of overweight, obesity, underweight and stunting in female learners in 31 primary schools in rural KZN, using anthropometric data collected in 2011. That data revealed some micronutrient deficiencies of iron, vitamin A, iodine and zinc (NPC, 2011).

The findings of the current study equally revealed some lack of access to diets or food-groups which comprised micronutrients like vitamin A. The vitamin A rich fruits were yellow fleshed like ripe mango, apricots and ripe yellow peaches and yellow fleshed vegetables such as carrots and pumpkin. The results of the current study (table 7.11**)** indicated that a significant 90% of the sampled women had not eaten any vitamin A rich fruit (p<.0005) in the previous 24-hours of the recall period. Similarly, a significant 77% had not consumed any vitamin A rich vegetables (p<.0005) over the recall period, which was in the month of August, in spring, which is usually a dry season. The implication of those findings was that the sampled women might also be having micronutrient deficiencies in vitamin A and, therefore, potentially nutritionally insecure.

Those stated findings were cause for concern given the reported vitamin A deficiency in the country, where nationally representative data showed that among young children, poor growth and micronutrient deficiencies, especially of Vitamin A, persisted and remained a public health concern (Wenhold and Faber, 2016; Shisana *et al.,* 2013). Such findings signified the seriousness of a compromised Vitamin A status, as it affected the most vulnerable, especially the rural and resource-poor communities in SA (Wenhold and Faber, 2016). The vitamin A deficiency was also associated with increased mortality and morbidity, including susceptibility to infections, poor growth and '*xerophthalmia',* which was the abnormal dryness of the eye, typically associated with Vitamin A deficiency (McLaren and Kraemer, 2012, cited in Wenhold and Faber, 2016). That stated potential of susceptibility to infections because of lack of vitamin A was also cause for concern given the well-

known poor and unhygienic living conditions of most South African households in some rural and informal settlements.

Even the proportion that reported having consumed '*other vegetables'* was the result of probing, and such *'other vegetables'* were a mixed-dish with varied *'ingredients'* such as onions and tomatoes added as '*enhancers'* in stews of starchy vegetables like potatoes. A significant 55% (p<.027) had reported consuming other vegetables in mixed dishes such as *'achar'* and chakalaka which contained oil as well as other savoury spices and sauces. Both chakalaka and achar were commonly used as sauce-accompaniment for starchy staples such as pap, which is a stiff porridge variety made from maize meal.

The results thus far suggested that the sampled women consumed monotonous diets that were by implication dietary deficient. The findings also reported that they also consumed three food groups commonly associated with the global nutrition transition, namely

1) Spices, condiments and beverages,
2) sweets and
3) oils and fats

All three were generally regarded as components of highly processed, energy-dense and micronutrient deficient foods and associated with the global nutrition transition. The significance of nutrition transition and how it impacted communities such as the sampled women in relation to the consumption of those three food groups, deserve a brief explanation.

The general pattern of how the nutrition transition took effect in communities was marked by shifts in body mass index (BMI) distribution and increased obesity (Popkin, 2011). Popkin illustrated what he called a *'collision between human biology and modern technology, globalisation, government policies and food industry practices',* wherein there had been dramatic *'shifts'* which created far-reaching imbalances across the world. Vorster and Bourne (2016) reaffirmed that as they demonstrated the existence of shifts by illustrating that people had replaced drinking water and breast milk (which are the natural sources of drinks), by a vast array of

calorific beverages associated with the obesity epidemic. Such shifts in food and beverage consumption were consistent with the nutrition transition pattern often associated with shifts from traditional diets to modern forms of food consumption and reduced physical activity (Popkin et al., 2012; Drewnowski and Popkin, 1997). In that process, the diets of communities such as the sampled women in the study, became irrevocably transformed as they adopted the global dietary patterns, leading to a world dominated by highly processed foods and drinks in the context of nutrition transition (Monteiro et al., 2013; Popkin, 2011).

Three significant food groups associated with the nutrition transition and highly implicated in the global obesity epidemic, were the main food groups that the sampled women consumed the most, after the starchy staples. Those three were:

1) *Spices, condiments and beverages:* Those featured highly in the diets of the sampled women and contained *salt* (sodium chloride, sodium bicarbonate, monosodium glutamate and others). Spices and condiments related to food items such as Maggi soup/cubes varieties (e.g. oxtail, chilli beef and others/chicken vegetable and others) and varieties of Knorrox items such as salad dressings of all sorts, tomato sauce and aromat, classified as spices (see table 7.1). The significance of spices and condiments was their high salt content which was detrimental to health. The beverages within that food group related to coffee and tea both taken with sugar. Most families related consuming fruit juices rather than tea or coffee. But, some of the women reported that tea and coffee were generally taken black because they could not afford milk.

The African beverages, on the other hand, included some varieties of brewed softer porridge types made from grain, including an alcoholic version known as '*utywala'* and a non-alcoholic type called '*amahewu'* (South African Food and Cuisine: Zulu Cuisine of SA, no date). Each type *was* fermented in its unique way, but amahewu was sometimes consumed with the addition of sugar.

2) *Sweets included sugars categories* (sucrose, e.g. molasses and brown sugar; *lactose*; *high fructose,* e.g. fructose syrup, corn syrup, fructose, high fructose corn syrup and invert sugar). As a food-group, sweets had quite a significant role in the

nutrition transition, as they also formed part of energy dense diets and were highly implicated in the overweight and obesity epidemic.

3) *The oils and fats: fats categories* were also implicated in the global nutrition transition as energy-dense foods and were often used extensively together with salt and sugar to produce 'ultra-processed products' (Monteiro *et al.*, 2013). The addition of oils, fats to food during manufacture was highly significant in the global food market as it was linked with the *'highly processed products'* that were associated with the global nutrition transition and the global obesity epidemic (Monteiro *et al.,* 2013; Hawkes, 2005).

Three significant items, fat, sugar and salt were most important ingredients for ultra-processing. Most ultra-processed products were likely to contain 'refined starches', added sugars, hydrogenated fats (trans-fatty acids) and oils, and/or salt (Monteiro and Cannon, 2012; Hawkes, 2005). Such readily-edible food types were sometimes termed *'high value foods'* and were associated with western diets. "*Many of those products, while legal, were in effect fakes, made to look and taste like wholesome foods … packaged to have a long shelf life and eliminate the need for culinary preparation*" (Monteiro and Cannon, 2012:3). High value foods were agricultural goods with a high economic value per kilogram, etc. including products like fruits, vegetables, meat, eggs, milk and fish (Gulati *et al.,* 2005). They were high value-for-weight and with an enhanced potential profitability and typically among those items with the highest transaction costs (Delgado, 1999).

High-value items were developed by the acceleration of food science techniques which enabled the invention of intensely palatable products to fool the body's appetite control mechanisms (Monteiro and Cannon, 2012), made from cheap ingredients and additives, heavily promoted by transnational food and drink manufacturing corporations (Monteiro *et al.,* 2013). If consumed in small amounts and with other healthy sources of calories, ultra-processed products were harmless, but their intense palatability attained by high content of oil/fat, sugar and salt, and other additives, often made modest consumption unlikely (Monteiro *et al.*, 2013).

Monteiro and Cannon (2012:3) clearly stated that traditional long-established food systems and dietary patterns had been displaced in countries in the South like SA, by ultra-processed products made by 'Big Food' referring to transnational food corporations. They further stated that such displacement increased the incidence of obesity and of major chronic diseases subsequently affecting public health and undermining cultures, meals, family life, local economies and national identity. The findings of the current study seemed to be aligned with that view, given that their food choices seemed to be determined by what was available and at the price determined by the supermarket.

Whilst the HDDS, as a survey instrument, had a lot of good in terms of providing a measuring tool for determining household food access, the veracity of what people alleged to have eaten remained a challenge. People generally tended to be embarrassed to really open up about the true status of their household food insecurity and nutrition status. Possibly if the tool could be used to the same community repeated in three monthly intervals. A once-off application of that tool might not reflect the true nature of food and nutrition insecurity status within the households of the sampled women.

7.5 Conclusion

The diets of the sampled women suggested that they consumed what might be regarded as a monotonous diet that lacked dietary diversity. As dietary diversity was a proxy indicator for food and nutrition insecurity, it could be assumed that the sampled women had a micro-nutrient deficient diet. A micronutrient deficient diet could compromise the health of the women of reproductive age. Their lack of resources might have restricted them from accessing foods that could be regarded as rich in micronutrients such as meat, fish, vegetables and fruits. Their low socio-economic status might have also compelled them to consume the purely starchy staple diet, and might also be vitamin A deficient, which was said to be a characteristic feature among the poorer South African population.

The sampled women's dietary patterns might have been influenced by their price-dependent food choices and they could mainly buy what they could afford, as it was

made available by big corporations trying to increase the sales of their highly processed products using cheap materials and through various promotional strategies.

The role of government intervention in those instances could be to support the poor by ensuring the affordability of nutrient dense food groups such as fresh fruits and vegetables. The consumption of indigenous food items and other indigenous food types could be encouraged through creative ways like creative '*indigenous food festivals.*

Chapter 8

Black South African Women's perceptions of obesity in the Msunduzi District of Pietermaritzburg

Abstract

Aims*:* To establish the Black South African women's perceptions of obesity in rural and urban areas in the Msunduzi District of Pietermaritzburg.

Methodology*:* The research design adopted was qualitative research methodology, using qualitative techniques, mainly the focus group interviews for data collection. Those were complemented by traditional key informants' perspectives of obesity using rapid rural appraisal approach.

Results: The perceptions of obesity among the Black women in SA might be influenced by their traditional and cultural beliefs that regard obesity as a sign of wealth and beauty. Among the focus groups there seemed to be no real word for obesity. Similarly, the traditional perspective did not seem to have any word for obesity.

Conclusion: The Black South African women's perceptions of obesity seemed to be informed by their traditional beliefs of associating obesity with beauty, wealth and good health.

Keywords: *obesity, Black women, perceptions.*

8.1 Introduction and Background

The World Health Organization (WHO) (2010) report on the global status of non-communicable diseases (NCDs) demonstrated that obesity was a growing threat in most low- and middle-income countries such as South Africa (SA). That report presented evidence that 80% of the health burden from NCDs like cardiovascular diseases, diabetes and some cancers was carried by low- and middle-income countries. A similar global report by the WHO (2016) on diabetes as a serious chronic NCD, confirmed the upward trend from 4.7% since 1980 to 8.5% in 2014. The 2013 South African National Health and Nutrition Examination Survey (SANHANES-1) reported on national estimates of health status of adults regarding NCDs and other major risk factors, reported similar findings (Shisana *et al.,* 2013). Shisana *et al.* (2013) partly attributed the low intakes of fruits and vegetables in SA to households being food insecure and poor. Food insecurity had been linked to detrimental health outcomes, including obesity and some chronic diseases (Naicker *et al.,* 2015).

The SA population, particularly Black African people, has demonstrated shifts in dietary intakes that culminate in the increasing prevalence of obesity (Shisana *et al.,* 2013; Sartorius *et al.,* 2015). Micklesfield *et al.* (2013) and Cois & Day (2015) indicated that within the Southern African region, SA's epidemiological transition was moving at an alarming rate. Concurrent dietary changes were evident even among the lower socio-economic households, who also suffer from combinations of poverty-related infectious diseases and non-communicable diseases (NCDs), including obesity (Drewnowski, 2009; Vorster *et al.,* 2011; Micklesfield *et al.,* 2013).
Black Africans were also thought to have abandoned their traditional plant-based diets, low in fat with high fibre content in favour of the 'western' diet (Kruger *et al.,* 2005; Kimani-Murage *et al.,* 2010; Popkin *et al.,* 2012). The 'Western diet' was associated with dietary patterns characterised by high consumption of refined cereals, processed and red meats and the adoption of sedentary lifestyles (McNaughton *et al.,* 2007; Kimani-Murage *et al.,* 2010). Such dietary patterns were associated with increased risk of NCDs such as type-2 diabetes and obesity and other chronic disease risk factors (McNaughton *et al.,* 2007).

Cois and Day (2015) found a strong positive trend in body mass index (BMI) indicating overall increases in adult South Africans who were overweight or obese. Similarly, Micklesfield *et al*. (2013) specified that statistics from the 1998 National Demographic and Health Survey (SADHS) reported an obesity prevalence of 30% in all women over 15 years of age, with the prevalence affecting mostly Black South African women at 31.8%.

Some other studies were also of the view that overweight and obesity were on the rise in SA, largely among Black African females who were also socio-economically disadvantaged, living with both under- and over-nutrition (Faber and Wenhold, 2007; Shisana *et al.,* 2013). Both under- and over-nutrition had detrimental effects as they reflected micronutrient deficiencies (Faber and Wenhold, 2007).

Puoane *et al.* (2005) explored perceptions about factors associated with body weight and body image, in a sample where out of 44 participants, 25 were obese and 15 were extremely obese. Those results suggested the influence of socio-cultural, behavioural and environmental factors (Puoane *et al.,* 2005). In another study assessing dietary intakes, attitudes towards weight control, perceived causes of being overweight and perceived health risks, Faber and Kruger (2005) found that most of the rural women studied were unconcerned about their weight, and most overweight and obese women did not want to lose weight. Those studies indicated consistent acceptance of being overweight or obese. The current study was to establish the Black South African women's perceptions of obesity in rural and urban areas in the Msunduzi District, and to find out where they sourced food as opposed to producing it, to see the link between what they consume and health.

8.2 Methodology and Design

The current study was exploratory on the perceptions of obesity. It adopted the survey-based research design, using a focus group interview guide to conduct in-person interviews about the Black South African women's perceptions of obesity. The researcher-administered semi-structured interview guide which provided the research instrument and qualitative research methodology for the study. Data were collected using qualitative techniques, mainly the focus group interviews

complemented with traditional key informants' perspectives of obesity. The rationale for choosing this qualitative method (focus groups) was because of time and resource constraints. Discussions were not recorded because of the noise factor. Instead, there were two post-graduate students who wrote down the responses from the groups.

For the researcher to gain access to those communities, a relationship with May'khethele Project in Pietermaritzburg was developed by formally writing to their leadership to request their co-operation in the current study. That United States Agency International Development (USAID) supported project granted the researcher access to the May'khethele community. They were aware that the Ethical Clearance had been granted to continue with the study. May'khethele Project provided HIV/AIDS education to rural and urban communities focusing on orphans, vulnerable children and youth. The co-operation with May'khethele Project helped the researcher to gain entry to some of the urban and rural communities they serviced, such as Elandskop and the KwaQanda rural villages. The topic of the study had been briefly explained to each focus group and they were aware that participation was voluntary.

The study population was Black African females organised into six homogeneous groups of under 35 years of age that were classified as youth, and over 35 years as adults, in both rural and urban areas. The rural focus group participants were drawn from two rural villages, one of them Elandskop, which provided two youth groups consisting of 13 and 10 participants. The Kwa-Qanda focus group consisted of 16 adult participants. Because of the limited availability of participants, and May'khethele work schedules in those communities, the focus groups could only be arranged on the days of their weekly meetings with May'khethele Project. They would allocate time (about two hours) for the focus groups after their schedule for the day on the dates that had been pre-booked. Similarly, the urban focus groups which were drawn from May'khethele community members had to be pre-booked. The pilot group of six, as well as two youth focus groups of 16 and 12 per group, and one adult group of six participants were all from the May'khethele community. The total number of focus group participants was 73.

The researcher used the Focus Group Interview Guide (Table 1.) for all the focus groups in relaxed settings using the groups' mother tongue to communicate. That setting allowed the discussions to flow and elicit the participants' personal perceptions on the topic. Each question was asked, and participants engaged each other until the moderator felt it had been exhausted. Each of the six questions provided a discussion theme and the moderator would only probe for clarity, however, some statements were recorded verbatim. The reliability was ensured through documenting the discussions using post-graduate students to document what was said. The researcher also took a wider sample of participants, grouped into four categories, namely: adult rural, adult urban, youth rural and youth urban, to improve the validity of the study.

To gain further insight into the topic, the researcher also engaged three traditional key informants to enquire about their perceptions of obesity from a traditional perspective, using short individual telephonic interviews. One was from Qamata and a member of the House of Traditional Leaders in the Eastern Cape; the second from Maphumulo in KwaZulu-Natal and a leader of Traditional Healers in SA; the third from Gauteng, an academic and an African Traditionalist. They were selected because of their status and indigenous knowledge of African culture. The researcher would initially phone to introduce the topic and request time for a short interview. On the set date the researcher asked (1) their perceptions of obesity among Black women and (2) about food eaten in households. The researcher would request that the conversation be on speaker phone to write down the information they provided. They could elaborate as much as they wanted to on each question.

The short telephonic interviews of traditional key informants were undertaken using the Rapid Rural Appraisal (RRA), which was an approach for developing a preliminary understanding of a situation such as the prevalence of obesity (Beebe, 1995). The technique was commonly used in rural development projects and key informants were major tools for RRA. Cross-checking, according to Chambers (1981), was worthwhile as it asked for more useful and additional information from different key informants who were regarded as knowledgeable on the topic. Their information was used to compliment the data from focus group interviews. The

researcher used only those key informants who were accessible, willing to participate and share their views through individual telephonic interviews.

8.3 Findings

8.3.1 Focus groups' data

The open-ended questions in the focus group interview guide were used to conduct the discussions. The initial question in all the focus groups, which asked where they normally get food for home consumption (Table 1.), brought about divergent views. Overall, the older participants, especially from the rural areas (KwaQanda rural village), associated the question with agriculture and planting. Most of them provided various reasons why they could not produce enough food for home consumption as they used to, such as ill health, poorly fenced gardens and lack of water for their gardens. Subsequently, they stated that they often bought most of their food from the supermarket and spaza shops. But, they stressed that they did not have enough money to buy food and often looked for specials at supermarkets.

The younger groups, both rural and urban, associated the first question (Table 1.) with the need for more money to buy more food for their households. They mentioned the food they bought from various supermarkets such as cooking oil, bread, rice, Rama margarine, mealie-meal, onions and potatoes. They perceived supermarkets to be cheaper, especially when they had special promotions. In all the focus groups the first question ended up discussing the need for more money to buy food for their households. Planting and producing food from the fields and gardens was perceived to be backward and the least desired activity by the younger groups.

The second question, enquiring about the traditional Zulu words for a fat body, brought about various descriptions all of which appreciated fat bodies. There was no real word for 'fat bodies' in their language. They referred to 'fuller bodies' and a 'rounded fuller figure'. All descriptions suggested that the fuller bodies and the rounded fuller figures were appreciated as they were associated with wealth and dignity. They were regarded as signs of people who ate well, a similar finding in both age groups.

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The findings from the third question, which asked what the participants liked about a fat body, indicated that it was acceptable in the African culture and was deeply embedded in the value-systems of Black Africans for a woman to be big. All focus groups perceived the rounded fuller figure as an African representation of health and beauty. One of the rural focus groups (KwaQanda older group) figuratively indicated that when a woman is fat, it was a sign that she was eating anything she desired.

The fourth question, which enquired about what they do not like about a fat body, did not yield clear responses from most groups, as most of them could only see the benefits associated with fat bodies. One of the urban youth groups (May'khethele) mentioned what they called extreme fatness, which they said was not liked, because it reduced one's physical activity levels and was problematic in getting dress sizes.

The fifth question, which asked what they liked about a thin body in a woman, was basically contrasted to the (what they called) rounded fuller bodies. It was negatively associated with people who were poor with little or no food to eat and not appreciated. A thin body was viewed as not respectable and people who were not well-off.

The sixth question, which asked about what they do not like about a thin body, was almost answered in question five. None of the focus groups appreciated thinness, as it was negatively associated with ill-health, especially HIV/AIDS and unhappiness.

Table 1. Focus Group Interview Guide

No.	Interview questions	Various responses
1.	Where do you get your food for home consumption? Why?	Spaza shops, supermarkets or food markets.
2.	What are the traditional Zulu words for a fat body? Why?	There is no Zulu word for a fat body.
3.	What do you like about a fat body in a woman? Why?	Dignity, wealth, respectable, beauty.
4.	What do you not like about a fat body in a woman? Why?	Problem with dress sizes at times, when there is extreme fatness.
5.	What do you like about a thin body in a woman? Why?	African women don't look right when thin.

6.	What do you not like about a thin body in a woman? Why?	People think one has HIV/AIDS.

8.3.2 Key informants' data

The role of the key informants was to provide further insights on the perceptions of obesity from the perspective of traditionalists. They were asked about (1) their perceptions of obesity among Black women in general and, (2) about food eaten in the households.

- *On the question about their perceptions of obesity among Black women:*

The Qamata traditional key informant stated that obesity among African women was a relatively new phenomenon. The notion of obesity was not known, as only acceptable 'muscle build-up' (referring to growing big without fat) in women's bodies was common, especially after childbirth, because traditionally, women were highly active when engaged in various household chores. Similarly, the Maphumulo key informant stressed that women were highly actively engaged in traditional chores to produce food by cultivating crops such as maize, beans and pumpkins in the fields and vegetable gardens. The implication was that women were too active to be fat. The Gauteng key informant also concurred that obesity had not been common and referred to some food-order in diets with social meanings.

- *On the question of food consumed in households:*

The Qamata key informant pointed that households used to consume food that had been produced from the home. This view had been supported by the Maphumulo key informant who indicated that overall, the main traditional chores for women were to produce food for households, by cultivating crops such as maize, beans and pumpkin in the fields and vegetable gardens. The Qamata and Maphumulo key informants generally concurred that Black women no longer eat traditional food, but rather eat 'White man's food'. The Gauteng key informant indicated that the selection of foods through the food-order that had been culturally controlled, might have protected women from eating the foods they eat lately. The food they eat lately was what the Qamata and Maphumulo key informants called the 'White man's food' which might be a proxy for 'western' dietary patterns.

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In the literature, what was termed 'western' dietary patterns had been associated with shifts in dietary intakes that culminated in increasing prevalence of obesity (Shisana *et al.,* 2013; Sartorius *et al.,* 2015). Some studies found that overweight and obesity were on the rise in SA, particularly among Black African females who were also socio-economically disadvantaged, living with both under- and over-nutrition (Faber and Wenhold, 2007; Shisana *et al.,* 2013). Faber and Wenhold (2007) indicated that under- and over-nutrition had detrimental effects on people's health, as they reflected micronutrient deficiencies.

8.4 Discussion

While obesity was generally measured through a series of human body measurements to define the severity of the overweight or obesity (Ying Lee *et al.*, 2008), the results from the current study suggested that the sampled women in the focus groups did not even have a real word for 'obesity' in their language. The notion of obesity was not perceived to exist. Rather, they had names like 'fuller bodies' or 'rounded fuller figure', which were adored and perceived as indicators of beauty and even a sign of affluence. That perspective was alluded to by the traditional key informants, who stated that the current levels of obesity were a new phenomenon. Those perceptions were identified despite the World Health Organisation (WHO) (2011), report that the anthropometric indicators were predictive of the risk of chronic diseases.

Even though literature had provided scientific evidence of the links between obesity and non-communicable diseases (NCDs) through energy dense food consumption and low intakes of fruit and vegetables (Misra *et al.,* 2011), all the focus groups did not seem to realise the link between consuming healthy food and good health. When purchasing their food from supermarkets and spaza shops, they said they chose food items that they could afford, especially items on special promotion provided by the supermarkets.

The focus group participants seemed to focus on the convenience that the supermarkets and shops provided, selling mostly refined and energy-dense food products which did not need refrigeration. Some studies (Shisana *et al.,* 2013;

Drewnowski, 2015; Stelmach-Mardas *et al.,* 2016), illustrated the role of high energy-dense food consumption as one of the main risk factors linked to obesity. The main products the focus group participants often sought in supermarkets tended to be associated with diet high in saturated fats, sugar and refined foods, whilst low in fibre, such as cooking oils, margarine and varieties of calorific sweetened beverages, often termed 'western diet' (Popkin and Gordon-Larsen, 2004).

Ideally, the consumption of those food products should be moderated to reduce obesity and NCDs (Drewnowski 2015). Drewnowski (2015) also presented the hypothesis that the observed social gradient in NCDs among the lower socio-economic households might be partly related to food prices and diet costs, leading to low-cost, energy-dense and nutrient-poor diets being those of choice for the poor. Shisana *et al.* (2013), Swinburn *et al.* (2013) and Igumbor *et al.* (2012) concurred with the hypothesis that high energy-dense foods which typically contain high quantities of fat, sugar and/or starch, as opposed to low energy-dense foods such as fruits and vegetables, were detrimental to health.

Evidence suggested that the obesity trends most evident among Black women in SA were observed among children and adolescents as well as other race groups, which might suggest that the population was undergoing a rapid epidemiological transition (Sartorius *et al.*, 2015; Solomon *et al.*, 2014; and Shisana *et al.*, 2013). Sartorius *et al.* (2015) demonstrated the progression of obesity prevalence in three cross-sectional surveys of South African adults aged ≥15 years, in 2008, 2010/2011 and 2012, showing that obesity increased significantly from 23.5% in 2008, to 27.2% in 2012, with a significantly (p-value<0.001) higher prevalence among females (37.9% in 2012) compared to males (13.3% in 2012). Those studies indicated that the prevalence of obesity was growing and diets with low fruit and vegetable intakes might expose people to the risk of developing NCDs.

It could be that the adoption of the 'western diet' the groups seemed to embrace, exposed them to the high prevalence of obesity and other degenerative diseases such as heart diseases, high blood pressure, type 2 diabetes and some cancers (Shisana *et al.*, 2013; Goedecke *et al.,* 2005; Puoane *et al.,* 2005;). The 'western

diet' was food that was purchased mostly from large commercial entities known as 'Big Food', collectively referring to both multinational and national companies that dominate the food and beverage environment (Igumbor *et al.*, 2012). In the broader consumer food environment, Big Food ensured the availability, affordability and acceptability of highly processed products (Igumbor *et al.*, (2012). It might be that Big Food's strategy of ensuring the availability, affordability and acceptability of their products possibly 'lured' communities such as the participants in the current study to choose those highly processed and energy-dense food products. Those were products that were often promoted at reduced rates to encourage sales of those energy-dense products with long shelf life such as oils and calorific sweetened beverages, which are highly implicated in the prevalence of obesity.

8.5 Conclusion

Perceptions of obesity among the sampled women from Msunduzi seemed to have been influenced by their cultural beliefs where obesity was not regarded as unhealthy. There seemed to be no word for overweight and obesity in their language. Their cultural value systems were not supportive of slimmer bodies, as they regarded 'rounded figures', which were proxies for overweight and obesity, as attractive. This was notwithstanding evidence from literature, that obesity was a public health concern resulting from lifestyles and contexts of epidemiological transition, where highly processed, energy-dense food was consumed. There might be need for government interventions that prioritise public health on food and nutrition, including the awareness of obesity and the associated risk factors for NR-NCDs.

Chapter 9

Discussion, Conclusions and Recommendations

9.1 Introduction and discussion

The study explored whether the sampled women from Pietermaritzburg might have been affected by the nutrition transition, a global phenomenon associated with modernity, urbanisation and shifts from people's indigenous diets and lifestyles. Nutrition transition was also associated with shifts in disease profile from infectious diseases to nutrition related non-communicable diseases (NR-NCDs), the most obvious being obesity, some cancers and metabolic syndrome (Hawkes, 2005). The sub-objectives were also interrogated to better understand if nutrition transition played a role in determining people's food choices and dietary patterns.

The sampled women's anthropometric and demographic status (the first sub-objective) were examined, focusing on the possible impact of the nutrition transition and its associated dietary shifts and obesity.

The food insecurity (the second sub-objective) and its association with the anthropometric status of the sampled women was also examined as one of the sub-objectives. The possible link between food insecurity and the nutrition transition was also examined in the current study.

The nutrition insecurity (third sub-objective) helped to shed light on the food groups that the sampled women consumed. Such food groups indicated if the women experienced dietary shifts from their traditional diets and if they showed signs of increasing obesity levels.

The fourth and last sub-objective in the study explored the women's perceptions of obesity in focus group settings that assessed their food choices and dietary patterns.

The main objective of the study explored whether there was any correlation between the nutrition transition and the reported overweight and obesity among Black African

women in SA, and how that was associated with food and nutrition insecurity. Therefore, the research question posed was: *Does nutrition transition distort food choices and dietary patterns, leading to the overweight explosion and the obesity epidemic?* Thus, the research sub-objectives were discussed and analysed to provide support for the research question:

9.1.1 Sub-objective 1 - Determining the anthropometric and socio-demographic status of the sampled women

a) The anthropometric status of Black African women using BMI, WHR and WC: was measured through the body mass index (BMI) measurements, which provided details about their body composition. The waist-to-hip ratio (WHR) and the waist circumference (WC) both measured the extent of abdominal obesity. Of note in the use of WHR and the WC, was the protocol used, e.g. standardising those measurements when taken by different people in the study (WHO, 2011). In the current study the anatomical placement of the measuring tape, its tightness and the type were according to WHO's standard.

Besides the fact that BMI is one of the WHO's standards for defining the severity of overweight and obesity across populations, it might also be one of the easiest that could be used effectively even in the most remote areas. Also, the measures of the abdominal fat mass, the WHR and WC could be indicative of serious abdominal obesity if the values are high. The average WHR for the sampled women was 0.85, while the WC indicated the average waist circumference (in cm) of 106.74. That was significantly higher than the cut-off of ≥80cm, the implication being that on average the sampled women's WHR and WC values were high. The ethnic specific values for WC for Sub-Saharan Africans, to which the sampled women belonged, used both the European and North American cut-points of ≥ 80cm for women (Alberti *et al.*, 2006b). (**Table 4.2**. Results for BMI & Waist Circumference).

b) Assessing socio-demographic variables using marital status; social grants and household lifestyles:

The marital status, as a socio-demographic variable, was found to be a possible predictor of food poverty and food insecurity at household level, according to Woolard (2002). Marital status might have helped some households where both spouses worked to pool their resources and improve their household socio-economic status. In female-headed households, more often one person - the female head, worked. Should that female head lose a job or have no good qualification, the family becomes the burden of the state through social grants. The marital status indicated that 66.1% of the households were female-headed, and possibly susceptible to food poverty and food and nutrition insecurity. Also, Social grant recipients reflected a possibility of vulnerability to poverty, and food insecurity. The ownership of television (TV) sets by 94% might be suggestive of sedentary lifestyles.

9.1.2 Sub-objective 2 - Assessing the status of food insecurity with HFIAS

As a household food insecurity measurement, HFIAS was based on the household experiences of problems regarding access to food and represented three domains of food insecurity found to be universal across cultures. HFIAS posed questions using nine occurrences - and nine frequency of occurrence questions, to measure the level of food insecurity within the household using a four-week recall period.

HFIAS was a good household food insecurity measurement, as it could be translated into any language of the participants. The language used does not have complex phrases that could be difficult to translate. Therefore, it could be used cross-culturally. It was useful in exposing the extent of household food insecurity as people reported their own experiences at household level.

The questions were sometimes deemed too intrusive as some participants did not want to be known to be food insecure or living in poverty. That was especially the case when they had a friend or someone else listening. The researchers would lower their voices, especially when asking sensitive questions about household food insecurity. The respondents would get the cue and also lower their voices when responding to questions.

The findings that almost all women in the study were obese might be an indicator that they were going through the nutrition transition and had shifted from traditional foods to what was termed the western diet. Such diets were highly implicated in the global nutrition transition and the associated obesity epidemic.

In terms of the household food insecurity as measured by the HFIAS, it could be argued that there were indications of the existence of food insecurity at varying levels among the sampled women. Those incidents could be significant given the 1996 World Food Summit utterances, that food security existed when every household individual at all times had enough nutritious food for an active, healthy and productive life (Department of Social Development and Department of Agriculture, Forestry and Fisheries, 2013).

9.1.3 Sub-objective 3 - Assessing the nutrition insecurity using HDDS

The Household Dietary Diversity Score (HDDS) was designed to be used as a simple food group dietary diversity indicator, in resource-poor settings using a 24-hour recall period (FAO and FHI 360, 2016). The HDDS using a DD was found to be a valuable measure that could easily reflect if a household had access to a variety of healthy and nutritious foods. This assessment tool could make it possible to detect the consumption of nutritious and micro-nutrient adequate diets within households.

On the whole, the findings were suggestive of a community that was undergoing a nutrition transition as they seemed to consume food groups that were energy-dense and implicated in the global obesity epidemic. The nutrition transition and its symptomatic shifts from traditional diets to adopting the highly processed so- called 'western diets', seemed to be linked with shifts in BMI levels of the study participants.

9.1.4 Sub-objective 4 – Focus groups for assessing perceptions of obesity

The fourth sub-objective of the study focused on the Black women's perceptions of obesity using focus group discussions, as well as the perceptions of some traditional key informants. The focus groups might have provided those groups opportunities to realise that obesity was an issue, thus creating an awareness of obesity among the

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participants. The findings indicated that the focus group participants could not associate obesity with NR-NCDs. They seemed to venerate obesity as a sign of beauty and sign of health and affluence.

9.2 Conclusions

1) The sampled women's anthropometric status showed high BMI, WHR and WC values in conjunction with socio-demographic results that were suggestive of sedentary existences.

2) Their lifestyles revealed possible food and nutrition insecurity at household level (mostly supported by government social grants, worsened by a combination of sedentary lifestyle and the high levels of obesity).

3) The women abandoned indigenous foods and mostly consumed foods that are known to induce overweight and obesity such as oils, sugar/sweets and salt associated with the nutrition transition.

4) The sampled women in focus groups might have been undergoing a nutrition transition, and were dependent on supermarket promotion specials in their food choices and dietary patterns.

9.3 Recommendations

The government's intervention in nutrition education about the unhealthy eating practices should prioritise public awareness on obesity by targeting certain food types, particularly:
1) The sugary drinks and tea, and excessive use of cooking oil and salt
2) Certain micronutrient dense food groups, such as vegetables and fruit, should be subsidised and zero rated for value added tax (VAT).
3) Targeted awareness among affected communities that overweight and obesity are not healthy.

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Appendix A

Anthropometric Data Sheet for Body Mass Index (BMI)

Interviewer number _____

Respondent name _____ **and number** _____

Weight (kg) _____

Height (cm) _____

Circumference (cm):

    Waist (cm) _____

    Hip (cm) _____

Thank you

Appendix B

SOCIO-DEMOGRAPHIC QUESTIONNAIRE

Respondent name: _____   *and number:*   **1-3**

Interviewer number: _____   **4**

Respondent Birth Date: | D | D | M | M | Y | Y | Y | Y | **5-12**

Interview Date: | D | D | M | M | Y | Y | Y | Y | **13-20**

Respondent Age (years) if Birth Date unknown: **21-22**

Municipality: _____   23

What is your marital status?   24

(1) Unmarried
(2) Married
(3) Divorce
(4) Widowed
(5) Living together
(6) Separated
(7) Traditional Marriage
(8) Other, specify _____

What language do you speak?   25

1. Sotho
2. Tswana
3. English
4. Afrikaans
5. Xhosa
6. Swazi
7. Zulu
8. Other, please
Specify_____

Does anyone in your family get a government grant?   26

1. Yes   2. No

If yes, which type/s?   27-28

1. foster care   2. child support 3. old age 4. disability?

Are you breastfeeding?

    1. Yes   2. No

29

If yes, how old is the baby?

    _____months

30-31

Household composition:

How many persons live in the house permanently (5-7days per week)?

_____

32-33

Number of children (<18 years): _____

34-35

Number of adults (≥ 18yrs): _____

36-37

What is your highest level of education?

_____

38-39

Primary employment status of respondent (tick only one)

    1. Housewife by choice
    2. Unemployed
    3. Self employed
    4. Full time wage earner (receive a salary)
    5. Other, specify (part-time, piece job etc.) _____
    6. Don't know

40

Husband/partner's primary employment status (tick only one)

    1. Retired by choice
    2. Unemployed
    3. Self employed
    4. Full time wage earner (receive a salary)
    5. Other, specify (part-time piece job etc.) _____
    6. Not Applicable e.g. dead

41

Who is the head of the household?

1. Wife
2. Husband
3. Child/ren
4. Parent
5. Grandparent
6. Friend
7. Other, specify _____

42

Type of dwelling?

1. Brick, concrete: (1) Yes   (2) No   43
2. Traditional mud: (1) Yes   (2) No   44
3. Tin: (1) Yes   (2) No   45
4. Plank, wood: (1) Yes   (2) No   46
5. Other: specify _____   47

What fuel is used for cooking?

1. Electric: (1) Yes   (2) No   48
2. Gas: (1) Yes   (2) No   49
3. Paraffin: (1) Yes   (2) No   50
4. Wood, coal: (1) Yes   (2) No   51
5. Sun: (1) Yes   (2) No   52
6. Open fire: (1) Yes   (2) No   53

Do you use cast iron pot for cooking?   54

(1) Yes or (2) No. **If yes, how often?**

1. ≤ Once a week;   2. > Once a week   3. Every day   55

Does your home have a working

Refrigerator and/or **freezer?**

1. Yes   2. No

Stove? (Gas, Coal or electric or Hot plate, microwave)

1. Yes   2. No

Primus or **Paraffin Stove?**

1. Yes   2. No

Television (TV)?

1. Yes   2. No

Does your home have a vegetable garden?

1. Yes   2. No

Thank you for your time.

Appendix C

Household Food Insecurity (Access) Scale (HFIAS)
Questionnaire

Respondent name _____ and number |__|

Interviewer number: |__|

Municipality: |__|

The purpose of these **questions** is **to assess** the three generally accepted domains of food security, viz.:

- *adequate* food *availability*

- *adequate access* to food by all people and

- *appropriate* food *consumption/utilisation* by all.

The **recall** period is 30 days or **4 weeks/month**.

Each question assesses the **occurrence** and **frequency** of incidents to be asked in the questionnaire. E.g. Q.1 and Q1.a

- **Q1**. assessing the **occurrence**, and

- **Q1. a** assesses the **frequency**.

No.	Question	Response Options	CODE
1.	In the past four weeks, **did you worry** or get **anxious** that your household/**family would not have enough food?**	0 = No (skip to Q2). **How do you know?** [no complaints; children and/or teenagers]. 1 = Yes. **How do you know?** [complaints about not having enough food; children and/or teenagers]	....|__|
1.a	How often did this happen	1 = **Rarely** (**once or twice** in the past four weeks) 2 = **Sometimes** (**three to ten times** in the past four weeks) 3 = **Often** (**more than ten times** in the past four weeks)	....|__|
2.	In the past four weeks, **were you** or any of your household /family members **not able to eat the kinds of foods you preferred** because of **lack of resources?**	0 = No (skip to Q3). **How do you know?** [no complaints; children and/or teenager] 1 = Yes. **How do you know?** [complaints about food they did not want to eat; children and/or teenagers]	....|__|
2.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	....|__|
3.	In the past four weeks, **did you** or any household/family member **have to eat a limited variety of foods** due to **lack of resources?**	0 = No (skip to Q4). **How do you know?** [no complaints; children and/or teenagers] 1 = Yes. **How do you know?** [complaints about eating the same type of food children and/or teenagers]	....|__|
3.a	How often did this happen?	1 = **Rarely** (**once or twice** in the past four weeks) 2 = **Sometimes** (**three to ten time**s in the past four weeks)	....|__|

		3 = **Often** (**more than ten times** in the past four weeks)	
4.	In the past four weeks, **did you** or any household/family member **have to eat some foods** that **you really did not want** to eat **because of lack of resources (e.g. money)** to obtain other types of food?	0 = No (skip to Q5). **How do you know?** [no complaints; children and/or teenagers] 1 = Yes. **How do you know?** [complaints about eating food they do not want children and/or teenagers]	....|__|
4.a	How often did this happen?	1 = **Rarely** (**once or twice** in the past four weeks) 2 = **Sometimes** (**three to ten times** in the past four weeks) 3 = **Often** (**more than ten times** in the past four weeks)	....|__|
5.	In the past four weeks, **did you** or any household/**family member have to eat a smaller meal** than you felt you needed **because** there was **not enough food?**	0 = No (skip to Q6). **How do you know?** [no complaints; children and/or teenagers]. 1 = Yes. **How do you know?** [complaints about size of serving; children and/or teenagers]	....|__|
5.a	How often did this happen?	1 = **Rarely** (**once or twice** in the past four weeks) 2 = **Sometimes** (**three to ten times** in the past four weeks) 3 = **Often** (**more than ten times** in the past four weeks)	....|__|
6.	In the past four weeks **did you or any** household/**family member have to eat fewer meals in a day because** there was **not enough food?**	0 = No (skip to Q7). **How do you know?** [no complaints; children and/or teenagers]. 1 = Yes. **How do you know?** [complaints about always feeling hungry outside of the meals time; children and/or teenagers]	....|__|
6.a	How often did this happen?	1 = **Rarely** (**once or twice** in the past four weeks) 2 = **Sometimes** (**three to ten times** in the past four weeks) 3 = **Often** (**more than ten times** in the past four	....|__|

		weeks)	
7.	In the past four weeks <u>was there ever</u> <u>no food</u> to eat of any kind in your household/family **because of lack of resources (money)?**	0 = No (skip to Q8). **How do you know?** [no complaints; children and/or teenagers]. 1 = Yes. **How do you know?** [complaints about feeling really hungry outside and at meal times; children and/or teenagers]	….|__|
7.a	How often did this happen?	1 = **Rarely** (once or twice in the past four weeks) 2 = **Sometimes** (**three to ten times** in the past four weeks) 3 = **Often** (**more than ten times** in the past four weeks)	….|__|
8.	In the past four weeks **did you** or any household/family member <u>go to</u> <u>sleep at night hungry</u> because there was **not enough food?**	0 = No (skip to Q9). **How do you know?** [no complaints; children and/or teenagers]. 1 = Yes. **How do you know?** [serious complaints about feeling very hungry outside meal times and at night; children and/or teenagers]	….|__|
8.a	How often did this happen?	1 = **Rarely** (**once or twice** in the past four weeks). 2 = **Sometimes** (**three to ten times** in the past four weeks). 3 = **Often** (**more than ten times** in the past four weeks)	….|__|
9.	In the past four weeks **did you** or any household/family member **go** a <u>whole day and night</u> without eating anything **because** there was **not enough food?**	0 = No (**questionnaire is finished**). [no complaints; children and/or teenagers]. 1 = Yes. **How do you know?** [serious complaints throughout the day about feeling very hungry; children and/or teenagers]	….|__|
9.a	How often did this happen?	1 = **Rarely** (**once** or **twice** in the past four weeks) 2 = **Sometimes** (**three** to **ten** times in the past four weeks). 3 = **Often** (**more than ten times** in the past four weeks)	….|__|

Thank you

Appendix D

> **Household Dietary Diversity Score (HDDS) Questionnaire using 24 Hour Re-call**

Respondent name _____ and number: |__|

Interviewer number: |__|

Municipality: |__|

The Household Dietary Diversity Score **(HDDS)** survey instrument is based on 12 food-groups administered to get information related to **household economic access to food**. The target is persons under the same roof who share meals, includes **foods prepared** and **consumed in/out** of the **home**, and **purchased** or **gathered outside** and **consumed inside** the home.

N.B. Atypical consumption is **avoided** e.g. celebration/feast.

The 12 food-groups for HDDS

1. **Cereals:** maize/corn, wheat, rice. millet, oats etc.

2. **White tubers/roots:** potatoes, sweet potato, parsnip, turnip. Arrow root, amadumbe etc.

3. **Vegetables:** combination of:

   Yellow/orange Vitamin A-rich vegetables – carrot, pumpkin, orange flesh sweet potato
   Dark green leafy vegetables – spinach, wild spinach, pumpkin leaves, wild rocket
   Other vegetables – beetroot, peppers, tomatoes etc.

4. **Fruits:** combination of:

   Vitamin A-rich fruits - (yellow/orange) mango. Orange, apricots, peaches etc.

Other fruits – banana, apple, gooseberry, avocado etc.

5. **Meat:** Organ meat – liver, heart, gizzards, lung

    Beef, lamb, mutton, goat, pork, chicken etc.

6. **Eggs** – chicken, duck

7. **Fish and sea-food:** fresh, dried, canned

8. **Legumes, nuts, seeds**: beans, peanuts, macadamia, pecan nuts

9. **Milk and milk products**: amasi, yoghurt, infant formula, custard etc.

10. **Oils and fats:** Butter, margarine, mayonnaise, vegetable oil

11. **Sweets**: biscuits, cakes, chocolate, jam, sweetened fruit juice and sugary drinks

12. **Spices, condiments and beverages**: Maggi tubes, tomato ketchup, tea, coffee, beer, wine.

Appropriate translation and **adaptations** using key informants in the community and experts will be done.

N.B. __mixed dish__ ingredients such as **oils** and **sugars** within foods will be **probed and recorded** appropriately.

Household Dietary Diversity Score (HDDS) Questionnaire for the 24-hour Recall

The main Question:

Please describe the foods you ate or drank yesterday (meals and snack) during the day and night, whether at home or outside home. Start with the first food or drink eaten in the morning.

NB. Probe the respondent for food group not mentioned.

Question number	Food Group	Examples of foods	Yes = 1(circle) No = 0 (circle)
1	**Starchy staples – a combination of cereals and white roots & tubers**	Corn/maize, rice, pasta, wheat, sorghum or any other grains made from these e.g. bread, porridge, pap, pasta etc. white potatoes, amadumbe, and other foods from roots.	
2	**Vitamin A rich vegetables & tubers**	Pumpkin, carrot, squash or sweet potatoes that are orange inside.	
3	**Dark green leafy vegetables**	Wild spinach and, spinach, pumpkin leaves and other locally available dark green leafy vegetables.	
4	**Other vegetables**	Other vegetables e.g. chakalaka, achar, tomatoes, onion and other locally available wild vegetables.	
5	**Vitamin-A rich fruits**	Ripe mangoes, ripe pawpaw, apricots/peaches ripe or dried.	

6	**Other fruits and wild fruits**	Other locally available fruits including wild like amarula fruit, wild berries and guavas.	
7	**Organ meat**	Liver, kidney, sheep/ox intestines and stomach	
8	**Flesh meats**	Beef, pork, lamb, goat, or any wild game, chicken, duck or other birds.	
9	**Eggs**	Chicken, duck or any egg.	
10	**Fish**	Fresh, tinned or dried e.g. sardines and snoek	
11	**Legumes, nuts & seeds**	Beans, peas, lentils, peanuts, seeds or foods made from these e.g. peanut butter.	
12	**Milk and milk products**	Milk, maas, cheese, plain or sweetened yoghurt and other milk products.	
13	**Oils and fats**	Oils, fats, margarine added to food and used for cooking.	
14	**Sweets**	Sugar, honey, sweetened drink and juice, sugary foods such as chocolate, biscuits and cakes.	
15	Spices, condiments and beverages	Spices e.g. salt & pepper, condiments like sauces e.g. tomato sauce, beverages like tea, coffee and alcoholic beverages and any local beverage	

16. In the past 24 hours did you or anyone in your household eat **anything** (**meal e.g. KFC**, **snack e.g. chips** or **fruit**) **outside the home** (e.g**.** at the **School Tuck Shop** or from the **Spaza Shop?**

17. In the past 24 hours did you **eat or buy anything** that has **not** been **asked** in the questionnaire?

18. As a household, what is your **source of food**?

- do you **produce** your own food or?

- Do you **buy** from **local shops** or **local market** or?

- Do you **buy from big supermarket?**

- **Why is that?** _____

Thank you

Appendix E

Focus Group Interview Guide

No.	Interview questions	Various responses
1.	Where do you get your food for home consumption? Why?	Spaza shops, supermarkets or food markets.
2.	What are the traditional Zulu words for a fat body? Why?	There is no Zulu word for a fat body.
3.	What do you like about a fat body in a woman? Why?	Dignity, wealth, respectable, beauty
4.	What do you not like about a fat body in a woman? Why?	Problem with dress sizes at times, when there is extreme fatness.
5.	What do you like about a thin body in a woman? Why?	African women don't look right when thin.
6.	What do you not like about a thin body in a woman? Why?	People think one has HIV/AIDS

Appendix F

Informed Consent Letter- English

Food Security Programmes, School of Agriculture,
Earth & Environmental Sciences (SAEES)
University of KwaZulu-Natal,
Pietermaritzburg Campus,

Dear Participant

INFORMED CONSENT LETTER

My name is Phumzile Dandala. I am a Food Security PhD candidate studying at the University of KwaZulu-Natal, Pietermaritzburg Campus, South Africa.

I am interested in learning about the effects of *nutrition transition* (the change in the diets/foods of people, from the traditional staple food people used to eat, to the food they now eat. The food people tend to eat these days is called the*'western diet'*. I am studying the cases of people from Msunduzi Municipality such as KwaQanda and Elandskop and other neighbouring communities to see if eating the western foods has made any changes in their health and food security. Your community is one of my case studies. To gather the information, I am interested in asking you some questions.
Please note that:

- Your confidentiality is guaranteed as your inputs will not be attributed to you in person, but reported only as a population member opinion.
- The interview may last about 1 hour and may be split depending on your preference.
- Any information given by you cannot be used against you, and the collected data will be used for purposes of this research only.
- Data will be stored in secure storage and destroyed after 5 years.
- You have a choice to participate, not participate or stop participating in the research. You will not be penalized for taking such an action.
- The research aims to explore the impact of the nutrition transition among the people in the Msunduzi Municipality, and how it informs people's food choices.
- Your involvement is purely for academic purposes only, and there are no financial benefits involved.
- If you are willing to be interviewed, please indicate (by ticking as applicable) whether or not you are willing to allow the interview to be recorded by the following equipment and are willing or not, to be measured for body mass index (BMI):

	willing	Not willing
Audio equipment		
Photographic equipment		
Video equipment		
Or measured for MBI		

I can be contacted at:

Email: phumzile@cdtrust.co.za

Cellular phone: 079 2192 381

My supervisor is Professor Maryann Green who is located at the School of Agriculture, Earth & Environmental Sciences (SAEES) Pietermaritzburg Campus, University of KwaZulu-Natal.
Contact details: email: green@ukzn.ac.za, telephone number: 033 260 5271 & 082 510 8585.

My Co-supervisor is Dr Annette Van Onselen,
Dietetics and Human Nutrition SAEES,
Pietermaritzburg Campus, University of KwaZulu-Natal.
Contact details: Vanonselen@ukzn.ac.za, 033 260 6154 & 083 468 2862.

My other Co-supervisor is Professor Unathi Kolanisi,
University of Zululand
Faculty of Science and Agriculture, Consumer Sciences,
Kwa-Dlangezwa, South Africa.
Contact details: KolanisiU@unizulu.ac.za, 035 902 6003 & 073 054 8481.

You may also contact the Research Office through:
P. Mohun
HSSREC Research Office,
Tel: 031 260 4557 E-mail: mohunp@ukzn.ac.za

Thank you for your contribution to this research.

DECLARATION

I……………………………………………………………………… (full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project voluntarily.

I understand that I am at liberty to withdraw from the project at any time, should I so desire.

SIGNATURE OF PARTICIPANT   DATE

Informed Consent Letter- Zulu

Food Security Programmes, School of Agriculture,

Earth & Environmental Sciences (SAEES)

University of KwaZulu-Natal,

Pietermaritzburg Campus,

Mhlanganyeli

INCWADI YESIVUMELWANO ESICATSHANGISISIWE (Informed Consent Letter)

Igama lami ngingu Phumzile wakwa Dandala. Ngenza iziqu zobudokotela (PhD) mayelana nokutholakala kokudla, enyuvesi yaKwaZulu Natal ophikweni lwaseMgungundlovu.

Ngithanda ukwazi ngokuguquka kwendlela abantu abadla ngayo, kusukela ekudleni kwesintu okukwakudliwa emandulo kuze kufike ekudleni okudliwa esikhathini samanje. Uhlobo lokudla oludliwa esikhathini samanje lubizwa ngokuthi i-*'wersten diet'*. Okuchaza ukuthi ukudla kwasentshonalanga kwesilungu. Ngenza ucwaningo ezindaweni ezakhele umasipala waseMsunduzi (kwaQanda nase Elandskop), ukubheka ukuthi lokhu kudla kwasentshonalanga akushintshi yini ezempilo kanye nokutholakala kokudla kubantu abakhele lo masipala. Umphakathi wangakini nawo uyingxenye yalolucwaningo ngakho-ke ngingathanda ukukubuza imibuzo embalwa ukuze ngiqoqe ulwazi.

Qaphela lokhu okulandelayo

- Imibono kanye nemininingwane yakho kulolucwaningo iyimfihlo futhi izobikwa njengo mbono welungu loluntu.

- I-inthavyu ingathatha ihora elilodwa kodwa kuzoya ngokuthi wena ufuna kwenziwe kanjani, noma ihlukaniswe izigatshana.

- Ulwazi olunikile kanye nemininingwane eqoqiwe angeke kusetshenziswe ngendlela engalungile noma ephambene nawe, kodwa kuzosetshenziselwa izihloso zocwaningo kuphela.

- Imininingwane eqoqiwe izogcinwa endaweni ephephile, bese emuva kweminyaka emihlanu iyashatshalaliswa.

- Ungakhetha ukuhlanganyela, ukhethe ukungahlanganyeli noma ukuyeka ukuhlanganyela kulolu cwaningo, angeke ujeziswe ngalokho.

- Inhloso yalolucwaningo ukwazi kabanzi uma kukhona ukuguquka kwendlela okudliwa ngayo ngezikhathi zamanje, ngokukodwa ezindaweni ezakhele uMasipala wase Mgungundlovu.

- Ngokuhlanganyela kwakho kulolucwaningo ngeke uzuze mali, kodwa ubamba iqhaza kwezemfundo.

- Uma uvuma ukwenza i-inthavyu, tshengisa (ngokwenza uqwi ebhokisini elifanele) ukuthi uyavuma noma awuvumi ukuqoshwa ngalendlela elandelayo:

154

	Ngiyavuma	Angivumi
Ukuqoshwa izwi		
Ukuthatha izithombe		
ividiyo		
Ukukalwa		

Ngiyatholakala kulezinombolo:
Imeyili: phumzile@cdtrust.co.za
Ucingo : 0792192381

Abagquqguzeli abalawula lezifundo zami yilaba:
Professor Maryann Green
School of Agriculture, Earth & Environmental Sciences (SAEES)
Pietermaritzburg Campus, University of KwaZulu-Natali.
Imeyili: green@ukzn.ac.za,
Ucingo: 033 260 5271 & 082 510 8585.

Dr Annette Van Onselen,
Food Security Programmes, SAEES,
Pietermaritzburg Campus, University of KwaZulu-Natali.
Imeyili nocingo: Vanonselen@ukzn.ac.za, 033 260 6154 & 083 468 2862.

Professor Unathi Kolanisi,
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Faculty of Science and Agriculture, Consumer Sciences,
Kwa-Dlangezwa, South Africa.
Imeyili nocingo: KolanisiU@unizulu.ac.za, 035 902 6003 & 073 054 8481.

Futhi unalo ilungelo lokuthintana nehovisi lezocwaningo laleNyuvesi yaKwaZulu-Natal ngokuthinta:
P. Mohun
HSSREC Research Office,
Tel: 031 260 4557 E-mail: mohunp@ukzn.ac.za

Ngiyabonga ngeqhaza olidlalile kulolucwaningo.

ISIFUNGO

Mina…………………………………………………………………………………………………….. (amagama aphelele omhlanganyeli) ngalokhu ngiyaqonda ngokuqukethwe yilencwadi, kanjalo nohlobo lweprojekthi yocwaningo eyenziwayo, futhi ngiyavuma ukuhlanganyela kuyona, futhi angiphoqekile kulokho.

Ngiyaqonda nokuthi ngikhululekile ukuhoxa kulolucwaningo noma ngabe yinini uma ngifisa.

Isiginesha yomhlanganyeli……………………………………………………………

Usuku   …………………………………………………………………………………