



UNIVERSITY of the
WESTERN CAPE

Obesity in Children: Environmental and Parental Influences.

The Case Study of Khayelitsha in South Africa

By

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*A mini thesis submitted in fulfilment of the requirement for a degree
Magister Scientiae, in the Institute for Social Development, Faculty of
Economic and Management Sciences*

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March 2020

ABSTRACT

Overweight and Obesity are conditions of excessive fat accumulation in the body of an individual. Due to the growing prevalence of the obesity epidemic, obesity has become a global public health concern. Overweight among South African children is on the increase as many young people now suffer from diseases related to obesity. Given the prevalent conditions of weight gain amongst children, tackling obesity in children should be given greater attention as children are twice at risk of becoming obese in the later stage in life. Such intentional efforts could contribute significantly to reducing public spending in the treatment of non-communicable disease. This research aimed at understanding the Environmental and Parental Factors Influencing childhood overweight and obesity. The research identified the different factors that were associated with child overweight and obesity in the study area. Besides, the research was aimed at raising awareness of the need to sensitize parents and stakeholders on the factors associated to child obesity and proposed possible recommendations. To achieve these aims, one of the objectives was to statistically evaluate the extent of the prevalence of overweight and obesity in the study area as well as identify the types of food choices available to children. Furthermore, it analyzed dietary intake in households with obese parents and children, to determine the relationships that exist.

A review of the literature shows no program in place in the entire Western Cape Province that aims at addressing childhood obesity. In addition, a review of the literature showed that obesity is a multifaceted problem whose prevention will not be achieved by tackling one specific factor. With this evidence, the researcher seeks to advocate for a multifactor approach to address childhood obesity by focusing on the parental and environmental factors associated with childhood overweight and obesity.

The study used secondary data collected in 2016, by the Institute for Social Development. Qualitative and quantitative data relevant to this study was extracted and analysed using STATA version 14. There were 467 children involved in the study. The dataset contained variables relating to the built environment of the population of Khayelitsha where the study was conducted and parental factors associated with children's eating lifestyle. The data collected identified food types in the environment, food outlets and the effect of TV advertisements on food purchases. Qualitative methods enabled information related to food types to be extracted. Consequently, child dietary intake was obtained, which ensured that the nutritional value of children's food choices could be determined.

The found that over 60% of adults in the household were overweight and obese. Children with overweight condition were 16% (BMI 85th centile) and 14% (BMI 95th centile) were clinically obese. Carbohydrates form 87% of what children buy, while Proteins, Dairy Foods, Beverages and Fruits together formed only 13%. The primary objective of this research was to determine how parents, as well as the environment influence obesity in children. Since results showed that the number of households where adults were more obese than the children was higher, it confirms the fact that parents are influencing obesity in children. In addition, it was found that environmental factors like television viewing, types of food outlets in the community and food types, had contributed to obesity in the study site. From these results, the study concluded that both parents and the environment prompt childhood obesity.

KEYWORDS

Children,

Dietary,

Environmental,

Food,

Influence,

Khayelitsha,

Obesity,

Outlet,

Overweight,

Parental

DECLARATION

I declare that this thesis titled “*Obesity in Children: Environmental and Parental Influences in South Africa. The Case Study of Khayelitsha*” is my work, and has not been previously submitted for any degree or examination at any other university, and that all the sources used has been duly acknowledged by complete referencing.

Name Ayuk Juveta NchoungDate.....Signed.....

DEDICATION

This thesis was written at a time when our children needed me the most. The completion of this work came at great cost to our children who had to stay alone most of the time especially after school because my husband and I had to be at school. I dedicate this thesis to Caleb Godwins Nguatem and David Godlover Nguatem for their unusual support and understanding, their composure and discipline in our absence. All the times I left home for school, and they, with smiles, said “bye mummy” cheered my heart. I love them so much.”

ACKNOWLEDGEMENT

I want to acknowledge God Almighty for keeping me going from beginning to the end of this academic pursuit. Everyone who has been a support for me was His blessing to me. He gave me drivers from all directions.

I thank my supervisor Professor Mulugeta Dimbabo very much for his guidance and unending support. He was quite patient and understanding and gave me access to his office at any time. That on its own was a great relief. Your feedback went a long way to polish this work and bring it to standard. May the Lord reward you abundantly.

My gratitude also goes to the Institute for Social Development, for permitting me to use the data which was the hallmark for this study. Without this data, the aims of this study would not have been met. The findings would also not have been realized and consequently, the knowledge that I got would still be unknown.

Miss Gwendolyn Raitt and Mr. Rohan Maclons my ISC coordinators, I thank you very much for the trust you have in me to have given me a work-study position as a master's student. With the finance I earned, my fees were paid. I remain grateful to both of you.

My gratitude goes to the church Christian Missionary Fellowship International (CMFI) Cape Town and to Pastor/Dr. Bertrand Sone and wife Enih Sone, for giving me prayers and moral supports.

My sincere thanks to my husband Mr. Michael Nguatem Belebema. You have given me ceaseless support. You bore all my frustrations and made me work to finish. When I felt like I could not continue, your gentle voice would say. Try and complete that thesis. You did not withhold finances whenever it was needed. It was the 2018 Student Camp in Cameroon that finally brought me in to complete this thesis. Where you invested most, yielded the result that met the desire of your heart. You are a leader and a promoter. You have promoted me. God bless you in abundance. Our sons Caleb and David have been extraordinarily supportive in this journey. They gave me all the extra time I need to concentrate on my thesis after hours. May the Almighty God reward you greatly.

Finally, my prayer partners; you too knew whenever there was a halt. Your counsels meant so much. Your spiritual, moral and practical support was immeasurable. Thank you very much.

To God Be the Glory

LIST OF ACRONYMS AND ABBREVIATIONS

CSG	Child Support Grants
OAG	Old Age Grant
DG	Disability Grant
CDG	Child Disability Grant
SANHANES	South Africa National Health and Nutrition Examination Survey

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CHAPTER 1: INTRODUCTION TO THE STUDY

1.1 Introduction

The World Health Organization (WHO) defines overweight and obesity as conditions of abnormal or excessive fat accumulation. It is over forty-five years since a warning about the risk of proneness to obesity was first raised. However, this seems to be producing no results as the number of obese individuals and obesity-related diseases continues to rise. For 33 years, no nation has successfully recorded a reduction in obesity (Pienaar, 2015). As such, there is a growing prevalence of the obesity epidemic, leading to adult obesity linked to childhood overweight and obesity. For instance, children, who were obese at 1-2 years of age, will probably stay obese at 16-18 years (Lundeen et al., 2016). It is more likely for overweight children to become overweight adults (Wang and Lobstein, 2006). Both of these show the long-term persistence of obesity. And it is argued that the prevention of obesity in children should be prioritized to combat the epidemic. For this reason, this research studies causes of obesity in childhood in order to curb it.

This study seeks to explore the Environmental and Parental Influences on the Prevalence of Overweight and Obesity among Children in Khayelitsha, using qualitative and quantitative research methodologies. In the context of the proposed study, the researcher presents the following sections in this chapter;

(1.2) the background and contextualization, (1.3) significance of the study, (1.4) rationale of the study (1.5) problem statement, (1.6) research question (1.7) the research aim and objectives (1.8) specific objectives of the study limitation of the study, and (1.9) chapters outline.

1.2. Background and contextualization of Case Study Area- KHAYELITSHA

Khayelitsha is a township in the city of Cape Town; located about 30 kilometers east on the Cape Flats. It has a surface area of 10,000/km². Divided into 22 sub-sections, it is made up of both formal and informal areas. The Khayelitsha township is reported to have varying population figures. According to Figueroa et al. (2017), the population of Khayelitsha was 391749, whereas it was reported by Kaplan et al (2017) that the population was over 500 000 and Brunn and Wilson (2013) stated a population of 1million inhabitants. These conflicting figures pose a huge challenge for researchers, stakeholders and more especially for development planners to estimate an appropriate growth rate for resource allocation in the area. Its population comprised of 90.5% Black, 8.5% Coloured and 0.5% White. Thus, this area consists mainly of the blacks and coloured

racial groups that were discriminated in the past and about which there are few documents on nutritional status (SAJCH, 2011).

According to Figueroa et al. (2017), such a middle-income area will have a high prevalence of obesity. As such, other researchers have found that there is a high level of obesity in Khayelitsha. Although this is the situation, there is low recognition of obesity as a problem within it because it is a community where perception plays a role in body size and hinders the prevention of obesity. For example, due to the fact that fatness is perceived to be associated with riches, affordability of sufficient food and healthy eating, obesity in children has been thought to be reflecting good health derived from a sufficient supply of food (Mvo, 1999).

There are other social factors explaining why obesity is prevalent in Khayelitsha. Literature show that racial distribution has curved it a predominantly black locality. with its limited access to resources, low income and lack of economic opportunities are critical determinants of obesity in poor communities (Colls and Evans, 2014). Moreso, there is a serious nutritional crisis as obesity here results from over nutrition (Puoane, 2008), especially when there is the use of the healthy obesity concept (Malhotra, et al.; 2008).

However, studies have also shown that communities with low-income, racially and ethnically diverse populations tend to bear a greater burden of obesity and its related health problems (Elbel, et al., 2011). In addition, there is a link between migration and the changing lifestyle of the population as urban areas experience rural-urban influx. For instance, the name Khayelitsha is an expression in isiXhosa which means “Our New Home” (Curry, 2011:1), given by the migrants from the Eastern Cape to Cape Town. Migration led to nutrition transitions, defined by Mandle et al. (2015:1) as a shift from “traditional diets to contemporary patterns of food consumption”. In support of this, Bourne, et al. (2002) have provided insight into the change of diets of the black people, who have become exposed to Western diets characterized by decreases in carbohydrate and fibre and increases in fat. It is an indication that the blacks have abandoned traditional diets that have been associated with a low prevalence of degenerative diseases.

Likewise, Gopalan and Aeri (2001) has added that there is a rise in affluence in the community with a rise in employment and the salaries already mentioned, whose effects are changes in dietary practices, physical activity levels, and lifestyles. Thus, it has created an additional change that affects the health of inhabitants in Khayelitsha. Therefore, both the proximate and underlying causes of obesity are present in this study site. The proximate being the metabolic disruptors, and the underlying being those causes creating the metabolic dysfunctions (Chandaria, 2014). Yet, it is an area with little documentation about nutritional status.

Given the transition taking place, the underlying cause can explain obesity in adults. Some of these underlying causes include lack of access to healthy foods in childhood. For example, an adult who did not have access to healthy food in their childhood could be overweight or obese in their adult years.. Knowledge of the fact that early malnutrition from deprivation alters regulatory mechanisms for energy intake as stated by Case and Menendez (2009), is an important guide to the understanding of obesity in children. For example, the findings of other researchers have shown that women raised in poor households, who went hungry as children, were obese. Points to the fact that hunger and starvation are possible causes of obesity. Thus, the efforts devoted to fighting against the increase in the prevalence of obesity requires that the cause of obesity be understood. As another researcher has already commented, interventions might not be converted from one environment to another or across diverse cultural groups (Lobstein et al., 2015). From these, it is necessary to say that research on obesity has to be area specific. Therefore, to intervene in a specific area, the health status of that area needs to be understood. Hence, a case study approach has been used to gain insight into obesity in Khayelitsha. The subsections here below, provide elaboration concerning this research.

1.3. Significance of the study

Obesity is a problem that has gained significant international recognition in the twenty-first century. And a serious nutritional crisis had been indicated for children in the Khayelitsha community. Worldwide, and South Africa, in particular, is devoted to reducing this epidemic, due to its associated effects posed on the health of the nation(s). Childhood obesity is specifically an issue because obese children are twice at risk of becoming obese later in life (Serdula, et al, 1993). Thus, it predicts obesity in adulthood and it is a challenging phenomenon, as it is resistant to treatment as there are few treatments leading to permanent weight loss (Martin, 2018).

Furthermore, South Africa has the highest rates of obesity in Africa and overweight among South African children is increasing (Figuroa et al.; 2017). Currently, the rate of obese children in South Africa stands at 22.9%. And perhaps, after women (39.2%), children are the next in the obesity profile of the nation. In addition to this, many healthcare facilities are observing an increase in young people suffering from diseases related to obesity. Therefore, this study is useful as it will lead to an increase in understanding of obesity and will lead to solutions that will improve the human conditions. For example, the results can inform policymakers to develop programs to prevent obesity in children or intervene more successfully. Hence, the findings of this study would be very useful also for family members who would love to control but have rarely had opportunities to talk about obesity. For instance, creating opportunities to discuss overweight in

the health facilities since it has been noticed from parents, that overweight is infrequently discussed (Flower et al., 2007).

Moreover, this research seeks to highlight some of the environmental and parental factors associated with childhood overweight and obesity. The research will also lead to increased knowledge that will expand the database on childhood obesity for an area with not much research on nutritional status due to limited empirical data underlying causes of malnutrition in South Africa (Oldewage-Theron et al., 2006).

1.4. The Rationale of the Study

Obesity is a condition that can affect anyone in society; child or adult, male or female, rich or poor, educated or uneducated, urban dwellers or rural dwellers. It affects health, and also impact on productivity at work, thus affecting economic aspects of the country. Therefore, it is a social problem that spans from individuals, households to the nation at large. It is also quite clear that the food choices of individuals contribute greatly to the occurrence of obesity in every given country.

Furthermore, it has been understood that childhood is a fundamental period for the development of obesity. Obesity at this stage in life has health consequences but also influences the psychosocial development of the affected children (Wang and Lobstein, 2006). Therefore, this research is primarily to understand how the adults in the environment and the built-in environment, influence food choices of children to stimulate the occurrence of obesity. It will reveal unhealthy eating habits to refrain from while encouraging healthy lifestyles. It draws from the fact that if children are not exposed to unhealthy eating habits, they will become more responsible and choose healthily.

As already said above, there exists a link between child obesity and adult obesity. Thus, carrying out this research in a community consisting mainly of blacks, it means a solution to obesity from the population level with the largest number of individuals, would consequently prevent a lot of children from becoming obese and vice versa. As such, conducting this research would widen the gap between the affected and the unaffected. Therefore, available resources can be directed to carter to a smaller group of people, advancing the fight against the prevalence of obesity in South Africa.

1.5. Problem Statement

As earlier cited, the obesity epidemic is on the rise in South Africa. Two categories have been used to elaborate on this. Firstly, it has been read previously that more children are being affected, thus expanding South Africa's rate of obese children to 22.9%. Next, a comparison of the statistics on adult's rates of obesity between 2007 and 2013, shows that obesity has increased from 27% to 39.2% amongst females (Van Zyl et al. 2017).

This simultaneous rise in rates of obesity on adults and children certainly affects the nation. Thus in 2016, the Kwazulu Natal Health MEC declared that "Being obese is detrimental to good health." (Clark-Riddell and Sanpath, 2016:1). If the causes are not found and strategic interventions implemented, more people in the community could become affected. Consequently, there would be a subsequent increase in the number of cases reporting non-communicable diseases. As a result, there will be an additional problem of insufficient health facilities to cater for the affected children and adults. Already, many healthcare facilities are observing an increase of relatively young people suffering from diseases related to obesity. Worse still, the director of Priceless, has stated that the percentage of deaths in South Africa now caused by "non-communicative lifestyle diseases" is 13.1% (Clark-Riddell and Sanpath, 2016).

Thus, providing solutions to these problems will curb their possible outcomes. For there to be a quick intervention, this research which intends to provide clarity about how to combat obesity in a low-income community is worthwhile. To not conduct it might just mean that the existing relationship of having an obese child growing into an obese adult would continue, and the epidemic will continue to rise in South Africa.

1.6. Research Questions

To reduce the burden of obesity in families and the nation, sources causing obesity have to be identified. Two of these are the influences parents and the environment might be having on an individual. Hence, in the context of the research problems identified above, the main purpose of the research is to provide an answer to the general research question;

- ❖ What are the environmental factors that are linked to obesity?
- ❖ What are the parental factors that contribute to childhood obesity?
- ❖ How does the food choice of parents influence the food choices of the child?

1.7. The Research Aim and Objectives

This research aims to contribute to the knowledge of child and adult obesity and to propose recommendations that are aimed to fight against obesity in South Africa. It will enable the categorization of the children in the community in the order; obese or non-obese. In turn, this will

facilitate early identification Flower et al., (2007) as one of the effective ways to avert overweight and the complications that come with it.

Besides, the act of categorizing children according to their health status will also delineate where prevention and treatment efforts can be made. Summarily, the research aims to find out the extent of the prevalence of obesity in the area to know how to further prevent the situation of child obesity.

1.8. Specific objectives of the study

The specific objectives to achieve the aim are;

1. To review existing literature and also provide a theoretical and conceptual framework for the research by analyzing the relevant theories and concepts,
2. To study the BMI of children in Khayelitsha township in Cape Town to their food choices.
3. To determine healthy and non-healthy food choices for children.
4. To verify the link between obese children and parents. To do this parents' and children's dietary intake will be analyzed to determine the relationships that exist.
5. To identify the opportunities and challenges for the obese and provide practical recommendations to the government, policymakers, and other stakeholders.

1.9. Limitation of the Study

Although this research will contribute to reducing the burden of obesity in the nation of South Africa, it is dealing with a complex problem that is being investigated using different parameters. Due to the interest given to fighting obesity, there has been advancement in data storage about obesity. Thus, increasing the number of studies based on secondary data. Therefore, as the study makes use of secondary data it acknowledges that some limitations with the use of secondary data will apply. For instance, the quality of the data was not under the control of the researcher. As such, the data might not cover all aspects of interest in the current research.

1.10. Thesis Outline

The research is presented in five chapters; the first chapter has introduced the study, providing a brief background on the case study and stated the research problem, the main aim and specific objectives of the study. The rest of the chapters come in subsequently order as shown below:

Chapter 2 The Literature Review/Theoretical Framework: This chapter covers a literature review of the prevalence of obesity. In it, there is the definition and clarification of terms used, as well as an outline of the theoretical base for the research.

Chapter 3 Methodology: This chapter has stated the research design and included the sampling techniques, size of the sample, on what basis the sample was selected, what unit of analysis is

used. It is also in this chapter the qualitative and quantitative research methods used in this thesis will be explained in detail, to give validity and credibility of the research.

Chapter 4 Results and Discussions: It provides the findings of key variables and the discussion of how the research findings are related. Thus, the analyses run led the researcher to determine whether parents and the environment influence obesity in children. But its content shows firstly how the influences are brought about. So, where it was found that parents and/or the environment influenced childhood obesity, the discussion also clarifies how this took place.

Chapter 5 Conclusion and Recommendation: This chapter will state the main findings of the research. It is in this chapter that the researcher will conclude whether the hypothesis was correct or incorrect. At the end of this chapter, recommendations will be provided to the government, policymakers, and other stakeholders on practical measures to tackle obesity in children.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

A great deal of literature is available on overweight and obesity in developed and developing countries. Therefore, this chapter is a review of literatures that inform about obesity. These include (E.g. Clark-Riddell and Sanpath, 2016; Lobstein et al., 2015; Pienaar, 2015; Mandle et al., 2015). In 2006, about 1.1 billion persons in the world are overweight and 310 million were obese (Sang, et al., 2013). Additionally, Puoane et al., (2002) showed that with the use of cut off points (number borders for fatness used to identify health status such as overweight or obesity), many people tend to leave or enter the obesity bracket over time. Current observations agree that many people are entering the obesity category. For example, the world Health Organization provided information indicating the rise of overweight and obesity to 1.9 billion and 650 respectively in 2016 (WHO, 2020). Research has even shown that the life expectancy of obese individuals is shorter than that for people who are not obese. Thus, Steyn and Mchiza (2014) show that the number of obesity-related deaths globally per annum is 2.8 million. It is well known that obesity prevalence is increasing differently in different regions and ethnicity (Channanath, et al., 2017). One factor driving this, is the increased consumption of western diet around the world. These energy dense, cheap and nutrient poor foods are usually consumed outside the home (Mandle et al., 2015).

2.2.1 World

The consumption of western diets has definitely led to an increase in the burden of Non Communicable Diseases (NCDs) and some governments have responded by targeting Food Labeling. For the same reason, obesity in children is now having a worldwide concern. For instance, the World Health Organisation has termed obesity “one of the most serious public health challenges of the early 21st century” (WHO, 2012:13). Globally, it has been shown that its prevalence is higher in urban areas than in rural areas. The table below provides statistics around the world. A study in China showed that it increased from 8.99% in 2010 to 12.64% in 2014 (Zhai et al., 2017). These increases may impact highly on the health of the nation where health facilities may not have adequate infrastructures to manage and treat diseases in association with obesity (Keino et al. 2014). In like manner, some researchers have expressed that obesity is a “time bomb for future demands on health services” (Lobstein et al. 2015:2510). The table below provides statistics around the world.

Table 2. 1 Prevalence of Childhood Obesity in the World

Country	Continent	Percentage (%)
Mexico	North America	41.8
USA	North America	32.6
Argentina	South America	27.9
Brazil	South America	22.1
South Africa	Africa	13.5
China	Asia	12.64

Source Ho et al. 2012

Studies on child obesity have been going on for many years. Some of them have shown that the prevalence of obesity in children rose worldwide by 47.1% between 1980 and 2013. This can be explained by the results in 2010, which estimated that 92 million children were at risk of overweight (Pienaar, 2015). Others have shown healthcare facilities have observed an increase of relatively young people suffering from diseases related to obesity like; high blood pressure, coronary heart diseases and diabetes. In the United States obesity has more than tripled in just three decades (Harris et al., 2009). Worst still, Kipping, Jago and Lawlor (2008) revealed that 75% of overweight and obese children live in low and middle countries.

2.2.2 Sub Saharan Africa

In 2000, Martorell et al. showed that obesity was not a problem in sub Saharan Africa. Just as non-communicable diseases were linked to wealthier countries, so too was obesity. For instance, in middle-income countries, obesity is prevalent among the rich (Dinsa et al., 2012). Also, Choukem et al. (2017) ascertained that the risk of overweight and obesity was higher for children within high socioeconomic status than it was for those in settings of low socioeconomic status. All these point to the fact that the prevalence of obesity was very low in developing countries. But Capodaglio & Liuzzi (2013) stated, there is now high rates of obesity also in developing countries. Therefore, in the last two decades, this part of the world has been showing an alarming increase in obesity. Therefore, Steyn and Mchiza, (2014), added that in Africa, the percentage of overweight and obese adults from 20 years old and beyond, is 27% and 28% respectively.

This is the consequence of changing from consuming natural values of food to high energy-poor-nutrient -food. This affects even rural dwellers who are also consuming sugar-laden, highly refined food. Thus, malnutrition had set in and has been increasing in many Sub Saharan Africa countries, affecting children three to five years (Fotso, 2011). These foods are devoid of nutritious values to meet their dietary needs (FAO, 2006). That was shown to be more in urban than in rural areas, which confirms the findings that risk factors for rural are different from urban (Dalal et al., 2011).

Therefore, South Africa is seen practically involved in the fight against obesity. As seen in Mandle et al. (2015), it has the highest number of articles (n=6) globally used to study food labeling.

2.2.3 South Africa

South Africa has the highest prevalence of obesity in sub-Saharan Africa. A study conducted by the University of North West School of Biokinetics, Recreation and Sport Science, found that South African children had the third-highest obesity rate in the world (Vorster, et al., 2005). In Figueroa et al. (2017), childhood obesity is increasing in South Africa. For example, Table 1 shows that South Africa had 13.5% of obese children in 2012. But more recent studies in 2017 like Negash, et al. (2017) have shown that the prevalence is at 22.9%. Therefore, deduced from these figures, is the fact that there has been a 9.4% increase in five years. In addition, during the world obesity day, the Department of Health mentioned that obesity forms one of the top five risk factors for early death in South Africa. Although Bourne et al. (2002) had alarmed that modifiable risk factors like obesity which contribute to Non-Communicable Diseases in South Africa require attention, Clark-Riddell and Sanpath (2016) brought to attention that obesity-related diseases, stand as the other biggest killer of South Africans.

A lot of studies have revealed that in South Africa obesity is higher among the blacks or generally the low income population. With respect to the race, inclining higher obesity to the black communities is tied to the positive values attributed to obesity (Puoane, 2005). For instance, being obese is perceived as having money and the affordability of sufficient food. And overweight in children has also been perceived as reflecting good health. Although they have money to purchase food, in middle-income settings, access to healthy (Low-calorie) food is problematic given that healthy diets are expensive and cost about 60% more than the high calorie-dense food (Dinsa et al., 2012). As a result, inhabitants commonly consumed food items that will not incur an additional cost.

Therefore, a shift in diets and lifestyle are seen to be the agents of obesity in South Africa. Evidence of this shift is seen in the difference in obesity prevalence that was shown to be more in urban than in rural areas. This is a move from natural values of food (comprised of “grains and starch-rich foods low in animal fat and sugar” SAJCH (2011), to high energy-poor- nutrient -food. As seen before, this affects even rural dwellers who also, are consuming sugar-laden, highly refined food. The nutrient depletion is so devastated that maize meals are now being fortified. The reason being that children are introduced to complementary food types which in most African settings are nutrient deficient (Faber et al., 2005). The stage in life when children are introduced to solid food has been understood as a critical period when childhood malnutrition is developed.

2.2.4 Western Cape

Obesity in the Western Cape was found to be 21% in 2011 (Abrahams et al., 2011). In 1980, the rates of obesity for men and women were 17.9 and 20.4 respectively. And it has been proven that women become obese at a younger age. Therefore, it is essential to propose prevention at this younger age. Though obesity is still present at concerning levels Senekal et al. (2019), it is still possible to influence children to change their preferences and habits.

Therefore, a lot of interventions to reduce obesity have been suggested as shown in the literature. These interventions are suggestions to instigate the change in weight (Ho et al., 2012). The approach of education about the risks of obesity has been used to create awareness of the dangers of lifestyle choices on health. For instance, education is made before campaigns about calorie, fat and nutritional content of food so that people might make wise choices (Clark-Riddell and Sanpath, 2016). However, this has not been helpful as shall be seen in the section; various fights against obesity.

2.2.5 Khayelitsha

In the Western Province of South Africa in the city of Cape Town; is the township Khayelitsha, located about 30 kilometers East on the Cape Flats. It has a surface area of 10,000/km² and divided into 22 sub-sections. It is made up of both formal and informal areas. Even though researchers have recorded changing figures for its population, (391,749 Figueroa et al; 2017, 500,000 Patten et al. (2013) and 1 million Brunn and Wilson, 2013) there are in agreement that it is comprised of 90.5% Black, 8.5% Coloured and 0.5% White. Thus, this area consists mainly of the blacks and coloured racial groups that have been discriminated against in the past and about which there are few documents on nutritional status (SAJCH, 2011).

Furthermore, Khayelitsha is one of the South African townships which have been experiencing changes since the 1900s (Smith et al.; 2016). For instance, there are large amounts of informal commercial and industrial activities as well as expanded shopping center life. Despite being one of the poorest areas in the city of Cape Town, it is classified as a growing middle class. For example, 53% of the working-age population is employed, and more than a thousand households earn monthly income above R25, 000 (Cronje, 2014). As Figueroa et al. (2017) revealed, such a middle-income area would have a high prevalence of obesity.

Although there is a high level of obesity in Khayelitsha it has been found that there is low recognition of it (Devanatha et al. (2013). This problem exists because Khayelitsha is a community where perception plays a role in body size and hinders the prevention of obesity. For example, being obese is perceived as having money and the affordability of sufficient food. In Khayelitsha, overweight in children has been perceived as reflecting good health derived from a sufficient

supply of food (Mvo, 1999). Hence, Gopalan and Aeri (2001), states that this rise in affluence changes dietary practices, physical activity levels, and lifestyles. This explains why obesity was previously seen as a problem for wealthier people. Thus, it has created an additional change that affects the health of residents in Khayelitsha. One of the causes of obesity which is well known is the consumption of poor quality food types. Therefore, as a middle-class area, increase in the prevalence of overweight and obesity could have resulted from the transition or the convenience to purchase unhealthy food types from the shopping centers.

Therefore, Cohen, et al. (2012) advocate that the consumption of moderately good quality food will reduce obesity. This could be due to the low energy that good food is characterized by. If citizens consume good nutrient quality food, high energy foods will be avoided and there will not be unused energy for storage in the body as fat.

So, the researcher concluded that Proximate and Underlying Causes of obesity are present in this study site. The proximate cause refers to the type of food consumed and where the supplies of most of the energy come from. These can come from one of the following sources; carbohydrates, protein Vorster et al. (2005), foods high in fat (Senekal et al., 2003; Kruger et al., 2005)). And the latter authors included that this is prevalent in urban settings as their findings showed that fats contributed 30% total energy in the urban areas. The intake of foods high in fat is also common in children especially in homes where the parents would not remove visible fats before cooking (Zuercher et al., 2011).

Lack of physical activity is the second proximate cause of obesity and studies have shown low to moderate levels of activeness for South Africans. Although reasons have been given to explain this, it has been realized that obesity is associated with inactivity. That is the more inactive a person becomes the higher the BMI.

The underlying causes of obesity, on the other hand, refer to the reasons why people eat what they eat and are not active. Which might include, perception of ideal body size. In South Africa, overweight or obesity is perceived differently by the blacks, the whites or the Asians. Studies show that black South African women, in particular, have reported being satisfied with larger body sizes because they perceive thinness to be associated with being HIV positive. This can be due to the displeasure/fear of being stigmatized. Therefore, there had been weight cycling in this nation, whereby a thin body image had been adopted. But associating thinness to HIV status caused many to revert to the '*bigger the better*' (Senekal et al., 2003). Even though most literature mentions the two causes of obesity, as seen below Prentice (2005)

Table 2. 2 The Theoretical Framework

_THE STRUCTURE AND COMPOSITION OF THE DIETS OF ALL NATIONS ARE CHANGING RAPIDLY.

- The world's food supply and diets have been sweetened tremendously.
- Edible oil intake has grown very rapidly, particularly in Asia, the Middle East and Africa.
- The energy density of diets - particularly in the low-income world - seems to be growing rapidly.
- The intake of animal-source foods is increasing rapidly in the low-income world.

PHYSICAL ACTIVITY PATTERNS ACROSS THE GLOBE ARE CHANGING VERY RAPIDLY.

- Vast shifts in the overall allocation of market work (away from agriculture and other energy-intensive occupations) towards service sector occupations.
- Concurrent marked reductions in the level of physical activity within each occupation.
- Changes in the types of transportation used and leisure activity patterns that reflect a rapid shift toward reduced energy expenditures.
- Mechanisation of all home production-related activities
- Reduction of food preparation time by over half—from 2–3 hours per day to less than an hour per day as food consumed away from home increases in the higher income world.

elaborated on the structure and composition of diets and the physical activity patterns across the globe to show how they lead to obesity.

From the above, it is seen that the risk for childhood obesity cannot be traced to only one factor but to numerous contributors, interacting across levels of influence. For instance, experiencing hunger and starvation can lead to obesity in the future. Parents' lifestyles and choices of food would be another contributor to a child's obese status. So, the Bronfenbrenner's ecological model Bronfenbrenner, (1995) comprising Six Cs (the cellular, child, clan, community, country, and cultural levels) shows the transdisciplinary framework of possible areas from where the child can be influenced. Thus one can use these potential angles to study risk factors for childhood obesity. Biological (cell), psychological/behavioral (child), social and familial (clan), economic and political (community and country), Culture, which shapes the perception of obesity.

The Six C's Model conceptualizes the individual as implanted within the context of development over time and poses that factors within the concentric contexts are bidirectionally influential. This means that any aspect of the concentric can influence another in another concentric. For instance, before a child becomes obese (cell), there must have been other factors contributing to causing obesity. This resulted because the child is implanted within the context of development, affected each time, by the national economy (country sphere), family finances (clan) child's eating habit

(child), or the unavailability of food containing the right nutritional quality Becker (2013) (community sphere).

Therefore, on the accounts of this study where it is already known that obesity is considered as an indicator of wealth, good health and sufficient supply of food Puoane (2002); Kruger et al., (2005), it can be concluded that culture affects childhood obesity. Culture (the customs and beliefs and way of life of a particular group) Oxford (2017), sometimes has risk factors for obesity in children and youths from racial/ethnic minority groups (Peña et al., 2012). According to these authors, risks are higher among people living in black communities or those of low socioeconomic status. In addition, other interacting contributors across socioecological levels play a crucial role. As such, the perceptions of parents would greatly influence the prevalence or reduction in obesity. Sometimes, the perception of parents concerning food offered to children can be misleading. For example, sometimes for the parents to offer sweetened beverages, or sweets or candies, or fast foods to the child, it is a demonstration of love. And from Schwartz and Puhl (2003), this is the effect advertisement has on parents and children. More still, the environment generally influences childhood obesity.

There are different classifications for the approaches to target childhood obesity; upstream socio-ecological approach, midstream or behavioural approaches and downstream or clinical approaches (WHO, 2012). Furthermore, the upstream approach to prevent obesity targets the food system including its distribution, marketing, retail and service. The midstream approach on the other hand, consists of inventiveness to encourage individuals to change behaviours towards diet and physical activity. Hence this thesis will follow the above WHO guide to apply both upstream and midstream approaches. This means that the food environments and settings level (households), will respectively be studied, to motivate individuals to change diet and behaviors and implement better habits where the researcher finds applicable.

2.4 Conceptual Framework

2.4.1 Body Mass Index

In South Africa, it is already known that obesity is higher among the Blacks and the low-income population. Thus, to have determined this nutritional status of individuals and categorize some as obese, weight and height indices are used to measure body fat (Wang et al., 1994). Although there are various ways to measure adiposity, Body Mass Index is an indirect measure of adiposity in children. BMI is said to be practical, easy to obtain and unfailing (Kipping, Jago and Lawlor, 2008). The Body Mass Index is used as it measures excess weight relative to height. Body Mass

Index ‘is only a surrogate measure of body fatness’ (Prentice and Jebb, 2001). More so, it is this extra fat that is used to associate a person with ill- health.

Even though it is easy to measure the Body Mass Index of adults, certain factors make it difficult for children. Consequently, “The assessment of obesity in children relied on plotting BMI on a standard growth chart and then defining a cut-off point for increased BMI relative to age and sex” (Kipping, Jago and Lawlor, 2008:923). Clear international threshold figures of BMI are used to determine when a child is obese, overweight, normal weight or underweight. So, children have a risk for overweight and obesity if their BMI is respectively between the 85th \geq 95th percentile for age and gender as seen below.

Table 2. 3 Child BMI Measurements using Percentiles

Measuring Health Status for Children	
BMI Percentiles	Status
<5	Underweight
5-85	Normal weight
85-95	Overweight
\geq 95	Obese

Source: World Health Organisation (2012)

2.4.2 Parental Influence

From the literature, links have been traced between child obesity and the adult lifestyle in terms of food preferences. For example, Zuercher, et al. (2011) showed two types. The first is that children ate foods high in fat in homes where parents do not remove fats before cooking. Also, children eat grains in homes where adults eat grains. Even though both mother and father’s dietary intake affects that of children, it has been shown that the mothers influence the children stronger than their fathers. Children with overweight or obese mothers are found to be obese as well (Keino, et al. 2014). Thus, when food consumption patterned of female caregivers and the children were analyzed, it was found that both groups showed similar consumption patterns (Oldewage-Theron, et al., 2006). Therefore, food consumption behaviors of children mirrored those of parents or adults in the household. Such foods have been labeled as lacking real nutrition. These do not contain components necessary to enhance the thriving growth of the child and his development (Becker, 2013).

Following this concept, some research has proven that parental overweight and obesity of children at five have close links (GREPS, 1992). Also, extreme improvement in childhood obesity was

observed when families became involved in intervention programs (Ho, et al., 2012). For instance, parents can help their children eat less sweetened and salty food at home by exposing them to food cooked with less salt Schwartz and Puhl (2003), as continuous exposure will finally increase their preference for such meals. Hence, the work of Neumark-Sztainer, et. al. (2003) Family meal patterns: Associations with sociodemographic characteristics and improved dietary intake among adolescents, also show that parents can positively influence the eating habit of their children. Researchers continue to show the role of parents in limiting obesity. For instance, Kipping, et al. (2011), state that parental involvement strengthens any other intervention that is underway, and makes the intervention effective. So, parents are one of the important players in preventing obesity among children (Figueroa, et al., 2017). Thus if parents instead of choosing food for children based on the nutrient, rather focus on food enjoyable by the family, the health of the child might be endangered. In like manner, Elbel et al. (2011:494) discovered that “a clear association exists between young children’s food preferences (healthy or otherwise) and parent-reported food and beverage purchases.” And by this, there is a suggestion that parents are role modeling for their children. Given that parental influence on food decisions and child obesity is little understood, it is relevant to carry out a study about the involvement of parents in the food choices of children to understand how this influences obesity.

2.4.3 Environmental Influences

Studies to understand obesity and combat it has created two schools of thought regarding obesity. The Critical Geographies of Obesity and the Geographies of Obesity (Hopkins 2008, Evans 2006). Incorporating the environment is an ethical approach to study obesity; where the environment refers to ‘The sum of influences that the surroundings, opportunities or conditions of life have on promoting obesity in individuals and populations’ Swinburn et al. (1999:564) as cited in (Colls and Evans, 2014). There is, therefore, a claim that some environments are obesogenic, leading to the fact that including the study of the environment allows a research of the qualities of ‘health-promoting’ and ‘health-depleting’ environments. Hence, ANGELO (Analysis Grid for Environments Linked to Obesity) a framework within research on obesogenic environments– has been used in other studies. According to Harrington and Elliott, (2009), it divides environmental factors into two scales.

1. Micro (such as neighborhood recreational facilities, ‘healthy’ food availability or school-based policies on physical education)
2. Macro (such as regional planning policies and the perception of obesity in national media). (physical, economic, socio-cultural and political)

Furthermore, Kirk, et al. (2010), dissected that the environment can be studied as size, and type, where micro and macro should refer to the size and type implies the physical, economic, political and socio-cultural aspects, for measures related to obesity (e.g. dietary behavior, physical activity or weight). In all of this, Burgoine, et al. (2011) see an obesogenic environment as one which disrupts the body's 'natural' energy balance' a view that many have used to define obesity (Jiang, et al., 2016 ; Cowley, et al., 2016 ; Richard, 2015) This means that it is acceptable to study an environment to determine whether it is obesogenic or not. hence an environment proven to be having negative effects upon individuals' health would be referred to as the obesogenic environment.

Therefore, attention has also shifted from the obese individual, as a result of the rising notion that our surrounding can drive an unconscious influence on our behaviour. For instance, individual risk factors for obesity can be amplified due to an exposure to poor quality food environments; (Burgoine, et al., 2016) such as low income, and poor cooking skills. Hence, the 'built environment,' or aspects of a person's surroundings which are human-made or modified have begun to be studied.

The focus therefore can be on either food environments (energy in or energy out); physical activity environments (Burgoine, et al., 2011). Since research has delivered little consensus as to what features of the built environment are having the greatest effects upon health (Burgoine, et al. (2011), different environmental factors have been studied for association with the risk of causing obesity in the child. Some of these things include snacks and television viewing (Elinder, and Jansson, 2009). For instance, the obesity risk factor of foods like snacks is 1.3 while television viewing is 2.1 (Locard et al., 1992). Hence part of the research involved the analysis of the impact food types and television viewing are having on the children. So then, the built environment attempts to define an obesogenic environment by accounting for aspects such as; community design, neighbourhood and material deprivation as well as the prevalence of food stores. Due to the scope of this study, only the prevalence of food stores was studied.

It is important to identify some of the environmental risk factors of obesity within a natural build environment. Colls and Evans (2014:740) state that "moral knowledge about different population groups inform the identification of 'at risk' places and bodies". Evidence from grey literatures and news information were also used to gain an insight with respect to where the research could be carried out. Therefore, reading written information actually contributed to the choice to undertake a Case Study approach for data collection. The methodology to use existing secondary data sets has been used by other researchers as Colls and Evans (2014:738) had stated.

It is said in section 1.2 that the dwellers in Khayelitsha were rural Blacks who migrated to urban settings. Being exposed to Western diet, these have abandoned traditional diets which have been associated with low prevalence of degenerative diseases. Hence, it sets in curiosity for investigating this area whether change in diet can be impacting the health of its residents. Burgoine, (2011:738) also informs that the socio-economic status of the neighbourhood (which may affect the quality of retail food outlets) should be considered. Thus, it is shown that food quality is dependent on the food outlets.

Food availability at the neighbourhood level has recently received attention as a possible environmental determinant of diet (de Ridder, et al., 2017). As such, some researchers have documented differences in the availability of certain types of food stores because studies have begun to show an association between the availability of places to obtain foods and obesity. For example, chain supermarkets are believed to have healthier food than convenience stores because supermarkets increase healthier food purchase by adding nutritional values of their products (Rodriguez, et al., 2018). Hence, chain supermarkets, grocery stores and, convenience stores are likely to have different nutritional valuables (Morland et. al, 2006)¹. Powell et al. (2004) in an attempted to differentiate stores and the quality of food they sell, showed that food quality depreciates from chain supermarkets, non-chain supermarkets, grocery stores and, finally convenience stores. In this way, chain supermarkets are more likely to have nutritionally valuable and freshly prepared food and convenience stores are assumed to carry a larger proportion of energy-dense foods like pasta. Since the food choices that people make are limited to what is available to them, and convenience is an important predictor for food habits, other studies have shown that individuals living in areas where convenience stores are available, may be more likely to adopt an energy-dense diet (e.g. Wright, et al. 2016). Thus, it is found that communities with supermarkets have low prevalence of obesity and overweight, while a counterpart with grocery or convenience stores, is associated with an increased prevalence of overweight and obesity among residents.

All of these have shown that a relationship exists between health of people and place where people engage in daily activities. Thus, it can be argued that the environment tends to affect the health

¹ Supermarkets were defined as large corporate owned “chain” food stores, distinguished grocery stores, or smaller non–corporate-owned food stores.

Convenience stores included all food stores that carry a limited selection of foods, mostly snack foods.

of its residents (Smit, et al., 2016). As a result, part of the research shows analysis of the food outlets in the area.

The need to examine environmental factors in the combat of obesity, is an approach aimed to understand the population and thereby create changes to provide an alternative environment which supports healthy behavior concerning the food types available for consumption. This study is necessary for the desired success because the built environment can facilitate or hinder healthful eating.

Studying the environmental factors is linked to the section of the Bronfenbrenner's ecological model; clan, community or country and culture, which are external influences on the child. Since this research looks at how the environment influences obesity in the study area, types of food sold, where food is bought, are among some environmental issues which have been studied as seen below.

2.4.3.1 Lifestyle as a result of migration

Studies have shown that urbanisation is a major contributing factor to obesity in South Africa (Case and Menendez, 2009; Mandle et al., 2015). A lot of the people living in this study area are migrants from the Eastern Cape. According to the demographic results, Eastern Cape is one of the poorest provinces in South Africa. Usually, migration has resulted from a sending locality to the receiving locality. In this case, households migrants moved from Eastern Cape to Cape Town respectively, to search for work in order to improve the family access to resources (Bekker, 2001).

When people migrate from rural to urban areas, there is a change in life styles. For instance, when people from the Eastern Cape who have practiced predominantly subsistence agriculture Ho et al. (2012), relocate to cities where places of job are very far from home, food choices and methods of food preparation tend to be greatly altered and there is the shift to consuming atherogenic diets found in the towns (Bourne et al., 2002). This means that the habit of growing crop mostly for domestic consumption, is broken, and buying of food implemented. This is evident from Babu and Sanyal's (2009) realisation that 20% of food expenditure in urban areas went to food prepared out of the house. Furthermore, some two decades ago, children in Cape Town were found to have high risk for atherosclerosis than their counterparts in the rural areas.

Since people also spend most of the time out of home, more people have now tend to buy over-processed foods Clark-Riddell and Sanpath (2016) or high-fat foods (Case and Menendez, 2009). These may include; poultry with skin, fried chicken and fish, meat pies/sausage rolls, fried potatoes/French fries, deep fat fried confections (vetkoek, doughnuts, koeksusters), cheese, chocolates, and crisps" (Senekal et al., 2003:2). Sometimes when it occurs, there is a shift in the

caloric intake-expenditure balance. This means that caloric intake is greater than caloric expenditure. Consequently, excess calorie would be stored in the body as fats (Cohen et al., 2012). The consumption of fat has increased from 34g to 54g per person per day (Bourne et al., 2002). Another effect that transition has on the individuals, is seen in the abandonment of traditional food Puoane et al. (2012), which are high in fibre for highly refined food and food containing meat and dairy products which contain saturated fats. As from Schwartz and Puhl (2003), there is a toxic food environment.

2.4.3.2 Socioeconomic Status

Since the obesity in Khayelitsha has been linked to the transition taking place, it is also worthwhile to look into the socioeconomic of effects on the individuals. One of the things that is common with transition is the transformation of the market. It is shown that in Africa, there has been massive growth of industries manufacturing food; usually, the westernized food types. This has led to the presence of many western companies and brands in urban settlements. This means that there are also many different food types available for purchase by anyone who wants it.

In like manner, those who have attained higher levels of education possibly could enter job markets. Finding a well paying job leads to affluence which in turn, has relation to acquisition of over processed food. As Steyn and Mchiza (2014) have shown, people tend to perceive buying these westernized products as associating oneself with a desirable status.

Other urban problems such as high crime rates, also jeopardize safety of the inhabitants. In turn, impacting negatively on their activeness (Kruger et al., 2005). Consequently, this would revert to the accumulation of fats which would have been spent through being active.

Hence, with the transition taking place, both the underlying causes and the proximate causes can explain the obesity. This is because, there is a shift in the dietary pattern at the level of the community of Khayelitsha. Childhood circumstances such as hunger and starvation or poor nutrition could have affected the adults who are obese today. It is so because early malnutrition from deprivation alters regulatory mechanisms for energy intake (Case and Menendez, 2009). For example, women raised in poor households, who went hungry as children were found to be obese.

Therefore, from such knowledge, efforts have been devoted to fight against increase in the prevalence in obesity. As other researchers have already commented, interventions might not be converted from one environment to another or across diverse cultural groups (Lobstein et al., 2015). To reduce obesity, interventions have to be area specific. The specific type of intervention can only be practiced after the health status of that area needs to be understood afresh, from an

informed knowledge. For this reason, the theoretical framework has been used to find out how children become obese. Thus, from the aid of the model, a clear path can be traced to the causes of obesity in children in the semi- peripheral urban locality of Khayelitsha.

It has been said that food marketing to target children causes the increase in child obesity because promotion of food has a direct effect on children’s food preferences, knowledge and behaviour. Therefore, Mchiza and Maunder (2013) have written, advertisement of poor nutrient food to children is well known. An example of such advertisement is through the television. For example, “families in Quebec (where advertising to children under age 13 is banned) purchase fast food less often than do similar families in Ontario (where there is no such ban)” (Harris et al, 2009: 214). The different effects above are due to the fact that children tend to make requests to parents for foods advertised, since children usually recall the names of the advertised products. In addition, South Africa has also laid blame on the effect of TV adverts of food on health. This can be in the form of increasing children’s preferences for the foods advertised. As such, food companies tend to undermine parents’ ability to provide healthy food for their children. As a result, Brownell et al. (2010) said that this leads to obesity because it becomes difficult for children to cultivate responsible conducts.

Advertisement can also contribute to behavioural modification through the kind of products sold to the children; such that unplanned buying will be promoted by what is available (Brownell et al, 2010). For instance, advertisement habitually present snacks (candy, gum, mints, cookies, crackers, nuts, chips and other salty snacks) more than fruits, vegetables, grains and beans. Accordingly, children have become consumer by influence (Schwartz and Puhl, 2003). Therefore, it is the prerogative of this study to find out those environmental components influencing childhood obesity. Table 2.4 is a list of some recurrent environmental factors that contribute to obesity or overweight.

Table 2. 4 Environmental Factors Influencing Childhood Obesity

Environmental factor	Risk factor
snacks	1.3
excessive television viewing	2.1
short sleep duration	4.9

Source: Locard, et al. (1992).

In South Africa, it was found that television viewing lasting for more than three hours daily has contributed to the increasing prevalence of overweight among school children. Such knowledge of the time spent in front of television must have advantages to the advertising companies. Hence, television advertisement of fatty foods, is a target of children since these do not read newspapers (Schwartz and Puhl, 2003). Furthermore, Peña et al. (2012) provided the following list of risk factors to strongly affirm that they cause obesity: higher levels of television viewing and more televisions in bedrooms, higher consumption of sugar sweetened beverages, increased fast food consumption, lower levels of physical activity. Because behavior changes over time with changing environmental factors, obesity-related individual, familial, community, and environmental factors will be examined in this study.

2.5 Various approaches used to prevent obesity.

As have been mentioned already, the facts about the existence of obesity in the Western Cape indicate its increase in the province. For instance, between 1980 and 2011, the rates have changed by about .06%- 2.1%. And between 2012 and 2017, rates of obesity in children has increased by 9.4%; that is from 13.5% to 22.9%. The rise has been a concern of course and efforts have been made to reduce obesity. Therefore, a lot of interventions to reduce obesity have been suggested as shown in the literatures. These interventions are suggestions to instigate a change in weight (Ho et al., 2012). Below is a list of various attempts to reduce obesity.

The approach of education on the risks of obesity has been used to create awareness of the dangers of lifestyle choices on health. For instance, education is made prior to campaigns about calorie, fat and nutrition content of food so that people might make wise choices (Clark-Riddell and Sanpath, 2016). Although a lot of people after leaving from such educative programmes may think they have the knowledge about nutritious food, in practice, it has not been helpful. For example, a research on parents who believe they had fed their children healthful foods showed they still provided foods they think their child will like. This was evident in a study with mothers who thought they fed their children in keeping with nutritional guidelines. However, from the study it turned out the children were actually provided more sweets as food and less nutritious product like dairy (Schwartz and Puhl, 2003).

However, education alone cannot bring about personal change (Brownell et al, 2010). It is ascertained that better information such as guidelines to meet dietary requirement be given to promote good health (Jones and Ejeta, 2016). However, it can be argued that simply providing people with information about the importance to eat nutritiously will not by itself, improve eating behaviours. This draws from the research of Johnson & Birch 1994 cited by Schwartz and Puhl,

(2003) which shows that even though kindergarten children knew theoretically that excess fat and sugar as well as salt, are unhealthful, they preferred eating salty, fatty or sugary foods. For the same reason, community-based lifestyle programmes have been conducted for families of overweight and obese children.

Notwithstanding these efforts, failures still occurred. It could be that the parents are trapped in the web of wanting to help their children in an environment which naturally provides exposure to unhealthful foods (Schwartz and Puhl, 2003). As such, other researchers have studied school environment in the Western Cape and found that schools are not conducive to healthy eating (De Villiers et al., 2012). Efforts were turned to the individual to inculcate making a decisive choice regarding food types. An example of these included the use of the reward approach. It uses food as reward to children to slowly cause the children to accept novel foods. This could have come through the concept that continuous exposure to healthy food types will increase the child's preference for such foods. In one study to encourage children to eat a particular healthy food type, some of the children were rewarded with dessert, for trying new foods and this was found to be effective. It was also found that proposing to children to choose new foods was equally effective in encouraging children to taste the novel food (De Villiers et al., 2012).

Hence, the efforts to combat obesity cannot be denied. All of these show that one of the ways to fight obesity has been towards diet. But in many circumstances, it has been an ill-fated approach. This is seen in the increases being experienced even currently. In America, some children have even lost their lives in the attempts. This shows how some individuals have taken personal responsibility to fight against obesity.

Therefore, in summary, the literature provides evidence that adults have a critical role to play to influence children in the type of food eaten. Fortunately, parents have been and are interested in giving their children a healthy feeding. However, obesity has been on the rise. It is clear that there is some other aspect that hinders the success in the fights against obesity. For example, one researcher has shown that although school education has been modified to inform children on healthy feeding, there seems to be contradiction in teaching children not to eat 'junk' food and the quantity and types of junk food present in the communities (Schwartz and Puhl, 2003). Because obesity is a multifaceted problem. Thus, the prevention of obesity cannot be achieved by tackling only a specific aspect at a time.

Seeing therefore the interest of the parents and the potentials the environment provides and that no joint efforts have been conducted in the Western Cape, this research finds that it is worthwhile to investigate how both parents and environmental aspects in the study area are influencing the

child's feeding habit. Thus, it will be possible to understand how parental and environmental factors hinder the fight against obesity by making use of an appropriate theoretical framework. The next chapter develops on the research design and methodology used to understand and address obesity risk factors.

CHAPTER 3: METHODOLOGY

3.1. Research Design

According to Mouton (2001:14) a research design is a blue print of how you intend conducting the research. In this study, the overall framework of the research design outlines research methodology, focus area data collection, data collection tools and data analysis. Therefore, the research design shows the steps to be undertaken for a particular research project Creswell (2003), constructed by the searcher to ensure validity, reliability and accuracy (Kumar, 2005).

The purpose of the case study design was to explore the factors that may have contributed to obesity in Khayelitsha. As understood from the literature, parents and the environment in which one lives influence the food choices which most of the times, lead to the consumption of high energy, poor nutrient food types. According to Yin (2009) the case study design to the research to answer the ‘how ‘and ‘why’ questions of the investigation, due to the fact that the researcher has no control over the practices which exist in the environment.

Thus, this research is constructed to identify food types in the environment, cultural influences on food choices, effect of TV advertisements on food preferences. Data collected about these facilitated the calculation of Body Mass Index of children and adults in the study area. Thereafter, quantitative data analysis techniques were used to find existing relationships between given² variables, to help determine the answer to the research question.

3.2. Research Methodology

There are generally two types of research methods in the field of social sciences; the quantitative and the qualitative research methods (Denzin & Lincoln, 2011; Richards & Munsters, 2010). Furthermore, research methods are the type of techniques, instruments and skills required to execute each stage. As already mentioned, this research employed both the qualitative and quantitative research approaches. Qualitative methods had to do with the collection of data information related to child dietary intake. This ensured that every diet in the composition of food consumed by a child over the period of the research was taken into consideration, as this would reveal the nutritional value of children’s food choices.

² Found under Operationalization of Key Variables

Furthermore, comparison between what is found in the data collected was matched up with food products advertised on common South African TV channels. Similarly, snacks in the children lunch boxes are matched up with what is found in the Spaza shops³ in the study area. This information helped in understanding what aspect of the environment influences people's decisions to eat certain food types.

Quantitative methods include experiments, structured interviews and questionnaires. Data collected will be numeric or converted to numeric and a statistical programme is required for analysis (Brannen, 2017; Terre Blanche, et al., 2011). Meanwhile qualitative methods allow understanding of how children become obese, the quantitative methods help in realising the proportion of individuals in the study area who are actually suffering from obesity. Due to the fact that obesity is declared by using BMI values, quantitative research approaches will also facilitate the understanding the relationships of variables and BMI. Thus, by using weight and height measurements, BMI values were calculated as weight (kg) divided by height squared (m²). The use of BMI is beneficial in diagnosing health status for children who will not appear at risk visually (Flower et al., 2007).

3.3 Research participants and sampling criteria

3.3.1 Data sources

Data collection for this research included the review of literatures to obtain a world view of the prevalence of obesity. The choice of the specific area for data collection was also informed by literatures such as Bourne, et. al. (2002). For instance, the literature review section has portrayed that obesity exist more in the black communities of South Africa. Thus, this chapter will achieve the investigation on how the children in one of these black communities are influenced by the parents and the environment, by reviewing existing literatures and studying the BMI of children.

It is worth mentioning that the study of BMI would be impossible if data on food types consumed by households in this growing middle class community in Cape Town, were not collected and studied (Dinbabo et.al., 2017). Therefore, this research made use of secondary data collected from Khayelitsha by the Institute for Social Development. This institute used questionnaires, as the main tool for data collection. The main purpose was to gather information about obesity. This method of using secondary data is called content analysis. It is also defined as a structured approach to data collection (Plowright, 2011). The use of secondary data is a measure to limit bias,

3

since the researcher cannot change what is already written to suit what is wanted (Henning et al., 2004). In addition, certain aspects of the environment such as the location of food outlets that can impact individuals' health were identified. Moreover, this chapter has demonstrated how calculations to verify the link between obese children and parents were obtained.

3.3.2 Choosing the Age Group.

Although the data collection included children from 0-20 years, the age group with the most TV exposure is 8-12 years old. Most influenced group of children by television advertising is 2-11 (Livingstone, et al., 2004). Also other researches have used 9-12-year-old children to undertake studies on obesity. Again, it is endorsed by others that by the age of 8-10years, children can unfailingly report their food intake for food eaten in the earlier twenty-four hours. For instance, from the age of about 7-8 years children have the ability to participate in unassisted recall, but only for food eaten in weekdays. Therefore, the age of children considered for this research is from 2 to 12 years because parents could give recalls for children less than 7years (Livingstone, et al., 2004).

3.4 Operationalization of Key Variables

This section provides a list of the variables which have been used to find out the answer to the research question concerning childhood obesity. Since it is obvious that no child is born obese, certain factors must have influenced the accumulation of fats for obesity to result. Hence, measurements were done for core variables representing factors in the community within which the child is implanted, termed the environmental risk factors.

3.4.1 The Environmental Risk Factors

To succeed in combating obesity, it is important to understand the given environment because the built environment can both facilitate and hinder healthful eating. Without a doubt, certain environmental factors have been associated with the risk of causing obesity in the child. The environmental factors include food types available for consumption (food deserts - healthy food deserts vs junk food swamps), prevalence of food stores, television viewing. Hence part of the research involved the analysis of the impact these variables are having on the children. Furthermore, it looked at availability of food within the community which are consumed at home. Thus, the knowledge gained concerning the environmental context influencing behaviours could be used simultaneously with the traditional individual level obesity interventions.

3.4.1.1 Sorting Food Types in the Environment

This is a very important variable to measure as the particular food types and eating practices have been identified as unhealthy and leading to obesity. This variable was enable the research to prove whether food types in the environment are a driver of obesity.

3.4.1.2 Food Marketing (Advertisements) and Food Purchase

After determining the types of food in the environment, the research went on to what people in Khayelitsha buy. Thus, this variable aims at seeking if what children eat, is as a result of the influence the adverts on TV, Food Courts, Magazines, or Newspapers, have on the people. Therefore, it involved sorting and matching food types of children with those found in these sources.

3.4.1.2.1 Exposure to TV

Advertisement over TV channels has the first place above due to some of the reasons given here. In the twenty first century, children are exposed to all sorts of TV channels. One research showed that half of the times TV channels advertise food types that should be consumed moderately or infrequently (Cassim, 2010). The author further writes that on average, a child can view 21 adverts on food a day. If according to the STATS SA report of 2015, the children from 1-19 years make up about 39.5% of the South African population, it means that focusing attention on child-related issues is gearing in the right direction to curb the spread of obesity. Therefore, the research had to gather information on the types of food advertised and then relate it to the food consumed by the children. This was made possible by looking at preferred food children request, to determine if any of them falls among those advertised on television channels. To do this, advertisements were observed over a period of the study and a collection of advertised food and beverages was made. Thus, food types and other information available in the data, found to be suitable for this study were retrieved and analyzed to assess if they are significantly impacting this community with obesity. Before this analysis, the type of food was categorized from least obesogenic to most obesogenic following (Burgoine, et al., 2011).

3.5 Steps to Calculating the Dietary Intake

Dietary intake reveals the main cause of obesity as its determination allows the researcher to identify sources of the danger, especially as South Africans are known for consuming more-calories-less nutrients-diets. Hence, it deals with data related to food quality and analysed for

nutrient adequacy. Consequently, people will be given better information to enable them meet dietary guidelines in an effort to promote good health (Jones and Ejeta 2016). Furthermore, food security implies the consumption of nutritious food to meet their dietary needs. (USDA and FAO). Hence obtaining the dietary intake of individuals is a prerequisite to determine if there is food security in the area or not. In all obesity researches dealing with food types, one will always find categorisation of food types. For example; meat, animal fats, chocolates, biscuits, soft drinks and fried foods (Kruger et al., 2005). Fruits, vegetables, grains, calcium-rich foods snack foods, and soft drinks (Thompson and Subar, 2013).

Therefore, servings of fruits, vegetables, grains, calcium-rich foods, snack foods, and soft drinks were examined. According to Neumark-Sztainer, et. al. (2003) milk, chocolate milk, instant breakfast, yogurt, cheese, cheeseburger, pizza, macaroni and cheese, grilled cheese, nachos with cheese, pudding, frozen yogurt, ice cream, and milk shake are calcium-rich foods. These different lists informed the researcher to ask the respondents of the food components. A 24-hour recall was done by trained interviewers. This method allows individuals to give accurate information about the quantity as well, of their recent intake. The calculation thereof is to determine the level of nutrient in a diet. The 24-hour recall was done by interviewers using self-administered questionnaires. Although the 24-hour recall has limitation about the truth from the subject, in the 24-hour dietary recall, the respondent is asked to remember and report all the foods and beverages consumed in the preceding 24 hours or on the preceding day (Thompson and Subar., 2013). The questionnaires demanded how foods were prepared and common additions to foods. One advantage of the 24-hour recall administered by an interviewer allows even illiterate respondents to participate. The problem with the 24-hour recall which could have limited the accuracy of dietary intake as other researchers have noted, is 'Truth' about the information provided which Block, (1982) has mentioned cannot be avoided by the researcher. In like manner, Thompson and Subar (2013) gave three reasons for which individuals may not report their food consumption accurately; knowledge, memory, and the interview situation.

Data on food components was used to conduct qualitative analysis on the adequacy of individual dietary intake. As said in the joint report by EU and FAO (2011), this is a simple method that involves grouping of nutritional information in the food individuals have consumed. The sum of the total is obtained by counting the unit contribution of each dietary group, to reach a conclusion about access to a variety of foods. Thus, Guidance on Assigning Individual Foods to Food Groups in the European Union and Food and Agriculture Organisation report of 2011 was followed to separate the foods in this research into different food groups.

The dietary intake is the sum of all the food and drinks a person consumes regularly. And it provides information concerning the nutrient consumed. It can be used to determine whether food is healthy or unhealthy. Therefore, foods consumed were grouped under the different nutrient groups; Carbohydrates, Proteins, Fats and Oil, Vitamins. Dietary intake of adults (mother, father, or caregiver) as well as that of the children, were measured qualitatively. However, that for the adult and the child was analyzed separately. In addition, to know whether parents influence obesity in children it is important to know who decides the food that should be eaten at home or outside.

It was important to look into the dietary intake of people (adult and children) in Khayelitsha because it was found that dietary patterns for low-income population groups in South Africa come from relatively narrowed range of food which might just be maize, wheat, or rice without others like: vegetables, fruits or pulses (Jones and Ejeta, 2016). Therefore, dietary intake was collected to evaluate whether dietary intake is broad or narrow.

3.5.1 Dietary Intake of Household Members

The literature showed that children diets are usually made up of nutrient insufficient to meet their nutrient requirements. For this reason, high nutrients are often required for children's growth. Hence one way to provide sufficient nutrients for growth is to increase the diversity of foods provided to young children (Steyn et al., 2006). Therefore, the purpose of analyzing dietary intake of children separately was to assess if the diet is enhancing thriving growth of the child (Becker, 2013) or not.

3.5.1.1 Dietary Intake of Males and Females

As already mentioned, the research determined the dietary intake of parents. Furthermore, the dietary intake of adults was grouped by gender. In cases where both parent (guardian) and child were obese, it would be simple to trace and identify link between the child's dietary intake and that of the adult. More so, it would further assist in determining whether it is the females or the males who influence childhood obesity in the Khayelitsha community. The content in the adult's food was compared to that of the child's, and similarities determined. This was guided from an already established saying that "children eat what parents eat" (Zuercher et al., 2011).

Keino et al. (2014) states that increasingly men are becoming more at risk of obesity in recent years. Given that parents are one of the important players in preventing obesity among children Figueroa et al. (2017), measurement of dietary intake might be useful in leading parents with obese children to play helpful roles.

In addition, it is important to assess nutrients based on the level of energy (kcal), total fat, saturated fat, carbohydrate and protein, calcium (mg), iron (mg), vitamin A (IU), vitamin C (mg), vitamin E (mg), vitamin B-6(mg), folate (μg), and fibre (g). Informed by other researchers, energy intakes below 400kcal/day or above 7,000kcal/day were excluded from analyses examining associations with dietary intake because these values are considered biologically implausible for habitual intake.

So in calculating dietary intake, people can be classified into low, moderate and high intakes which are used to indicate a diseased condition (Block, 1982). Dietary intake is also a useful indicator for assessing correlations between diet consumed and diseases (Azadbakht and Esmailzadeh, 2011). To have been able to decide whether food consumed was of higher diet quality or signifies adequate nutrient intake, major food groups were further divided into subgroups. For instance, bread-grains (refined bread, biscuits, macaroni, whole grain bread, corn flakes, rice and refined flour), vegetables (vegetables, potato, tomato, other starchy vegetables, legumes, yellow vegetables and green vegetables), fruits (fruit and fruit juice, berries and citrus), meats (red meat, poultry, fish and eggs) and dairy (milk, yoghurt and cheese). These subgroups likewise showed the dietary diversity of the food consumed.

Risk factors of food consumed were measured as a proxy to determine how the environment might influence obesity. Also, quantitative analysis was used, which entailed inferential and descriptive analyses of values of Body Mass Index $\{\text{weight (kg)}/\text{height (m}^2)\}$, and other variables to help establish the relationships that exist.

3.6 Body Mass Index

3.6.1 Measurement of BMI in Children

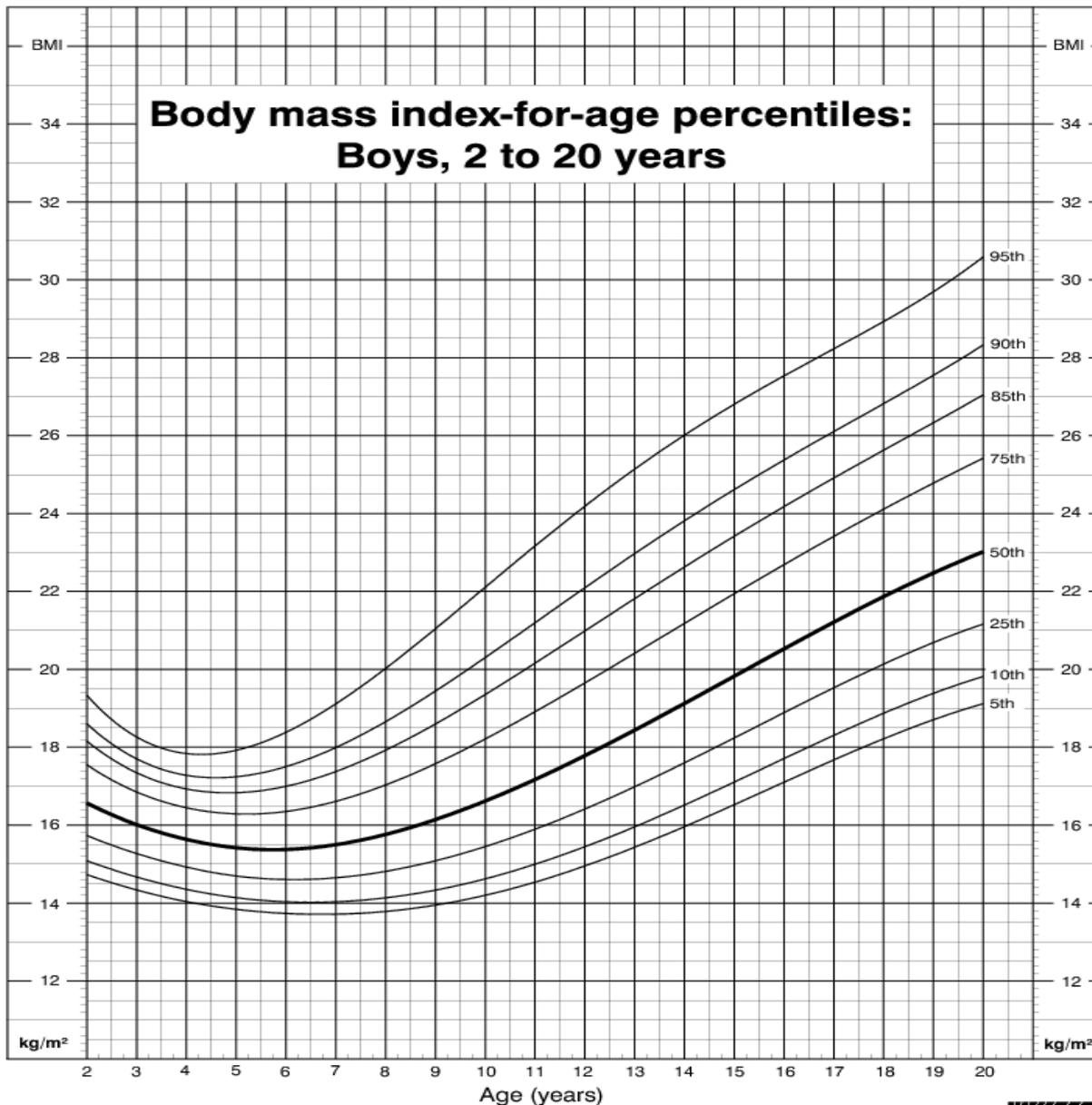
Although it is easy to measure the Body Mass Index of adults, certain factors make it difficult for children. Consequently, “The assessment of obesity in children relies on plotting BMI on a standard growth chart and then defining a cut-off point for increased BMI relative to age and sex” (Kipping, Jago and Lawlor, 2008:923). Thus after the calculation of BMI of children, the BMI was superimposed on a growth curve to know the percentile of the children.

Clear international threshold figures of BMI are used to determine when a child is obese, overweight, normal weight or underweight. These have shown that children have a risk for overweight and obesity if their BMI is respectively between the 85th \geq 95th percentile for age and gender as seen below. These percentiles were coined by the American Centre for Disease control and Prevention in 2000 (Flower et al., 2007).

BMI can be adjusted to compare a child's weight to other children's weight (Cole et. al., 2005). For instance, figure 1 below shows that at 2 years, 95% of boys have BMI less than 19.4. It enables weight prevention for children who are at risk of obesity and the control on those who are already obese. There are three ways to avert overweight and the complications that come with it; prevent, early identification and treatment (Flower et al., 2007).

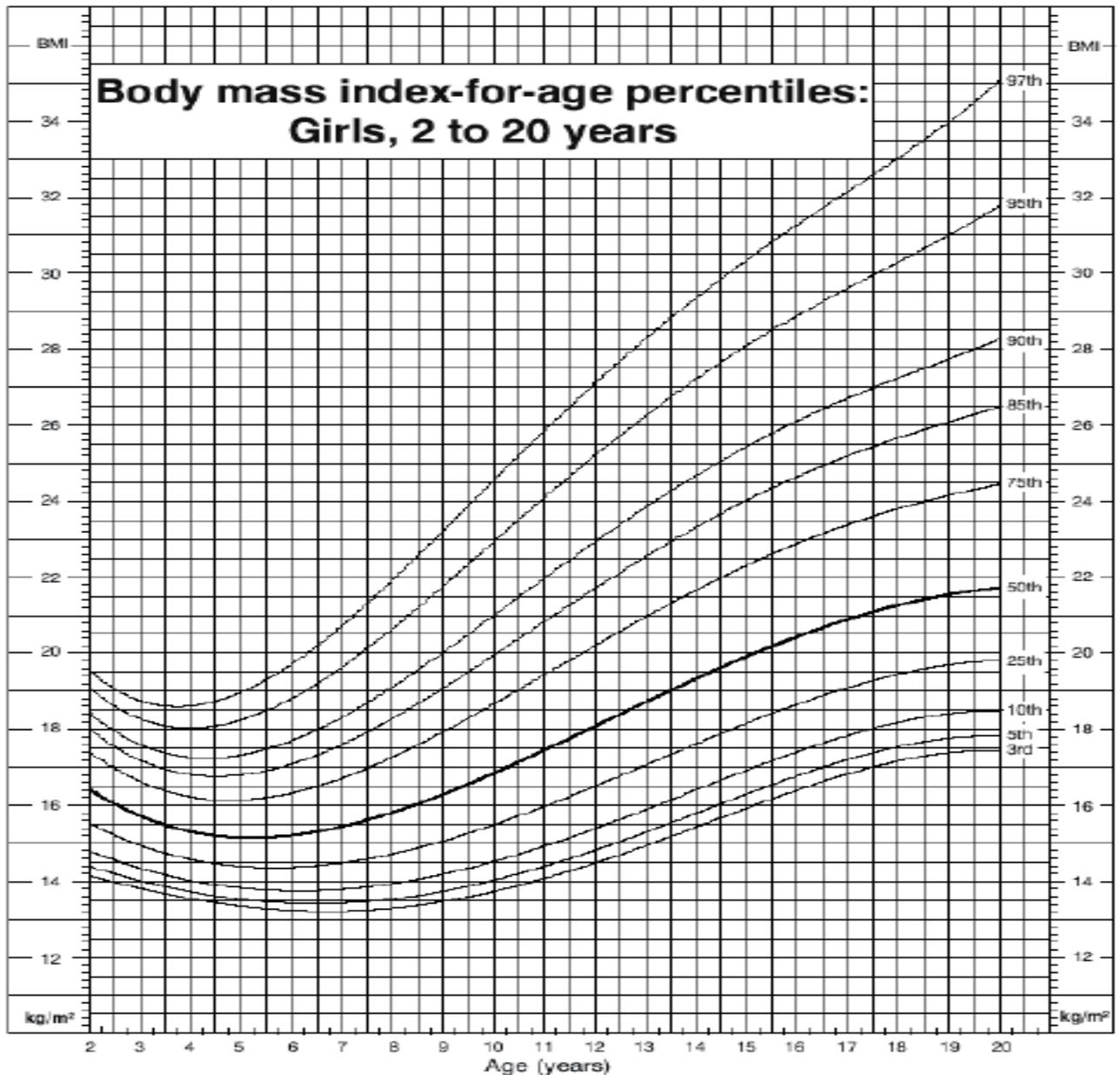
Figure 3. 1 Growth Chart for Calculating Child's BMI by Percentile

CDC Growth Charts: United States



Published May 30, 2000.
 SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).





Source: CDC, (2019)

3.7. Chapter Summary

This chapter has thus far elaborated on the steps undertaken to explore main factors contributing to obesity in Khayelitsha. Drawn from the literatures reviewed, Parental influence as well as environmental influences were examined. Parental influence is as a result that most of the children are minor who might be influenced by their parents. food choices of parents and those of the children were obtained from and hence dietary intake were compared. Concerning the how the environment influences obesity, food types in the environment, types of food outlets, and food advertised for example on TV were among the key variables. Both of these approaches were to information which will enable the calculation of the BMI. Thereafter, analyses were made and the result discussed in the next chapter.

CHAPTER 4: DATA ANALYSIS AND PRESENTATION OF RESULTS

4.1 Introduction

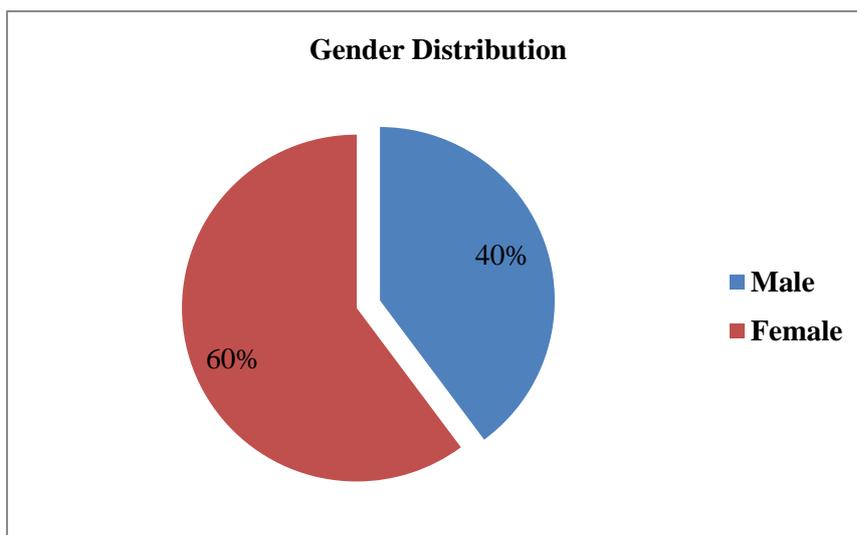
This chapter focuses on the data analysis and presentation of the results on the association of environmental and parental factors and their contribution to children's weight gain or weight losses. The chapter presents both descriptive and inferential statistical analysis where appropriately. The descriptive analysis shows the demographic characteristics of the population; and the environmental factors identified by the study. In the analysis, inferences drawn from further in-depth analysis and findings, are presented in the form of tables and graphs.

4.2. Descriptive Statistics

4.2.1 Households Characteristics in Khayelitsha

In Khayelitsha, 532 households were interviewed during the survey. From the above households, there were 2179 household members. Household was defined using the Stats SA 2011 sampling frame, given a response rate of 89%. Households were randomly selected from 25 enumeration areas using probability proportion to size (PPS). These results showed that in terms of Race, 99% of the population of Khayelitsha was Black Africans. Gender distribution of the population showed that 40% were male and 60% female. As will be further discussed, gender is a critical determinant of weight gain or weight loss in any community. Gender characteristic of a population is indicative of the population structure and where possible inferences can be drawn from such population with respect to population health.

Figure 4. 1 Gender Representation in the Sample



Source: Analysis of ISD dataset

4.2.2 Distribution of Children in households

The average household size in Khayelitsha from the sample was 5.11 which was greater than the national average of 3.3 persons per household. The distribution of children in the household showed that majority of household had one child (49%). Cumulatively, 93% of the children sampled live in households with one 1-2 children.

Table 4. 1 Number children in Households

Number children in Households			
No. of Children	Households	%	Cumulative%
1	146	49.66	49.66
2	128	43.54	93.20
3	12	4.08	97.28
4+	8	2.72	100.00

Source: Analysis of ISD dataset

4.2.3. Child Age by Gender

This research focuses on children between the Ages of 2 to 12 years old. The table below presents the results for the gender and age disparity in the population of children identified as members of the household. Gender and Age are critical indicators to measure child overweight and obesity. As seen on table 5.1 below, both male and female children were included in the study. There was a total of 473 from all ages, which this study examined.

Table 4. 2 Number of Children Who Participated in The Study

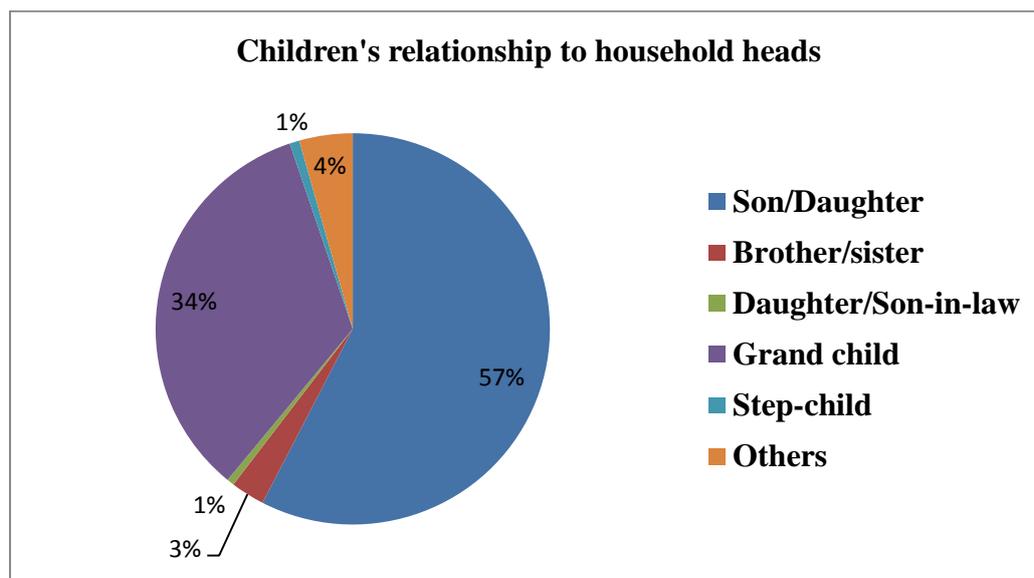
Children's Age and Gender						
Age group	Male		Female		Total	
	N=200	%	N=262	%	N=473	%
2	23	6%	22	5%	45	5%
3	18	5%	25	5%	43	5%
4	19	5%	20	4%	39	5%
5	31	8%	25	5%	56	6%
6	16	4%	23	5%	39	5%
7	17	4%	26	6%	43	5%
8	18	5%	19	4%	37	4%
9	10	3%	30	6%	40	5%
10	10	3%	25	5%	35	4%
11	19	5%	18	4%	37	4%
12	19	5%	29	6%	48	6%

Source: Analysis of ISD dataset

4.2.4. Children and household Relationship

Household characteristics help the research to understand household dynamics. Given that the average household size in this study is almost double the national average, the implication on food security are very eminent. Children in the household were classified as shown in figure 4.2 below. Son/daughter was 57% Grandchildren was 34%. This is relevant to know who the child relates with, as this could determine whether there is influence or not.

Figure 4. 2 Children’s Relationship to Household head

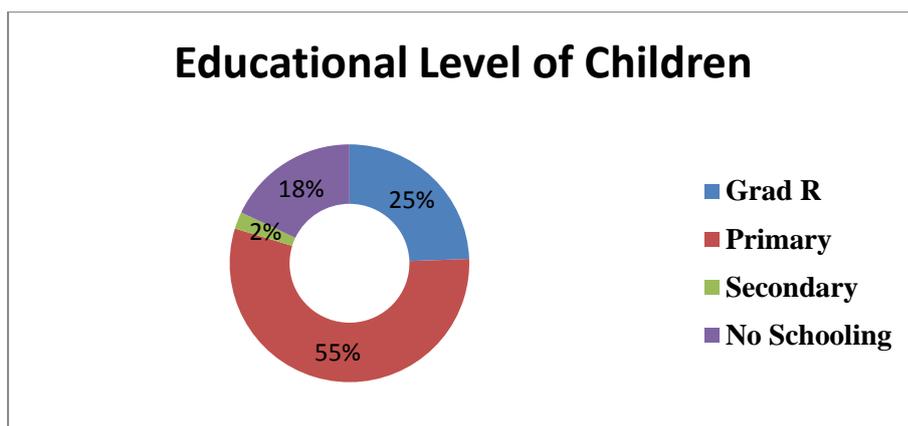


Source: Analysis of ISD dataset

4.2.5 Children’s Attending School

Education is one of the key human capital indicators and an important tool for poverty alleviation. Early childhood development faces different levels of challenges especially for black South African given the impact of Apartheid which limited majority of Black people from accessing basic education. This study collected data on children’s educational level to ascertain and assess the level of participation of children; how it affects their health perception. The result in figure 4.3 below showed that, for children within the Age group, 25% of children were attending Grad R, (Early Childhood Development (ECD)), 55% attended primary school. and 18% were either school dropout or had never attended school. The 2% secondary school were not included due to the age target group. furthermore, obtaining information necessitated analyzing food consumed outside the house.

Figure 4.3 Children's Attending School

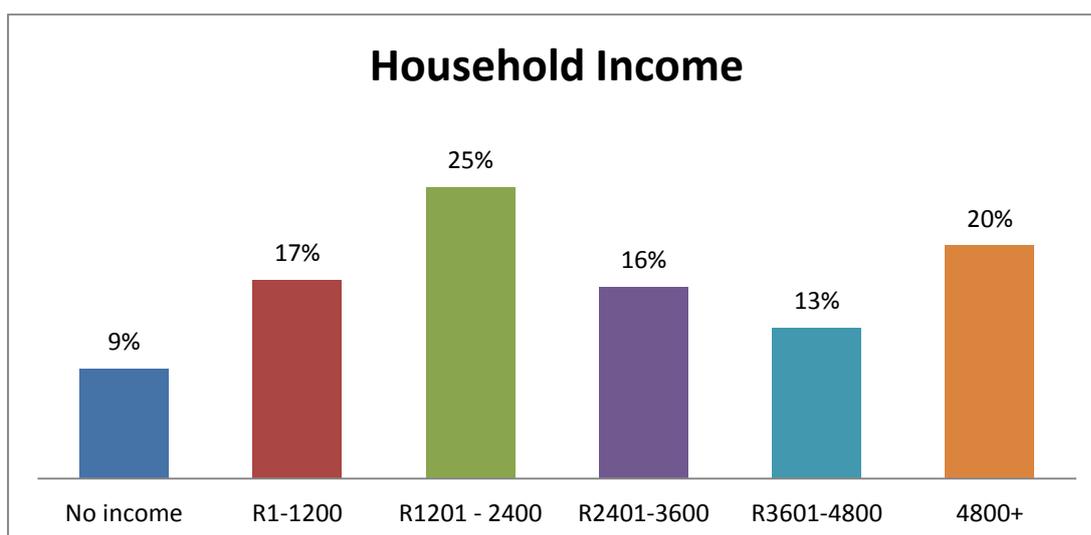


Source: Analysis of ISD dataset

4.2.6 Household Income

Household income is used in the survey to measure household poverty level. This study found that 67% of households earned monthly incomes of R3600 or less. The income level informs of the affordability of households as well as the kind of retail outlet from which food is bought. Since at times this income carter for rents, it implies some households are left finally with a smaller amount to feed on. Low-income earners are most likely to eat high energy dense food types since they are cheaper in the markets.

Figure 4.4 Grouped Population according to Household Income



Source: Analysis of ISD dataset

Since there is high unemployment rate in the study area with over 42% of the population unemployed, the only remedial means of income comes from social grants. Influx of grants is represented on Table 4.3 below.

Table 4. 3 Income from Grants

Share of Income from Grants by grant type		
Income	N=1625	%
CSG	957	58.89
DG	211	12.98
OAG	398	24.49
FCG	59	3.63

Source: Analysis of ISD dataset

A significant percentage (58%) of the population are recipients of the child support grant (CSG). This grant is intended to improve standard of living for the child who is vulnerable to poverty. There is usually high dependence on the CSG, as it tends to support the entire family. Hence, is not sufficient any more for the purpose of the grant to explain why many residents in Khayelitsha eat unhealthily. It also explains why 18% of children do not go to school. However, it tells the reader that many households have children.

4.2.7 Body Mass Indexes (BMI)

BMI is one of the several approaches to determine whether a body is fat or fit. Like the other body fat assessment methods, the BMI is useful in clinics and community settings. According to the WHO, measuring BMI is to standardize cutoff points for overweight and obesity in both adult and children. The standard measurement of BMI is obtained using $BMI = \frac{Weight}{Height^2}$. Even though BMI is measured this way, the WHO classified adult BMI as follows- Underweight (<18.5) Normal Weight (18.5-24.9), Overweight (25.0-29.9), Obese I (30.0-34.9), Obese II (35-39.9) and Obese III (40+). The result show that amongst the adult population in Khayelitsha, about 44% were obese, and 22% were overweight. This high prevalence of obesity in the area is likely to impact on children.

Table 4. 4 Measurement of Adult BMI in Khayelitsha

Adult BMI in Khayelitsha		
Weight Measure	N=571	%
Underweight	29	5.08
Normal weight	166	29.07
Overweight	126	22.07

Obese class I	101	17.69
Obese class II	149	26.09

Source: Analysis of ISD dataset

4.2.7.1 Measurement of BMI in Children

Studies have shown that there are controversies regarding BMI measurements and even more so measuring child BMI. According to the WHO guidelines, BMI cut off for children are applied using Z-Scores (Wang and Chen, 2006). Cole et.al. (2005) undertook an analysis of children's BMI to understand the best approach to measuring child BMI. The author made use of four different methods such as BMI, BMI %, BMI z-scores and BMI centile. The rationale was that BMI is influenced by gender and a person's relative adiposity as well as their genetic formation. However, Cole did not conclude on any best approach but recommended that each case should be looked at independently and an appropriate measure be applied. In social science, it may not be necessary to examine the baseline issues of weight gain but a simple methodology of BMI for Age or BMI Z-scores is appropriate enough to establish a fact of prevalence.

In this study, after obtaining the BMI of children 2 to 12 years old using the formula

$$bmi = \frac{Weight}{(Height)^2}$$
 it was found to range from 5.8- 43.2kg/m². The mean BMI for the children was 17.6kg/m² with a SD=5.371898. Thus, child BMI was analysed using the WHO guidelines for children where BMI cut-offs were applied using percentile ranking of z-scores (Wang and Chen, 2006). "Z-score percentiles were classified as follows: 5th percentile= z-score (<-1.64; underweight), >=5th percentile to <85th percentile z-score(>=-1.64 to <1.04; normal weight), >85th to <95th percentile =z-score (>=1.04 & <1.64; overweight) and obesity is classified as >=95th which equal a z-score of >=1.64" (Dinbabo et.al., 2017, p.93). The study found that using the WHO Growth Curve, girls 12 years or younger with BMI of 14 will fall within 3rd to 5th percentile. However, it was different for the boys. Boys 4-9 years, which BMI of 14 fell in the 5th-10th percentile of the Growth Curve. But for the same BMI of 14, boys 9-11 years fell under the 5th percentile.

On the other hand, girls with a BMI of 22 who were 11 years or younger fall above the 85th percentile while boys 11 years and lower and BMI of 22 fell above the 95th percentile section of the child Growth Curve. This indicates that in the sample, boys 11 years of age had a higher susceptibility to overweight than girls of the same age. Boys 11 years old become overweight when BMI is 22-24kg/m². Boys of this age category fall between the 85th and 95th percentile and are then classified as obese. Both sexes have BMI from or above 85th-95th percentile. It showed that there were children who are underweight, normal weight, overweight and obese in the study. Therefore, children in these different categories were grouped as seen on the table below. Table 4.5 shows that about 14% of the children that were measured had BMI z-scores above 95th percentiles an indication of obesity amongst the children.

Similarly, 16% of the children were overweight. Cumulatively overweight and obesity constitutes 30% of the children sampled in the study area

Table 4. 5 BMI of Children in Khayelitsha

BMI of Children in Khayelitsha				
Age	BMI	Percentile	N=213	%
2-12 years	<14	<5th	63	30%
2-12 years	14-18	5th-85th	87	41%
2-12 years	18-21	85th-95th	34	16%
2-12 years	>22	>95th	29	14%

Source: Analysis of ISD dataset

4.2.7.2 Weight of Adults versus Weight of Children.

Under this section, the household IDs were used to determine the BMI of the household members, by listing the BMI of the children and the adults side by side. Any household where there were both adult and child obesity was selected. There were 102 such households where the BMIs of adults and child were matched. Hence this number of households were further considered for this comparison. It was noticed that most of the children with larger BMI had BMI higher than 224. This is displayed on the table below. For children, BMI Higher than 22 indicate a Z-score in the >95th percentile, and as such, classifies the child as obese. Different kinds of results achieved from the analysis.

- Households with child BMI larger than adult BMI,
- Households, with child BMIs lower than adult BMI,
- Households, with child BMI larger than that of some adult whereas it was at the same time lower than another adult.
- Households having two or more children with different BMI. It could be seen that one of the children had a higher BMI than the only adult, meanwhile the BMI of the other child was lower, and,
- Household with child BMI the same as BMI of Adult.

The children were grouped accordingly.

4.2.8 Food availability/BMI

The relationship between obesity and diet intake usually leads to many researches concluding that diet is the main source of increase weight gain. There, the food environment or the dietary

categories within a social environment are therefore a critical determinant factor for obesity prevention. Hence, food availability at the neighborhood level has recently received attention as a possible environmental determinant of diet. Some research has documented differences in the availability of certain types of food stores (Morland et. al, 2006). It is known that chain supermarkets, grocery stores and, convenience stores are likely to have different nutritional valuables, this part of the research shows analysis of the food outlets in the area. This was drawn from the question in the survey which asked “where do you buy food?” It found that most of the people buy food from supermarket chain stores, especially those on the top 5 in the country; including Shoprite, Pick-n-Pay, Checkers, and Woolworth. in addition, grocery stores like Super Spar, Organic Ingredients, also serve as food outlets. However, not all purchased food from those outlets. Others bought food from Spaza shops as seen in the figure below.

Figure 4. 5 School children at Spaza Shop.



Source: Thabo, (2018)

analysis showed there are eight types of food outlets where the inhabitants of Khayelitsha possibly buy. Table 4.6 shows that about 63% of the population buy food from Shoprite, which makes Shoprite the biggest food outlet of the population. Given this evidence, it is worth stating that policies regulating chain super markets needs to address the issue of quality and availability of appropriate healthy food types as a strategy to tackle obesity. Some research has attempted to lay claims on the fact that Spaza shops are one of the major contributors of increasing access to high-

energy dense food types. However, the evidence show that such claims do not hold water tide as Spaza shops only makes 6% of the population’s food outlet in the food environment. Food from convenient stores and Spaza shops are limited whether in respect of variety or in terms of quality but most accessible to low income earners in South Africa’s informal settlements (Vogel, 2018).

Table 4.6 Food Outlets in Khayelitsha.

	Food Purchased with Cash Source	Frequency	Percentage	Cumulative
1	Checkers	90	8.87	8.87
2	Pick n Pay	128	12.61	21.48
3	Shoprite	642	63.25	84.73
4	Spar	65	6.4	91.13
5	Woolworth	5	0.49	91.62
6	Spaza Shop	61	6.02	97.64
7	Informal Markets	11	1.08	98.72
8	Others	13	1.28	100

Source: Analysis of ISD dataset

In addition, convenient stores and spaza shops make it easier for children who take money to school to buy whatever they want from the spaza shop. The food consumed by the children was retrieved and the result is given below. It shows that out of the 66 children who buy food at school, the majority takes bread, followed by 14 others who go to school with Drink-O-Pop. This drink comes in 5g sachets, which are dissolved in 2 liters of water to make pure refreshment (Promasidor, 2017). It is said to be free from sugar, tartrazine and contains no preservatives. Another observation that has been made is that the number of children taking fruit and yoghurt to school is very small compared to those who take bread to school.

4.2.8 Food consumption/ At home or outside

Children were asked to state whether they buy food at school and if such food item was their usual food. First, the researcher looks at how frequently the children bought food items at school or on their way to school. The results show that 46% of the sample “Always” buy the food types presented in figure 4.6 that follows. 21% never buy food at school or on their way to school. This evidence indicates that children are most likely to be at risk of eating unhealthy food types as there is no parental control in this environment. The School environment could either pose as a risk factor or act as a preventive factor when the school implements nutritional control mechanism.

Table 4.7 Children’s Food Consumption frequency

Usual food children take to school			
	N=256	%	Cum %
Never	54	21.09	21.09
seldom	24	9.38	30.47
Sometimes	40	15.63	46.09
Often	20	7.81	53.91
Always	118	46.09	100.00

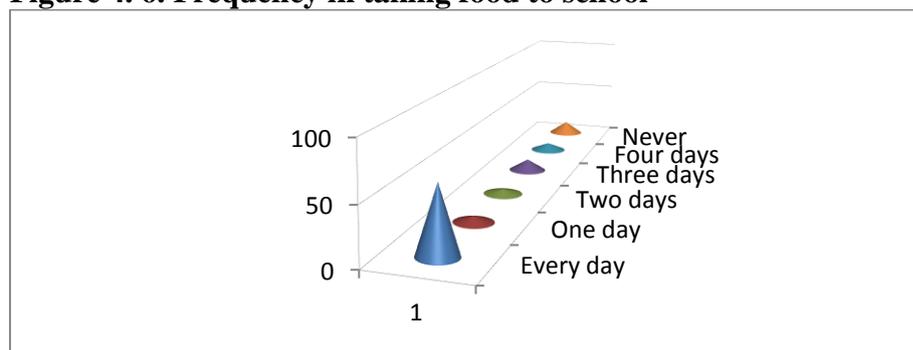
Source: Analysis of ISD dataset

The graph above shows that Drink-a-pop which is sugar sweeten drink is the highest product consumed by the children, followed by chees, bread and pie. Given that over 40% of the children reported that these are the usual food they buy while at school, in the view of this researcher, this evidence indicates that there is a high risk of children buying unhealthy product. Added to the already heavy dependence on energy dense products within their food environment, there is urgent need to policies that addresses these risk factors.

4.2.9 Dietary Intake of Child

It was important to look into the type of food because as Steyn et al. (2006) had shown, children need particular food types to improve micronutrient intakes. Thus, there are recommendations for children to consume more meat, poultry, fish, eggs, fruits and vegetables. Due to this information, type of food children eat (at home, takes in the lunchbox or buys), were examined (Figure 4.6). Before this analysis, data on where food is eaten was retrieved. Firstly, it was seen that a lot of children (327), making 57.37% of those in the study area, always take food to school in their lunch boxes.

Figure 4. 6. Frequency in taking food to school



Source: Analysis of ISD dataset

Food taken to school could have been in the lunchbox packed at home or simply bought at school or on the way to school. Therefore, the study went on to determine whether food taken to school is bought or not. The result is given below.

Table 4. 4 Child take food to School vs Child Buys food

Child take food to School vs Child Buys food					
Take food/bought food	Yes	No	Total	Coefficient	P-value
Yes	81 (77.1%)	24(22.8%)	105(100%)		
No	39(92.8%)	3(7.1%)	42(100%)	4.9408	0.026
Total	120(81.6%)	27(18.3%)	147(100%)		

Source: Analysis of ISD dataset

Result in Table 10 show that 77% of children who indicated that they bought food also had their lunchbox packed with food on a usual bases compared to 22% who bought food but did not have a lunchbox from home. About 93% of those had lunchbox packed from home but did not buy food while 7% of children had neither lunchbox packed from home nor did they buy food from school. These later category are mostly likely children who suffer from hunger on a usual bases in the study area. That notwithstanding, the types of food children consumed have been listed below. The results demonstrate that children eat the same type of food whether at home (lunchbox used as proxy), or bought. A Chi square analysis was performed to see the difference between children who buy food and children who take food to school. The result indicates that between there was a significant difference between the two groups with a *P-value* 0.026. This difference harnesses the fact that children will most likely buy something to eat at school even when their parents give them food in their lunchboxes.

4.2.10 Food Types in the Environment.

Table 4.8 further shows the percentage distribution of the food types children will usually buy as identified in the survey. These food types were categorized into their nutritional categories as shown in Figure 4.7 below. Overall, the dominant food types that children bought was Crisp such as Chips (Lays, Doritos, Niknaks) 27%. Fried potato chips second highest food type bought. About 23% of children bought fried potato chips and sweets 19%.

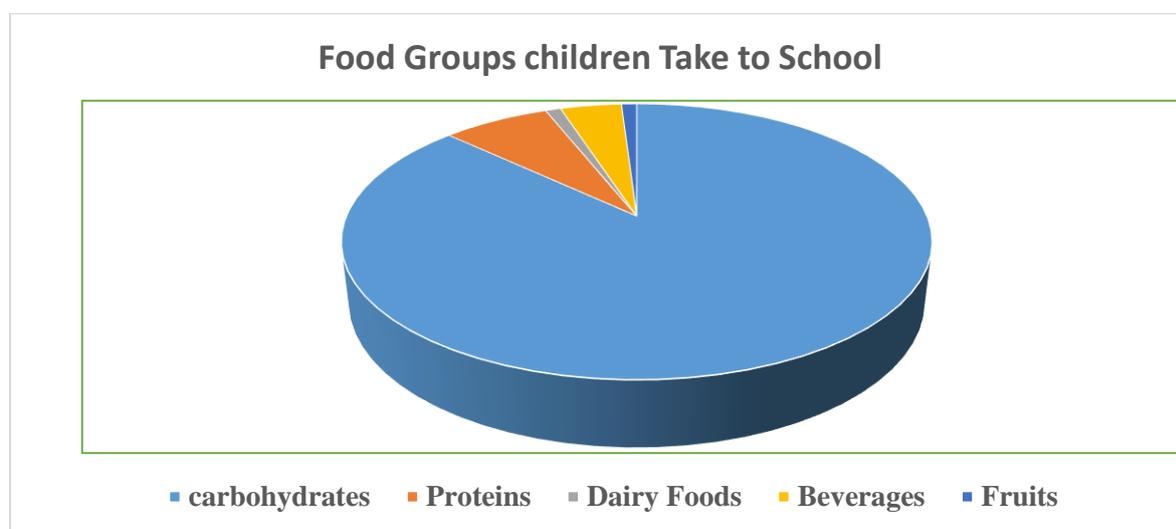
Table 4. 5 Child Buys Food types in the Community

Type of Food child buys	N=159	Percentage
Amagwinya	3	2%
Biscuit	4	3%
Bread	4	3%
Cakes	4	3%
Chicken	4	3%
Chips (Fried)	36	23%
Chips (Lays)	43	27%
Drink-a-Pop	7	4%
Fruits	1	1%
Hotdog Roll	6	4%
Lollipops	13	8%
Suckers	1	1%
Sweets	31	19%
Yoghurt	2	1%

Source: Analysis of ISD dataset

Knowing the type of food children consumed is critical in understanding children’s dietary intake and the implication on their health status. Thus the components of the different food groups shows that carbohydrates form 87% of what children buy, while Proteins, Dairy Foods, Beverages and Fruits together formed only 13% of what children buy, as seen on the figure below.

Figure 4. 7 Food Groups



Source: Analysis of ISD dataset

From the list mentioning the type of food, children take to school; it was observed that although the children consume all the different food types, most of them consume mostly, carbohydrates. It is evident that the overconsumption of carbohydrate related food types is likely to impact on the health status of the child in the short term and in the long term.

This research has used Fruit and Vegetable intakes of the child as proxy for healthy diet since these have been recommended for the improvement of children’s health. The result in Table 4.9 shows that none of the children consumed vegetable whether in their lunchbox packed or when they buy food. Results are also indicating that, children consumed foods in the carbohydrate group. This implies that the recommendation to give children more meat, poultry, fish, eggs, fruits and vegetables, to improve micronutrient intakes is not yet brought into this part of the country after 12 years.

Table 4. 6 Dietary Intakes

Carbohydrates	Proteins,	Vegetables	Fruits,	Dairy Foods	Beverages
Sugar	Red meat		Apples,	Cheese	Drink-O-Pop
Sweets (lollipops)	Sausage			Yoghurts	
Ice cream, suckers	(beef,				
Bread	pork)				
Biscuits, cakes,	chicken,				
Amaguinya (vetkoek)					
Chips (Fried potato)					
Chips (Lays)					

Source: Analysis of ISD dataset

As such, micronutrients wanted by the body to produce enzymes, hormones and other substances essential for proper growth and development are lacking. Therefore, it can be concluded that the dietary intake of children from the study area come from a very narrow dietary diversification. Because the body does not produce micronutrients but must obtain them from food, it tends to suffer severe consequences when food providing these micronutrients are not consumed.

4.3 Environmental Risk Factors

4.3.1 Exposure to TV as an influence on Food Purchase

This section focuses on the analysis of the relationship between TV and children eating lifestyle and what are the implications on the health of the child. It is important to note that in this analysis,

the samples are different because the analysis focus on household and not on children in particular. Thus, households with children and household with children plus TV was categories and a chi square analysis performed. Studies have shown that Television advertisement contributes in household food decision making. In this study, TV was identified as one of the critical environmental factors that affects children’s food choices decision making. Table 4.10 below show the relationship between TV adverts and household food decision making. The result show that 25% of children in households with TV strongly agree that the food they bought was related to advertisement on TV. In general, proportion of children living in households with TV was 61% who agree or strongly that they were influenced by TV adverts in their food choices.

Table 4. 7 Influence of TV on Food Purchased

Influence of TV on household and children eating life style					
	Yes	No	Total	Coefficient	P-value
Strongly Disagree	116(18.83%)	22(35.48%)	138(20.35%)	21.1255	0.000
Disagree	63(10.23%)	3(4.84%)	66 (9.73%)		
Indifferent	60(9.74%)	9(14.52%)	69 (10.18%)		
Agree	220(35.71%)	25(40.32%)	245(36.14%)		
Strongly Agree	157(25.49%)	3(4.84%)	160(23.60%)		
Total	616(90.86)	62(9.14)	678(100%)		

Source: Analysis of ISD dataset

From the chi square analysis, there is sufficient evidence to believe that children living in in poor communities are influenced by TV in their food choices decision making. The result shows that *Pearson X² =21.1255 with a P-Value= 0.000* which is less than 0.05 significance level. Since children are not independent of their parent, there is a double challenge for children in dealing with the environmental influence on them in their food choices and health status. In 4.3.2, I looked at the parental factor as one of the environmental factors of children’s food choices decision making.

4.3.2 Parental Influence

The table below gives one of the ways by which parents influence the diet of their children. It can be understood that 265 parents ask their children what they like before cooking or buying food.

Table 4.8 Parents' Give What Child Wants

Parents asks what child likes	N=144	Percentage
Always	54	37.50
Sometimes	59	40.97
Never	31	21.53

Source: Analysis of ISD dataset

The next example below continues to show how parents influence the diet and consequently, health status of their children. Though the research show that a lot of the parents do not give money to children, children who receive such privilege spend the money on bread, chicken, fried chips, lays (snacks), drink-o-pop, hotdog roll, lollipops and sweets. That is 87% of the time children buy carbohydrate inclined foods. Only 13% of food purchase by children fall under protein. It is also seen on the table that even when parents do not give children money, there still buy on their way from or to school. This means that other members in the households or members in the neighbourhood also give the children money which is used to buy carbohydrate laden foods. Thus, both parental and environmental influences on the child are evident from the results obtained.

4.3.3 Comparing Adult Obesity to Child Obesity

Under this section, the household IDs were used to determine the BMI of the household members, by listing the BMI of the children and the adults side by side. Any household where there were both adult and child obesity was selected. There were 102 such households where the BMIs of adults and child were matched. Hence this number of households were further considered for this comparison.

It was noticed that most of the children with larger BMI had BMI higher than 22⁴. This is displayed on the table below. For children, BMI Higher than 22 indicate a Z-score in the >95th percentile, and as such, classifies the child as obese.

Different kinds of results achieved from the analysis.

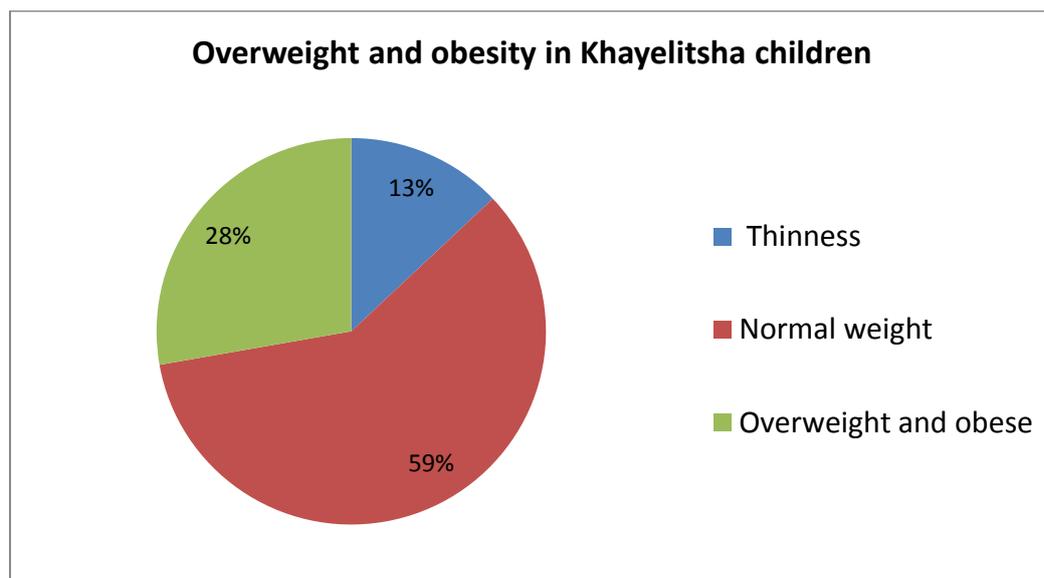
- Households with child BMI larger than adult BMI,
- Households, with child BMIs lower than adult BMI,
- Households, with child BMI larger than that of some adult whereas it was at the same time lower than another adult.

⁴Although BMI is used on the tables, the Z-score is what was used to determine whether the child was obese or not. From the literature it was clear that any BMI over 24 left the child (male or female) above the 95th percentile, at which the child is considered obese.

- Households having two or more children with different BMI. It could be seen that one of the children had a higher BMI than the only adult, meanwhile the BMI of the other child was lower, and,
- Household with child BMI the same as BMI of Adult.

The children were grouped accordingly, and the percentages of the number of children under each nutritional status was represented on the pie chart below.

Figure 4.8 Nutritional Health Status of Children



Source: Analysis of ISD dataset

4.4 Conclusion

This chapter has presented the main results or findings of this study. The chapter started with a brief introduction of the objectives of the analysis and describes the data analysis process. A descriptive analysis of the demographic characteristics of the chapter was presented and runs through the entire chapter. In the second section, the chapter attempts to operationalize the key variables by using tables and graphs. Some inferential statistics are presented where appropriately to assess the significance of the associations. Chi square was done to find the relationship between taking food to school and BMI of child. Furthermore, the relationship between usual food of child and the BMI were analyzed to determine the effects of what a child eats daily at school and at home.

The chapter found that, first from the analysis, 57% of the sample of children were sons and daughters in the household. About 80% of children were in Grad R and Primary school. The child support grant is the main source of income as 58% of children are dependent on child support grant. The study found that about 30% of the children were overweight and obese using the WHO

BMI Z-Score threshold for children. The result also shows that though children generally take food to school, there was significant evidence that children who take food to school will also buy food at school. In addition, food advertised on TV was highly associated to children's food choices indicating that children food choices is influenced partly by watching TV advert. Neither the food choices of adults nor the environment in which a child lives, influence the child becoming obese. However, it is understood that the quantity of the carbohydrates category of food is a determinant factor when dealing with the issue of obesity. The insignificant result can further be explained by comparing the number of underweight, normal weight, overweight and obese children found in the community. It was noticed that the number of overweight children were more than the number of obese children. Also the percentage of children with normal weight was high. That notwithstanding, the results show that if the situation is not addressed, there would be a shift into the threatening categories; from normal to overweight and from overweight to obese, in the near future.

Chapter 5 Conclusion and Recommendation

5.1 Introduction

The excessive accumulation of fat in the body of an individual is what is scientifically known as overweight and in some extreme case obesity. The prevalence of the obesity has become a public health concern internationally and in South Africa in particular. South Africa currently has the highest rates of obesity in sub Saharan Africa. There has been growing evidence of child obesity worldwide leading to children suffering from non-communicable diseases such as hypotension and diabetes. Given the prevalent conditions of weight gain amongst children, tackling obesity in children should be given greater attention as children are twice at risk of becoming obese in the later stages in life. It is thus, argued that the prevention of obesity in children should be prioritized to combat the epidemic which could contribute significantly to reducing public spending in the treatment of non-communicable diseases.

This research aimed at understanding the environmental and parental factors influencing childhood overweight and obesity in Khayelitsha, an urban peripheral township in Cape Town ,South Africa. The research identified the different factors that were associated with child overweight and obesity in the study area. Besides, the research was aimed at raising awareness of parents and stakeholders on the factors associated with child obesity and proposed possible recommendations. This chapter has summarized the main research findings and made conclusions and recommendations. The chapter highlights each of the key objectives of the research project and responds to the research question set out in the introduction.

5.2 Conclusions

Chapter five revisits the other chapters by stating the overall aim of this research. The overall aim of this research was to contribute in the fight against obesity in South Africa as a whole, by studying to understand obesity in children. This came from the information drawn from general knowledge (WHO) as well as from reviewed literatures about the prevalence of obesity (conditions of abnormal or excessive fat accumulation).

There is the general problem that since more than half a century warnings about the risk of proneness to obesity has been going on, efforts to curb it seems to be producing low results because the number of obese individuals and obesity related diseases continue to rise. It is so because the obesity epidemic could persist sometimes from child into adulthood as some studies have tracked adult obesity to childhood. Therefore, the fight against obesity needs a study to understand the causes of obesity during childhood. This approach is taken because the researcher agrees with the argument that prevention of obesity in children should be prioritized in order to combat the

epidemic. The need for such an approach is supported by the already existing evidence in South Africa, where the number of children affected by obesity is on the rise. Thus, this research asked the following specific questions;

1. “Does the environment influence the food choices of the child?.
2. How does parent’s food choice influence the food choices of the child?

Hence to answer the questions above, the researcher used qualitative and quantitative research methodologies, to explore the environmental and parental influences on the prevalence of overweight and obesity among children in Khayelitsha.

5.2.1 Research Objectives: Summary of Findings and Conclusions

As seen earlier, the specific objectives of the research were:

5.2.1.1 Research Objective 1:

To review existing literatures and also provide a theoretical and conceptual framework for the research by analyzing the relevant theories and concepts. This objective was met and as seen in the Literature review section, it helped to understand the extent of the fight against obesity and also to determine the variables with which to conduct this necessary aspect in the fight. It is also relevant to mention that it was quite surprising to find some of the results from this particular research blending into what other researchers have found when they carried out research on obesity in other parts of the world.

5.2.1.2 Research Objective 2:

To study the BMI of children in relation to the food choices to determine healthy and non-healthy food choices for children in a growing middle-class area in Cape Town. The result determined in chapter four indicated that there is prevalence of obesity amongst children in Khayelitsha. In addition, some children were even more obese than their parents. As usual, the obesity observed here was linked as most of the times, although not limited to, the result of the consumption of high energy, poor nutrient food types. This conclusion was made from analyzing food types in the environment and parents’ food choices.

This was directed by the understanding obtained from the literature; parents and the environment in which a child tends to live, influence the food choices of the child. It was a remarkable observation that most children take food to school. The food in the lunch box was thus collected and analyzed. The analysis shows that most of what is taken to school falls under the carbohydrate food group. On the other hand, only very few children had food that provide micronutrient like yoghurts, fruits or vegetables.

Thus, healthy food types for children has been determined to include more proteins (meat, poultry, fish, eggs), fruits and vegetables, laden food types. This means that parents must change from feeding the children with narrow dietary intake to a more dietary diversification. Therefore, consumption of different types of food, like fruits and vegetables supplement nutritional variation which contributes to “better lifelong health as the World Health Organisation (2013) encourages.

5.2.1.3 Research Objective 3:

To Verify the Link Between Obese Children and Parents. In order to verify the link between obese children and parents, care was given to ensure that only parents and children in the same household were matched. Thus, household IDs were used to analyses the links. Although it was found that in some households, children were more obese than parents were, other households showed the contrary. Even though BMI of adults were determined and used directly, after determining the BMI of children, the values were converted to Z-score. It was until then that Z-scores (percentiles) were used to determine an obese child. So all males and females above the 95th percentile, considered obese, were selected for the match with any obese adult in the same household. There were 102 households for this, representing a portion of the total number of obese children in the community. Therefore, it can be concluded that obesity in children is influenced by their parents.

5.2.1.4 Research Objective 4:

To identify the opportunities and challenges for the obese and provide practical recommendations to government, policy makers, and other stakeholders. This last objective was equally met. From the literature and the results obtained, it can be said that the obese have a lot of challenges. Firstly, the environment is obesogenic as there are more convenient stores than supermarkets. Eventually, there are few accesses to nutritionally healthy food types. Since these are less abundant, the prices are certainly above the affordability of most of the residents in Khayelitsha. Therefore, most people purchase from convenience stores which are noted for their large supply of high energy dense food within a limited range of food types. Despite the interest to adopt healthier food choices, the nature of an obesogenic environment in which the inhabitants of Khayelitsha are found, does not support such desires. Therefore, the government, policy makers, and other stakeholders can increase variety of food types by increasing supermarkets in the area. Better still, fruit stalls can be encouraged closed to the convenience stores as a more rapid intervention. It will help to expose other types of food not only to parents (adults) but also to school children. Some of these children recall the names of fruits and perhaps make requests to parents for these advertised fruits. As can be realized, it will facilitate diversification of dietary intake which even WHO has recommended for children.

Irrespective of the challenges mentioned, the results of this research can be used to motivate obese individuals. First and foremost, the call to support and improve health behaviours is for people of all sizes. Again, every person in a community needs to know that irrespective of body size, there are physical, social and legal barriers in the environment which can inhibit individuals from being healthy. With this approach, the obese can feel less stigmatized, when a research is committed to understand factors that might affect an individual's capacity to be well. More specifically, people who are obese should be made to know that government, policy makers, and other stakeholders are willing to curb obesity in the society. However, to propose appropriate area specific, economic, political and social interventions data must be collected.

5.3 Recommendation

Since the results of this research like many others, show that obesity is on the rise, it is clear that preventing obesity is much more effective than treating it. Therefore, further research can be done to understand why children have low range of dietary intake despite recommendations to diversify dietary intake by eating a range of different food types.

The results of this research can be used to motivate obese individuals that the call to support and improve health behaviours is for people of all sizes. Such that the issue of being stigmatized is reduced, as such a research is committed to understand factors that might affect a body's capacity to be well, in order that appropriate area specific economic, political and social interventions be recommended. Again, every person in a community needs to know that irrespective of body size, there are physical, social and legal barriers in the environment, which can inhibit bodies from being healthy.

The thesis found that the children in the study area feed on a narrow range of diet; mostly in the carbohydrates food groups. This fits with other studies which showed that fruits and vegetables are usually absent from the diets of those living in low-income areas. This points to the fact that, important micronutrients good for children's health and development like iodine, vitamin A and iron, were absent from children's diets. It is also obvious that micronutrients will help prevent diseases. Thus, though parents may not provide nutritious food due to low income (mostly child support grants), the government can play a vital role in including fruits and vegetables in the children's diet through the school feeding schemes. As it is well recognized, fruits and vegetables complement dietary diversification, which contributes to "better lifelong health" (WHO, 2013).

REFERENCES

Azadbakht, L. and Esmailzadeh, A., 2011. Dietary diversity score is related to obesity and abdominal adiposity among Iranian female youth. *Public health nutrition*, 14(1), pp.62-69.

Becker T. 2013. Kids need guidance about what they eat. https://www.fredericknewspost.com/news/health/kids-need-guidance-about-what-they-eat/article_2e2d2b58-d100-57c9-81eb-1b8df3af776b.html?TNNoMobile <Retrieved on the 8 March 2017>.

Bekker, S., 2001. Diminishing returns: circulatory migration linking Cape Town to the Eastern Cape. *Southern African Journal of Demography*, pp.1-8.

Biro, F.M. and Wien, M., 2010. Childhood obesity and adult morbidities. *The American journal of clinical nutrition*, 91(5), pp.1499S-1505S.

Block, G., 1982. A review of validations of dietary assessment methods. *American journal of epidemiology*, 115(4), pp.492-505.

Boeije, H. 2009. Analysis in qualitative research, Sage Publications Ltd. Creswell, J.W., 2002. Educational research: Planning, conducting, and evaluating quantitative (pp. 146-166). 4th edition. Upper Saddle River, NJ: Prentice Hall.

Bourne, L.T Lambert, E.V Steyn K., 2002. Where does the black population of South Africa stand on the nutrition transition? *Public Health Nutrition*: 5(1A), 157–162

Brannen, J. ed., 2017. *Mixing methods: Qualitative and quantitative research*. Routledge.

Bronfenbrenner, U., 1995. Developmental ecology through space and time: A future perspective. *Examining lives in context: Perspectives on the ecology of human development*, 619(647), pp.10176-018.

Brunn, S.D. and Wilson, M.W., 2013. Cape Town's million plus black township of Khayelitsha: Terrae incognitae and the geographies and cartographies of silence. *Habitat International*, 39, pp.284-294.

Burgoine, T., Alvanides, S. and Lake, A.A., 2011. Assessing the obesogenic environment of North East England. *Health & place*, 17(3), pp.738-747.

Burgoine, T., Forouhi, N.G., Griffin, S.J., Brage, S., Wareham, N.J. and Monsivais, P., 2016. Does neighborhood fast-food outlet exposure amplify inequalities in diet and obesity? A cross-sectional study. *The American journal of clinical nutrition*, 103(6), pp.1540-1547.

Channanath, A.M., Elkum, N., Al-Abdulrazzaq, D., Tuomilehto, J., Shaltout, A. and Thanaraj, T.A., 2017. Ethnic differences in association of high body mass index with early onset of Type 1 diabetes—Arab ethnicity as case study. *PloS one*, 12(4), p.e0175728.

Capodaglio, P. and Liuzzi, A. (2013). Obesity: A disabling disease or a condition favoring disability? *European Journal of Physical and Rehabilitation Medicine*, 49(3), pp-395– 398

Case, A. and Menendez, A., 2009. Sex differences in obesity rates in poor countries: evidence from South Africa. *Economics & Human Biology*, 7(3), pp.271-282.

Cassim, S.B., 2010. Food and beverage marketing to children in South Africa: mapping the terrain: invited review. *South African Journal of Clinical Nutrition*, 23(4), pp.181-185. Chandaria, S.A., 2014. The Emerging Paradigm Shift in Understanding the Causes of Obesity. In *Controversies in Obesity* (pp. 63-73). Springer, London.

Choukem, S.P., Kamdeu-Chedeu, J., Leary, S.D., Mboue-Djieka, Y., Nebongo, D.N., Akazong, C., Mapoure, Y.N., Hamilton-Shield, J.P., Gautier, J.F. and Mbanya, J.C., 2017. Overweight and obesity in children aged 3–13 years in urban Cameroon: a cross-sectional study of prevalence and association with socio-economic status. *BMC obesity*, 4(1), p.7.

Clark-Riddell, J. and Sanpath, A. 2016 Obesity-a-new-threat-to-South-Africa IOS/NEWS / 30 April at 10:04am <http://www.iol.co.za/ios/news/obesity-a-new-threat-to-south-africa-2016068>

Cohen, D. and Rabinovich, L., 2012. Peer Reviewed: Addressing the Proximal Causes of Obesity: The Relevance of Alcohol Control Policies. *Preventing chronic disease*, 9.

Cole, T.J., Faith, M.S., Pietrobelli, A. and Heo, M., 2005. What is the best measure of adiposity change in growing children: BMI, BMI%, BMI z-score or BMI centile?. *European journal of clinical nutrition*, 59(3), p.419.

Colls, R. and Evans, B., 2014. Making space for fat bodies? A critical account of ‘the obesogenic environment’. *Progress in Human Geography*, 38(6), pp.733-753.

Cowley, M.A., Brown, W.A. and Considine, R.V., 2016. Obesity: the problem and its management. In *Endocrinology: Adult & Pediatric* (pp. 468-478). Elsevier.

Curry E. 2011. New, Assertive Women's Voices in Local Election. Wayback Machine. Archived 10 April 2011 at the<<https://web.archive.org/web/20110410012930/http://ipsnews.net/news.asp?idnews=54270>> [Accessed 4/2/2020]

Dalal, S., Beunza, J.J., Volmink, J., Adebamowo, C., Bajunirwe, F., Njelekela, M., Mozaffarian, D., Fawzi, W., Willett, W., Adami, H.O. and Holmes, M.D., 2011. Non-communicable diseases in sub-Saharan Africa: what we know now. *International journal of epidemiology*, 40(4), pp.885-901.

de Ridder, D., Kroese, F., Evers, C., Adriaanse, M. and Gillebaart, M., 2017. Healthy diet: Health impact, prevalence, correlates, and interventions. *Psychology & health*, 32(8), pp.907-941.

Denzin, N.K & Lincoln, Y.S. 2011. *The SAGE Handbook of Qualitative Research*, 4th edition. Los Angeles: SAGE Publications.

Devanathan, R., Esterhuizen, T.M. and Govender, R.D., 2013. Overweight and obesity amongst Black women in Durban, KwaZulu-Natal: A ‘disease’ of perception in an area of high HIV prevalence. *African journal of primary health care & family medicine*, 5(1).

- Dinbabo, M.F., Karriem, A., Penderis, S., May, J., Fulcher, C., Belebema, M.M.N., Mogatosi, M.T., Zinja, M.P., Gangen, M.N.M., Adams, M.R. and Ngcwayi, M.N., 2017. Food choices and Body Mass Index (BMI) in adults and children: Evidence from the National Income Dynamics Study (NIDS) and empirical research from Khayelitsha and Mitchells Plain in South Africa.
- Dinsa, G.D., Goryakin, Y., Fumagalli, E. and Suhrcke, M., 2012. Obesity and socioeconomic status in developing countries: a systematic review. *Obesity reviews*, 13(11), pp.1067-1079.
- Drewnowski, A. 2009. Defining Nutrient Density: Development and Validation of the Nutrient Rich Foods Index. *Journal of the American College of Nutrition*, 28(4): 421S–426S.
- Elbel, B., Gyamfi, J. and Kersh, R., 2011. Child and adolescent fast-food choice and the influence of calorie labeling: a natural experiment. *International journal of obesity*, 35(4), p.493.
- Elinder, L.S. and Jansson, M., 2009. Obesogenic environments—aspects on measurement and indicators. *Public Health Nutrition*, 12(3), pp.307-315.
- Evans, B. (2006). ‘Gluttony or sloth’: critical geographies of bodies and morality in (anti) obesity policy. *Area*, 38(3), 259-267.
- Faber, M., Kvalsvig, J.D. and Lombard C.J., 2005. Effect of a fortified maize-meal porridge on anaemia, micronutrient status, and motor development of infants. *The American Journal of Clinical Nutrition* 82 (5), pp.1032-1039.
- Flower, K.B., Perrin, E.M., Viadro, C.I. and Ammerman, A.S., 2007. Using body mass index to identify overweight children: barriers and facilitators in primary care. *Ambulatory Pediatrics*, 7(1), pp.38-44.
- Figuroa, R., Saltzman, J., Jarick Metcalfe, J. and Wiley, A., 2017. “Culture Is So Interspersed”: Child-Minders’ and Health Workers’ Perceptions of Childhood Obesity in South Africa. *Journal of obesity*, 2017.
- Gopalan, C. and Aeri, B.T., 2001. Strategies to combat under-nutrition. *Economic and Political Weekly*, pp.3159-3169.
- Harrington, D.W. and Elliott, S.J., 2009. Weighing the importance of neighbourhood: a multilevel exploration of the determinants of overweight and obesity. *Social Science & Medicine*, 68(4), pp.593-600.
- Harris, J.L., Pomeranz, J.L., Lobstein, T. and Brownell, K.D., 2009. A crisis in the marketplace: how food marketing contributes to childhood obesity and what can be done. *Annual review of public health*, 30, pp.211-225.
- Ho, M., Garnett, S.P., Baur, L., Burrows, T., Stewart, L., Neve, M. and Collins, C., 2012. Effectiveness of lifestyle interventions in child obesity: systematic review with meta-analysis. *Pediatrics*, 130(6), pp. 1647-1671. <https://en.wikipedia.org/wiki/Khayelitsha> retrieved on 9/2/2017.
- Hopkins, P., 2008. Critical geographies of body size. *Geography compass*, 2(6), pp.2111-2126. http://www.journals.cambridge.org/abstract_S1368980005000728 15 September 2014.

- Iversen, P.O., Du Plessis, L., Marais, D., Morseth, M. and Herselman, M., 2011. Nutritional health of young children in South Africa over the first 16 years of democracy. *South African Journal of Child Health*, 5(3), pp.72-77.
- Jiang, S.Z., Lu, W., Zong, X.F., Ruan, H.Y. and Liu, Y., 2016. Obesity and hypertension. *Experimental and therapeutic medicine*, 12(4), pp.2395-2399.
- Jones, A.D. & Ejeta, G. 2016, "A new global agenda for nutrition and health: the importance of agriculture and food systems", *Bulletin of the World Health Organization*, vol. 94, no. 3, pp. 228-229.
- Jones, A.D. and Ejeta, G., 2016. A new global agenda for nutrition and health: the importance of agriculture and food systems. *Bulletin of the World Health Organization*, 94(3), p.228-229.
- Kaplan, S.R., Oosthuizen, C., Stinson, K., Little, F., Euvrard, J., Schomaker, M., Osler, M., Hilderbrand, K., Boule, A. and Meintjes, G., 2017. Contemporary disengagement from antiretroviral therapy in Khayelitsha, South Africa: A cohort study. *PLoS medicine*, 14(11).
- Keino, S., Plasqui, G., Etyang, G. and van den Borne, B., 2014. Determinants of stunting and overweight among young children and adolescents in sub-Saharan Africa. *Food and Nutrition Bulletin*, 35(2), pp.167-178.
- Kipping, R.R., Jago, R. and Lawlor, D.A., 2008. CLINICAL REVIEW-Obesity in children. Part 1: Epidemiology, measurement, risk factors and screening. *BMJ (CR)-print*, 337(7675), p.922.
- Kipping, R.R., Jago, R. and Lawlor, D.A., 2011. Developing parent involvement in a school-based child obesity prevention intervention: a qualitative study and process evaluation. *Journal of Public Health*, 34(2), pp.236-244.
- Kirk, S.F., Penney, T.L. and McHugh, T.L., 2010. Characterizing the obesogenic environment: the state of the evidence with directions for future research. *Obesity Reviews*, 11(2), pp.109-117.
- Kruger, H.S., Puoane, T., Senekal, M. and van der Merwe, M.T., 2005. Obesity in South Africa: challenges for government and health professionals. *Public health nutrition*, 8(05), pp.491-500.
- Kumar, R., 2005, *Research Methodology: A Step-by-Step Guide for Beginners*. SAGE Publications Limited, 2010.
- Labadarios, D., Steyn, N., Maunder, E., MacIntyre, U., Gericke, G., Swart, R., Huskisson, J., Dannhauser, A., Vorster, H., Nesmvuni, A. & Nel, J. 2005. The National Food Consumption Survey (NFCS): South Africa, 1999. *Public Health Nutrition*, 8(5).
- Livingstone, M.B.E., Robson, P.J. and Wallace, J.M.W., 2004. Issues in dietary intake assessment of children and adolescents. *British Journal of Nutrition*, 92(S2), pp.S213-S222.
- Lobstein, T., Jackson-Leach, R., Moodie, M.L., Hall, K.D., Gortmaker, S.L., Swinburn, B.A., James, W.P.T., Wang, Y. and McPherson, K., 2015. Child and adolescent obesity: part of a bigger picture. *The Lancet*, 385(9986), pp.2510-2520.
- Locard, E., Mamelie, N., Billette, A., Miginiac, M., Munoz, F. and Rey, S., 1992. Risk factors of obesity in a five year old population. Parental versus environmental factors. *International journal*

- of obesity and related metabolic disorders: journal of the International Association for the Study of Obesity, 16(10), pp.721-729.
- Lundeen, E.A., Norris, S.A., Adair, L.S., Richter, L.M. and Stein, A.D., 2016. Sex differences in obesity incidence: 20- year prospective cohort in South Africa. *Pediatric obesity*, 11(1), pp.75-80.
- Malhotra, R., Hoyo, C., Østbye, T., Hughes, G., Schwartz, D., Tsolekile, L., Zulu, J. and Puoane, T., 2008. Determinants of obesity in an urban township of South Africa. *South African Journal of Clinical Nutrition*, 21(4), pp.315-320.
- Martin, J., 2018. Effective strategies to prevent obesity. *Health Promotion Journal of Australia*, 29(S1), pp.26-28.
- Martorell, R., Khan, L.K., Hughes, M.L. and Grummer-Strawn, L.M., 2000. Overweight and obesity in preschool children from developing countries. *International journal of obesity*, 24(8), pp.959-967.
- Mandle, J., Tugendhaft, A., Michalow, J. and Hofman, K., 2015. Nutrition labelling: a review of research on consumer and industry response in the global South. *Global health action*, 8(1), p.25912.
- McGarvey, E., Keller, A., Forrester, M., Williams, E., Seward, D. and Suttle, D.E., 2004. Feasibility and benefits of a parent-focused preschool child obesity intervention. *American Journal of Public Health*, 94(9), pp.1490-1495.
- McLoughlin, C. 2011, "Factors Affecting State–Non- Governmental Organisation Relations In Service Provision: Key Themes From The Literature", *Public Administration and Development*, vol. 31, no. 4, pp. 240-251.
- Morland, K., Roux, A. V. D., & Wing, S. (2006). Supermarkets, other food stores, and obesity: the atherosclerosis risk in communities study. *American journal of preventive medicine*, 30(4), 333-339.
- Mouton, Johann; Babbie, 2001 Earl The practice of social research, Cape Town: Wadsworth Publishing Company.
- Mvo, N., 1999. A study of the relationship between maternal obesity and child under-nutrition in African women attending a child health clinic in Khayelitsha, Cape Town (Doctoral dissertation, University of Cape Town).
- Neumark-Sztainer, D., Hannan, P.J., Story, M., Croll, J. and Perry, C., 2003. Family meal patterns: associations with sociodemographic characteristics and improved dietary intake among adolescents. *Journal of the american dietetic association*, 103(3), pp.317-322.
- Negash, S., Agyemang, C., Matsha, T.E., Peer, N., Erasmus, R.T. and Kengne, A.P., 2017. Differential prevalence and associations of overweight and obesity by gender and population group among school learners in South Africa: a cross-sectional study. *BMC obesity*, 4(1), pp.1-8.
- Oldewage-Theron, W.H., Dicks, E.G. and Napier, C.E., 2006. Poverty, household food insecurity and nutrition: coping strategies in an informal settlement in the Vaal Triangle, South Africa. *Public health*, 120(9), pp.795-804.

Peña, M.M., Dixon, B. and Taveras, E.M., 2012. Are you talking to ME? The importance of ethnicity and culture in childhood obesity prevention and management. *Childhood Obesity*, 8(1), pp.23-27.

Pienaar, A.E., 2015. Prevalence of overweight and obesity among primary school children in a developing country: NW-CHILD longitudinal data of 6–9-yr-old children in South Africa. *BMC obesity*, 2(1), p.2.

Plowright, D., 2011. *Using mixed methods: Frameworks for an integrated methodology*. Sage publications.

Puoane, T.R., Tsolekile, L., Igumbor, E.U. and Fourie, J.M., 2012. Experiences in developing and implementing health clubs to reduce hypertension risk among adults in a South African population in transition. *International journal of hypertension*, 2012.

Prentice, A.M., 2005. The emerging epidemic of obesity in developing countries. *International journal of epidemiology*, 35(1), pp.93-99.

Prentice, A.M. and Jebb, S.A., 2001. Beyond body mass index. *Obesity reviews*, 2(3), pp.141-147.

Puoane, T., Steyn, K., Bradshaw, D., Laubscher, R., Fourie, J., Lambert, V. and Mbananga, N., 2002. Obesity in South Africa: the South African demographic and health survey. *Obesity research*, 10(10), pp.1038-1048.

Richard, D., 2015. Cognitive and autonomic determinants of energy homeostasis in obesity. *Nature Reviews Endocrinology*, 11(8), pp.489-501.

Richards, G. and Munsters, W., 2010. Developments and perspectives in cultural tourism research. *Cultural tourism research methods*, pp.1-12.

Rodriguez, N., Martinez, O., Mercurio, A., Bragg, M. and Elbel, B., 2018. Supermarket retailers' perspectives on healthy food retail strategies: in-depth interviews.

Rule, P. and John, V., 2011. *Your Guide to Case Study Research*. First edition, Hartfield Pretoria, Pretoria: Van Schaik.

Schwartz, M.B. and Puhl, R., 2003. Childhood obesity: a societal problem to solve. *Obesity reviews*, 4(1), pp.57-71.

Senekal, M., Steyn, N.P. and Nel, J.H., 2003. Factors associated with overweight/obesity in economically active South African populations. *Ethnicity & disease*, 13(1), pp.109-116.

Senekal, M., Nel, J.H., Malczyk, S., Drummond, L., Harbron, J. and Steyn, N.P., 2019. Provincial Dietary Intake Study (PDIS): Prevalence and Sociodemographic Determinants of the Double Burden of Malnutrition in A Representative Sample of 1 to Under 10-Year-Old Children from Two Urbanized and Economically Active Provinces in South Africa. *International journal of environmental research and public health*, 16(18), p.3334.

Serdula, M.K., Ivery, D., Coates, R.J., Freedman, D.S., Williamson, D.F. and Byers, T., 1993. Do obese children become obese adults? A review of the literature. *Preventive medicine*, 22(2), pp.167-177.

- Steyn, N.P. and Mchiza, Z.J., 2014. Obesity and the nutrition transition in Sub-Saharan Africa. *Annals of the New York Academy of Sciences*, 1311(1), pp.88-101.
- Steyn, N.P., Nel, J.H., Nantel, G., Kennedy, G. and Labadarios, D., 2006. Food variety and dietary diversity scores in children: are they good indicators of dietary adequacy? *Public health nutrition*, 9(5), pp.644-650.
- Thabo Molelekwa., 2018. Unhealthy offerings at SA's school tuck shops. Health-E News 29th June
- Thompson, F.E. and Subar, A.F., 2013. Dietary assessment methodology. In *Nutrition in the Prevention and Treatment of Disease (Third Edition)* (pp. 5-46).
- Van Zyl, S., van der Merwe, L.J., van Rooyen, F.C., Joubert, G. and Walsh, C.M., 2017. The relationship between obesity, leptin, adiponectin and the components of metabolic syndrome in urban African women, Free State, South Africa. *South African Journal of Clinical Nutrition*, pp.1-6.
- de Villiers, A., Steyn, N.P., Draper, C.E., Fourie, J.M., Barkhuizen, G., Lombard, C.J., Dalais, L., Abrahams, Z. and Lambert, E.V., 2012. "HealthKick": Formative assessment of the health environment in low-resource primary schools in the Western Cape Province of South Africa. *BMC public health*, 12(1), p.794.
- Vogel, C., 2018. *Contribution of the local food environment to the food choices of black urban adults in Mamelodi Pretoria* (Doctoral dissertation, University of Pretoria).
- Vorster, H.H., Venter, C.S., Wissing, M.P. and Margetts, B.M., 2005. The nutrition and health transition in the North West Province of South Africa: a review of the THUSA (Transition and Health during Urbanisation of South Africans) study. *Public health nutrition*, 8(5), pp.480-490.
- Wang, J., Thornton, J.C., Russell, M., Burastero, S., Heymsfield, S. and Pierson, R.N., 1994. Asians have lower body mass index (BMI) but higher percent body fat than do whites: comparisons of anthropometric measurements. *The American journal of clinical nutrition*, 60(1), pp.23-28.
- Wang, Y. and Lobstein, T.I.M., 2006. Worldwide trends in childhood overweight and obesity. *International Journal of Pediatric Obesity*, 1(1), pp.11-25.
- Wright, J.D., Donley, A.M., Gualtieri, M.C. and Strickhouser, S.M., 2016. Food deserts: What is the problem? What is the solution?. *Society*, 53(2), pp.171-181.
- Zhai, L., Dong, Y., Bai, Y., Wei, W. and Jia, L., 2017. Trends in obesity, overweight, and malnutrition among children and adolescents in Shenyang, China in 2010 and 2014: a multiple cross-sectional study. *BMC Public Health*, 17(1), p.151.
- Zuercher, J.L., Wagstaff, D.A. and Kranz, S., 2011. Associations of food group and nutrient intake, diet quality, and meal sizes between adults and children in the same household: a cross-sectional analysis of US households. *Nutrition journal*, 10(1), p.1.