

**FACTORS ASSOCIATED TO OVERWEIGHT AND OBESITY AMONG
ADOLESCENTS AT DENDRON HIGH SCHOOL LIMPOPO PROVINCE,**

SOUTH AFRICA.

by

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DEDICATION

This research work is dedicated to the following people:

▪My son (Mathane Mapaya), my daughters (Moyahabo Mapaya and Mokgadi Mapaya), My parents (Nelson and Elisa Mapaya), My Sisters (Mampenyane, Mokgadi and Monwana Mapaya).

Declaration

I declare that FACTORS ASSOCIATED TO OVERWEIGHT AND OBESITY AMONG ADOLESCENTS AT DENDRON HIGH SCHOOL LIMPOPO PROVINCE, SOUTH AFRICA is my own work and that all sources that I have used have been indicated and acknowledged by means of complete references and that this work has not been submitted before for any other degree at any other institution.

Mapaya Mercy

Date

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ABSTRACT

Background: Overweight and obesity are abnormal excessive fat accumulations in adipose tissue to the extent that it may have adverse effects on the health and well-being of the individual. Overweight and obesity are important modifiable risk factors for many chronic diseases, such as cardiovascular disease (CVD) and type2 diabetes. Food consumed away from home, fast food and sugary food leads to adolescents overweight and obesity. Overweight and obese adolescents tend to buy junk foods because they are cheap. The aim of this study was to investigate factors associated to overweight and obesity among adolescents at the Dendron High School, Limpopo Province, South Africa.

Methods: A quantitative study was conducted among 340 adolescents learners at the Dendron High School. A close ended questionnaire was used to collect data from the 340 adolescents. A stratified random sampling method was used to select learners to participate in the study. This type of sampling was used because learners were in different classes and different grades. The researcher obtained a complete list of all Grade 8 to Grade 12 learners attending the Dendron High School. The researcher took a register in each grade, given every name a code, put their names in a pot and randomly selected the participants. Body mass index (BMI) was calculated from the height and the weight of the participants. Data was analysed using SPSS version 23.0, which is a statistical software programme.

Results: the study results revealed that the majority of adolescents, at 129 (37.9%), were overweight, while 171 (50.3%) were obese. The results further revealed that adolescents over consumed sugary food, at 185 (54.4%), starchy food, at 283 (83.2%), fizzy drinks, at 219 (64.4%), and fast food, at 155 (90.0%).

In Conclusion: There is a need for nutrition education campaigns targeted at adolescents and educators to reduce overweight and obesity. Nutrition education should be a continuous effort. Efficient and effective school policies must be implemented for provision of quality food.

Keywords:**OVERWEIGHT; OBESITY; ADOLESCENTS; PHYSICAL ACTIVITY;
NUTRITION**

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List of Abbreviations

BMI: - Body Mass Index

CHD: -Coronary Heart Disease

DOE:-Department of Education

DSR:-Department of Sports and Recreation

Ht: -Height

NCGS: -National Clinical Guideline for Stroke

NS: -Nutritional Status

SA: - South Africa

SANHANES: - The South African National Health and Nutrition Examination Survey

TREC: -Turfloop Research Ethics Committee

TV: -Television

WHO: – World Health Organisation

DEFINITION OF CONCEPTS / OPERATIONAL DEFINITION

Overweight: According to this study overweight is when body mass index is 25-29, 9 kg/m² (WHO, 2016). A person of body mass index of 25-29, 9 kg/m² is considered being overweight. It will be used as it is.

Obesity: According to this study obesity is when body mass index is equal to or more than 30kg/m² (WHO, 2016). A person of body mass index of 30 kg/m² or more considered being obese .it will be used as it is.

Adolescents: According to these study adolescents are youth from ages 10 to 19. It will be used as it is (UNICEF, 2011). It will be used like that.

Nutritional information: is a concept introduced by nutrition labelling and education act of 1990 whereby it gives information on fat, cholesterol, carbohydrates, energy, sodium, fibre (Higgins, 2012). It will be used as it is.

CHAPTER ONE

INTRODUCTION AND BACKGROUND

1.1 Introduction

Overweight and obesity refer to abnormal excessive fat accumulation in adipose tissue to the extent that it may have adverse effects on the health and well-being of the individual (Rossouw, Grant & Viljoen, 2012). Overweight and obesity is a worldwide epidemic and is the fifth leading cause of death globally. The two epidemics, overweight and obesity, have doubled since 1980 and, in 2000, statistics showed that adolescent obesity increased in developing countries (Pretorius & Joubert, 2014).

Overweight and obesity are important modifiable risk factors for many chronic diseases, including cardiovascular disease (CVD), type2 diabetes, hypertension, hyper-cholesterolaemia, certain types of cancer, osteoarthritis and gallbladder disease. (Mohammad, Mouzan, Foster, Abdulla, Herbish, Ahmad,Omer, Quarachi & Tatjana, 2010).

Prevalence of overweight and obesity in adolescent ranges from 5% to more than 25% in some countries, such as Czech Republic, Estonia, Hungary, Latvia, Lithuania and Poland. This number continues to increase, regardless of the fact that governments offer awareness campaigns and take preventative measures (WHO, 2009)

Most countries differ in terms of the criteria used to the estimate prevalence of overweight and obesity among adolescents, including dissimilarity of age groups, which poses constraints on the data used to interpret trends (Musaiger, 2011).

The rate of overweight and obesity has also increased in the Eastern Mediterranean region. The lifestyle in the Eastern Mediterranean region, which has 21 countries, including Egypt, Iran, Jordan, Morocco, Pakistan, Afghanistan, Somalia, Sudan, Iraq, Yemen Gulf, Syria, Lebanon, Libya, Tunisia and Djibouti, has changed from a traditional way of life to a Westernised lifestyle, which leads to this high rate of overweight and obesity. In Qatar, the prevalence of overweight and obesity was found to be higher for adolescent boys, followed by adolescent girls. In Bahrain, the rate of overweight and obesity among adolescents was found to increase with age. In Saudi

Arabia, the prevalence of overweight and obesity was reported to increase with age among adolescent girls and adolescent boys (Al-Shamsi & Reem, 2008).

In 2007 the prevalence of adolescents with overweight and obesity was reported to be high in America, Oceania, Europe and low in Africa (Bibiloni, Maria del Mar, Ponus, Antoni Joseph, & Tur 2013). In America, overweight and obesity is attributed to the consumption of too much food and too little exercise among overweight and obese adolescents. Adolescents buy more soda, high caloric food, chips and candy. There is lack of vacant land for recreational purposes in America. Food in America is of lowest quality, which leads to the overconsumption of total energy soft drinks and more frequently eating fast food snacks, such as cakes, buns, meat pies and doughnuts. This decreases to the amount of food eaten at home. In schools in America, an increased environment for entrepreneurial opportunity, for example, the placing of kiosks outside of the school cafeteria, decreases time taken to queue for food (Kloub & Froelicher, 2009). Overweight and obese adolescents spend more time playing indoors than outdoors. Outdoors is associated with being too dangerous due to traffic. Television has become a substitute of outdoor activities for adolescents. Overweight and obese adolescents spend more time on watching television, movies and playing games, (Kloub & Froelicher, 2009).

The second highest rate of overweight and obesity was reported from Europe, while the third highest rate of overweight and obesity were reported from the Middle East. The prevalence of overweight and obesity in England is 1,3% for adolescent boys and 6,6% for adolescent girls, which is low. Canada has an overweight and obesity among adolescents of 28%. Urbanisation and enterprise, both in developing and developed countries, has led to unhealthy eating habits, which result in overweight and obesity. South Asia has high prevalence of overweight and obesity among adolescents. Adolescent boys are more overweight than adolescent girls. In South Asia, retail outlets dominate the market industry, where excessive meat and sweetened beverages are consumed. There is also the availability of hawkers who sell unhealthy food. High socioeconomic status is associated with this epidemic. Television viewing of more than 3 hours a day was also mentioned as an associated factor in overweight and obesity. (Adesuwa, Oliemen, Ifeoma & Nwadiuto, 2012)

In South Africa, central obesity was reported to be high in adolescent girls, and increases with pubertal development. An increase in body fat in adolescence girls accompanies puberty. Adolescents from a good socioeconomic background have shown to be more obese than those from poor families. Adolescents from a good socioeconomic background tend to have access to restaurants, which sell fast foods, and play computers videogames, which promotes physical inactivity (Murage, Kahn, Pettifor, Tollman, Kerstin & Norris, 2011).

The prevalence of overweight and obesity was 14,5% among 17 years old adolescents in Soweto. Overweight and obesity was found to be higher in adolescent girls (19,3%) than in adolescent boys (8,1%), where the usage of cars and washing machines were found to be among factors that influenced overweight and obesity among Soweto adolescents (Yah, 2014)

There is high prevalence of overweight and obesity among adolescents in the Limpopo Province, which leads to adolescents having cardiovascular disease. High lipid levels are shown to be genetically inherited (Phoku, 2013).

Overall, poverty is associated with the prevalence of overweight and obesity among adolescents. Poverty means less money, which leads to the consumption of inexpensive foods which are high energy dense. Sweetened beverage consumption and skipping meals contributes to overweight and obesity in adolescents from poor families. Skipping breakfast leads to overeating at lunch and dinner. Adolescents from poor families have a limited food budget and limited choices. Overweight and obese adolescents choose high fat food because these foods are more affordable and last longer than lean meat, fish, fresh fruits and vegetables. Adolescents also have limited access to supermarkets that sell nutritious food. Living in poverty means limited access to participate in physical activity. Living in poverty has been associated with lack of resources such as play areas (Schwarz & Peterson, 2010) .

Genes and environmental factors are associated with overweight and obesity. The presence of the human gene APOA2 results in a higher body-mass index (BMI). Genetic defects have been found to be associated with hypothalamic function and impaired satiety. Adolescents whose parents are obese are more likely to be obese. Polymorphism controls appetite and metabolism, which leads to adolescents being

overweight and obese when foods high in calories are consumed. Two copies of alleles, such as FTO, predispose adolescents to overweight and obesity. Individual adolescents carrying this allele prefer food that is high in calories, resulting in a reduced feeling of satiety. Those individuals carrying FTO do not seem to be predisposed to energy expenditure. with the presence of the melanocortin-4 receptor gene mutation in adolescents leads to excess intake of energy and preference for food which is high in total saturated fats (Kyung, Suzame & Jeanne, 2012).

Studies have shown that the presence of hormones, like leptin, ghrelin and adiponectin, influenced appetite and satiety, which is associated with overweight and obesity. Leptin is associated with hypothalamic and pituitary disorders. Overweight and obese adolescences have decreased leptin, ghrelin and adiponectin levels, which promotes increased appetite food intake, specifically highly fatty and sugary food, which leads to overweight and obesity (Kelly & Barlow, 2014).

This pandemic affects all socioeconomic groups, regardless of age, sex and ethnicity. Overweight and obesity in adolescents found to affect school performance negatively. Overweight and obese adolescents tend to miss school, especially those with diabetes and asthma, which affects their academic performance (Krushnapriya, Bishnupriya & Ajeeta, 2015). Adolescents aged 15 to 17 years, versus 12 to 14 years, have more opportunity to purchase their own food, to determine their own leisure time and have more discretionary income to act on. Adolescent girls fear being overly masculine and perceive pressure to be athletic as unfeminine. Adolescent boys spend more time being active, while adolescents girls spend more time socialising. Adolescent boys spend more time playing soccer and hockey, while adolescents girls spend more time dancing and doing gymnastics. Adolescent girls identify some sports as being too girly and some boys sport like rugby. Adolescents girls avoid getting dirty or sweaty (Krushnapriya, Bishnupriya & Ajeeta, 2015). Moreover, Spencer (2015) found that adolescents girls identify an ideal body as being thin and pretty. Adolescent girls make more healthy food choices than do adolescents boys, and are more likely to avoid high caloric food, eat more fruits and vegetables and limit their salt intake. Adolescent girls appear to have a better health knowledge than adolescents boys do, and are capable of changing their diet in line with recommendations. Adolescent girls control the family food consumption. Preparation of food relies on the participation of adolescents girls,

more so than adolescents boys. Adolescent girls tend to diet than adolescent boys, and are more likely to use food label information about fat content than boys would. The use of weight loss diets is more prevalent among adolescents girls than adolescents boys (Spencer, 2015).

It has been shown in studies (Wai & Lai, 2010) that adolescent girls are more overweight than adolescents boys are, because they spend more time on television viewing and on computers. Adolescent boys consume more fruit and vegetables than adolescents girls do. Adolescents girls while consuming more cakes and doughnuts. More adolescents boys consume breakfast than do adolescents girls.(Wai & Lai, 2010). Indians are less likely to skip breakfast than black African are. Indians protect themselves from adverse dietary practices and less likely to be from a single-parent household. Black Caribbean and black African adolescents skip breakfast and engage in poor dietary practices. The Somali adolescent community is influenced by cultural factors, such as the traditional Somali diet of rice, pasta, red meat and the consumption of fruits and vegetables associated with poverty and a lack information to prepare healthy meals.

A study conducted by Murage et al. (2011) has shown that the predisposing factors to overweight and obesity were age, sex, pubertal development and household income. Late adolescents become more overweight than early adolescents do. Adolescent girl become overweight or obese by the time of menarche. Adolescents boys are more physically active than girls and this in a difference in the rate of growth. Adolescent girls fear being masculine, avoid being untidy and eat more fatty food than adolescent boys do (Murage et al., 2011). In Mpumalanga Province, a lower prevalence of obesity in boys than girls, 20% and 25% respectively, was found. These differences are associated with differences in energy needs, level of physical activity, behaviour and culture. Overweight increases with age in Black adolescent girls and decreases with age in white adolescent girls . In African culture, overweight and obesity are associated with wealth and happiness and are also an indication that an individual does not HIV or AIDS (Rossouw et al., 2012).

Gender variation in the prevalence of overweight and obesity in the age group between 15 and 18 years of age indicated that adolescent girls are more overweight and obese

than adolescent boys. This pattern is consistent in Mexico and Saudi Arabia. (Pretorius & Joubert, 2014). Adolescents from the rural areas in Limpopo Province showed high overweight and obesity. One of the factors associated with this was found to be cultural beliefs. (Pretorius & Joubert, 2014)

Adolescents tend to consume unhealthy foods while watching television without supervision. Adolescents tend to consume more red meat, processed meat and sugary sweetened beverages and consume less chicken, fish, fruits and vegetables. There are commercials on television promoting unhealthy food (Levy, 2017). Studies have shown that the more food advertisements on television that adolescents see, the more adolescents want to eat the food advertised. These advertised foods are unhealthy foods, particularly pizzas, sodas and fast foods. Adolescents tend to lack attention to the portion size of the food they eat as a result of television viewing. The response by adolescents to satiety cues is also disrupted and they rely on external cues, such as the end of a television show. This leads to eating huge amounts of food and, ultimately, their being overweight and obese. (Boulus, Vikre, Oppenheimer, Chang & Kanarek, 2012).

Socioeconomic status plays important role in overweight and obesity. Adolescents from poor social economic statuses are exposed to fast food, the consumption of which causes them to be overweight and obese. The low income of parents is also associated with less buying of healthy food because these foods are expensive. Adolescents from poor families tend to buy inexpensive foods which are high in calories. Adolescents from poor families have poor access to supermarkets which leads to high energy food consumption (Nicole, 2010).

Adolescents of low educated parents were associated with weight gain. Overweight and obesity of adolescents are also related to lack of knowledge, particularly knowledge on nutrition, which leads to large portion size consumption. Adolescents from small size families tend to have high purchasing power and buy fast foods, which leads to overweight and obesity. Adolescents from lower economic statuses consume less fruits and vegetables, which leads to a high consumption of fast food (Nicole, 2010).

Pakistan has prevalence of adolescent with overweight and obesity of between 15% and 20%. Socioeconomic factors are the major factors contributing to obesity and overweight. Low income families spend money on inexpensive high caloric foods. Healthy food is more expensive than unhealthy food is. People from poor socioeconomic backgrounds have poor access to supermarkets which sell healthy food. Overweight and obese adolescents have access to grocery stores which sell unhealthy food. People from a high socioeconomic background spend more time on computers and video games, thus promoting overweight and obesity. Foods, such as processed food, sweetened beverages, cakes, chips and candy, as well as level of physical inactivity, also contribute to overweight and obesity. Adolescents who are exposed to meat and tend to eat meat everyday also tend to be overweight and obese. Meat proteins are digested later than fats and carbohydrates, which are then converted to fat in the body. Overconsumption of meat ultimately leads to overweight and obesity. (Ahmed, Laghari, Naseer & Mehraj, 2012).

In Vietnam, overweight and obese adolescents consume more of meat, dairy products, fish, sugary food and fatty foods. Overweight and obesity increases in this area. Adolescent boys in Vietnam show a higher rate of overweight and obesity than adolescents girls do. Those found to be overweight and obese were mostly from families with good income. Good income families have an opportunity to choose which food they want to eat. Unfortunately some choose not to cook and rather to buy unhealthy food. (Huong, Nga, Doan & Nguyen, 2013).

Worldwide, overweight and obesity has increased among adolescents, which increases the cost of health care among adolescents. Overweight and obese adolescents tend to become sick and need to be transported to the hospital, requiring the educator will call the ambulance to transport the learner to the hospital. Health care providers trained in weight management are needed. Health care costs are estimated to be more than \$140 billion per year in United States of America. (Schwarz & Peterson, 2010). Globally, the treatment of overweight and obesity requires a multidisciplinary team and approaches which include dietary management, physical activity enhancement, healthy lifestyle enhancement, pharmacotherapy, empowering providers and community education (Raj & Kumar, 2010). Some adolescents get pharmacological treatment, such as the blocking of the absorption of fat from their diet.

There are also appetite suppressant medications that adolescents receive in the hospital. There is also a need for parents to take time off work to look after overweight or obese adolescents, which leads to someone else to come to work for overtime. (Wile, Schwarz & Peterson, 2010).

1.2. Research Problem

There is an increase in the overweight and obesity rate among adolescents in schools, which is the health problem globally. Factors associated with overweight and obesity differ by region due to culture and socioeconomic influences. There are street vendors selling unhealthy foods, such as *sephatlo* and fat cakes. There are also tuck shops selling fatty foods, low fibre foods, ice pops and sweetened beverages This contributes to school children resorting to buying unhealthy food (Kim, Hong, Yun, Ryou, Lee & Kim, 2012)

Some adolescents from the Dendron High School come to the facility where the researcher works (the Helene Franz Hospital) in need of losing weight. At the Dendron High School there is a tuck shop selling *sephatlo* and fatty foods. Some learners buy these fatty foods on a daily basis. Overweight and obesity at an early age will lead to adult obesity, which will affect their productivity. At the end of this study, the researcher will make recommendations on how to lose weight and maintain normal weight among adolescents at the Dendron High School. So far, there have been no studies on factors associated with overweight and obesity done at the Dendron High School. It is important to understand the factors associated with overweight and obesity among adolescents at the Dendron High School.

1.3 Aim of the study

The aim of the study was to investigate factors associated to overweight and obesity among adolescents attending the Dendron High School.

1.4 Objectives

- 1.4.1. To determine the social demographic profile associated with overweight and obesity among adolescents at the Dendron High School.

1.4.2. To determine the dietary intake of adolescents at the Dendron High School.

1.4.3. To determine which food types are associated with overweight and obesity among adolescents at the Dendron High School

1.5 Research question

1.5.1 What is the socio demographics profile associated with overweight and obesity among adolescents at the Dendron High School?

1.5.2 What is the dietary intake of adolescents at the Dendron High School?

1.5.3 Which are the food types associated to with overweight and obesity among adolescents at the Dendron High School?

1.6 Significance of the Study

Overweight and obesity are increasingly becoming a public health concern in both high-income and low- to middle-income countries (LMIC). These two medical conditions are associated with a rise in chronic diseases, such as hypertension, coronary heart disease (CHD), type2 diabetes and certain types of cancer, which contribute to the burden of disease. Therefore, cost effective interventions are needed to combat the burden of overweight and obesity, including their health consequences in rural communities .The burden of overweight and obesity will be combated by conducting this study in order to understand the factors contributing to overweight and obesity. The findings of the study will help the researcher to recommend interventions to school learners on how to lose weight and live a healthy lifestyle. The findings will further inform policy development regarding tuck shop and street vendors at schools so as to comply with selling healthy food.

1.7 Summary

This chapter presented the background to the study, the problem statement and the aim of the study. The aim and objectives of the study were outlined in this chapter. The next chapter focuses on the literature review.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Overweight and obesity are major global disease burdens. Low levels of physical activity, television watching and dietary patterns are modifiable risks for overweight and obesity in adolescents (Goyal, 2011). Adolescent overweight and obesity is increasing in both developed and developing countries. This affects both physical and mental health. Overweight and obesity are also associated with premature morbidity and mortality (Reilly & Kelly, 2011). There is a link between overweight, physical inactivity, the environment and genes. Physical inactivity favours the storage of excess calories as fats. The consequences of overweight and obesity in adolescent girls include earlier puberty and menarche, type2 diabetes and obesity in adulthood. (Biro & Wien, 2010).

An elevated BMI in adolescents constitutes a substantial risk factor for obesity-related disorders in midlife (Tirosh, Shai, Afek, Dubnov, Ayalon, Gordon, Derazne, Tzur, Shamis, Vinker & Rudich, 2011). The World Health Organisation (WHO) classifies overweight and obesity as the fifth leading cause of global mortality, one of the greatest health challenges and as determinants for various chronic diseases, such as heart disease, hypertension and diabetes (Biro & Wien, 2010).

In America, overweight and obesity has emerged as one of the major health problems and the country is apparently dealing with an increasing number of overweight and obesity people (Leila, Muhamad, Nor, Ahmad & Ariyo, 2014) .At Rohtak District in Haryana, India, a rural area, more boys than girls were found to be overweight. (Leila, Muhamad, Nor, Ahmad & Ariyo, 2014)

2.2 Global perspective of adolescent overweight and obesity

Obesity has become an epidemic in many parts of the world. The WHO has warned of the intensifying epidemic of obesity that could put the population in many countries at risk of developing non-communicable diseases (NCD) (Musaiger, 2011)

Adolescent obesity is considered a significant and growing health problem worldwide. Approximately 17% of adolescents were obese worldwide (Center for Disease Control and Prevention, 2017). The prevalence of obesity in adolescents was reported to be 21% in United States of America, which was found to be due to caloric imbalances, placing adolescents at more risk for adult health problems (Center for Disease Control and Prevention, 2017). In India the prevalence of these conditions was found to be 12,6% for overweight and 3,4 % for obesity among adolescents. (Center for Disease Control and Prevention, 2017).

2.3 Africa perspective of adolescent overweight and obesity

A study in Sub Saharan Africa showed that overweight and obesity was higher in adolescent girls than in adolescent boys and that demographic, environmental and socioeconomic factors contributed to this situation (Keino, Plasqui, ETTYANG, & Van den Borne, 2014).

In Ghana, most of the adolescent girls were found to be obese (Peltzer & Pengpid, 2011). North Africa also showed an increase in obesity (Ellulu, Abed, Rahmat, Ranneh & Ali, 2014).

In Rwanda, obesity is reported to be growing among adolescents due to urbanization, a sedentary lifestyle and the consumption of fatty foods, (World Health Organisation, 2010). Obesity rates in a pooled sample of adolescent girls aged 15 years and older, living in the urban areas of 6 African countries, namely, Burkina Faso, Ghana, Malawi, Niger, Senegal and Tanzania, rose from 17,9% to 25,4% between 1992 and 2003 (Reddy, Resnicow, James, Funani, Kambaran, Omardien, Masuka, Sewpaul, Vaughan & Mbewu, 2012).

2.4 South Africa perspective of adolescent overweight and obesity

The perceptions adolescents on how they feel about themselves they compare themselves to others, and what they perceive as an ideal body weight or shape was evaluated. It was found that the perception of body weight among adolescents was influenced by media, culture and judgement received from others. Adolescent weight perception can affect psychological well-being. The perception of adolescent girls of

their weight was influenced by the weight of their peers. Being physically voluptuous in black culture is associated with beautiful, strong and desirable (Khutlang, 2018)

In Kwazulu Natal it was discovered that overweight and obesity black girls do not have a problem with their condition and perceived their weight as being normal. There is preference for overweight and obesity in these adolescents girls which is perceived as both acceptable and positive. The ideal body weight of adolescents seems based on what they have been socialising on. (Rossouw, Grant & Viljoen, 2012).

African cultures promote a fuller figured physique, which is associated with good living, wealth and affluence. Adolescents use media as a source of information on what they should look like. Overweight and obese adolescents associate food with nurture and comfort. When overweight and obese adolescence are overwhelmed and stressed, they comfort themselves with food. Overweight and obesity can also give rise to low self-esteem, lack of confidence and depression. (Rossouw et al, 2012).

African culture associates thinness with tuberculosis and HIV/AIDS and Africans prefer to be overweight and obese. Africans also associate overweight and obesity as opportunity to get married. Increased body weight was associated with dignity and a token of wellbeing, (Rossouw et al, 2012). Adolescents girls are more overweight and obese than male adolescents are. This is due to cultural beliefs, media, family and community influence and peer pressure (Joubert, 2014). It is also a belief that overweight and obesity of a girl child is a sign of good parenting.

In a study conducted in South Africa, adolescents from urban areas were at a higher risk of overweight than those from the rural areas. The contributing factors to overweight and obesity included increased calorie intake and low activity energy expenditure. (Rossouw et al., 2012).

2.5. Adolescent overweight and obesity in Limpopo Province

The increase in overweight and obesity among adolescents was found to be as a result of physical inactivity and altered eating patterns, leading to increased fatty foods consumption (Torola, Moselakgomo, Shaw & Goon, 2012). A study showed that overweight and obesity was higher in girls than in boys (Monyeki, Brits, Kemper & Makgae, 2008).

In the Limpopo Province, studies conducted in Ellisras, which is in Waterberg District, and Tshannda, which is in Vhembe District, showed that rural school adolescents had an increased prevalence of the risk factors for metabolic and cardiovascular diseases (CVD), and that overweight and obesity were among these risk factors (Toriola et al., 2012).

2.5 Factors associated to adolescent overweight and obesity

2.5.1 Socioeconomical status

Socioeconomical status plays a crucial role in overweight and obesity. Socioeconomic status can be associated to high caloric intake and inadequate physical activity which leads to obesity and overweight. In Australia, families with the lowest socioeconomic status were more exposed to fast food compared to families from a higher socioeconomic status (Tanja, Faith & Myles, 2006).

Purchasing street foods was associated with living in a formal house with water, electricity, refrigerator, freezer, microwave oven, electric stove and television. Those adolescents tended to reheat food that they bought on the streets. Adolescents living in a lower economic status consumed less fruits and vegetables. Adolescent girls living in low income areas were more overweight and obese than those living in high income areas (Leila et al., 2014)

Poverty and low education were found to be associated with weight gain. Poor families tend to buy inexpensive food items. Adolescents from a poor socioeconomic status have fewer recreational amenities, and a higher number of fast food outlets. Adolescents from poor families have limited access to physical activity and supermarkets, therefore, high energy food consumption results. Less educated adolescents know little about nutrition and serving sizes, which results in overfeeding of the body. Low income reduces the buying of healthy food (Nicole, 2010).

Adolescents from a high social economic status tend to restrain eating practices and increase their level of activity. They have capacity to manipulate their microenvironment to suit their needs. Small household size tends to result in high purchasing power and food availability, which leads to overweight in adolescents. (Tanja et al., 2006).

Adolescents living in single parent families showed a higher prevalence of overweight and obesity, which was attributed to choosing unhealthy food, less time to support physical activity and less time to prepare food. It was also shown that there was a greater prevalence of overweight and obesity in schools located in rural areas than schools located in urban areas (Vashisht, Vikram & Anvesha, 2018).

2.5.2 Dietary Intake

Soft drinks

Adolescent add more than 5 teaspoon of sugar to their beverages daily. The study done in Ghana showed lack of well-balanced diet in adolescent. Consumption of soft drinks was between two and four times per week .Adolescents are more accessible to sugary food. (Klutse , 2015).Consumption of sodas higher in adolescent boys than in adolescent girls. Candies and chocolate consumption between four times or more in a week. (Klutse, 2015) According to Ferreira, Claro and Lopes (2015) older adolescents showed a greater degree of overconsumption of sugary foods than younger adolescents did.

Starchy food

Adolescents consume starchy food greater than six times per week on macaroni, rice and other starch. High energy dense food increase adipose tissues. This may be due to poverty. Portion sizes in market places exceeded standard serving sizes. Portion offered are two to five times larger than the original sizes. Adolescents consume more of refined food than tubers due to food advertisements. (Craig, 2013).

Fast food

Consumption of fast food to adolescents has been a global phenomenon. Adolescents consume pizza, hamburger, hotdogs and other fast food four or more times per week. It was reported that there is a strong positive association of fast food and weight gain. Mechanism of fast food contribute to weight gain is its energy density.It was also indicated that adolescents with frequent consumption of fast food can lead to extra 4.5 kg weight gain. Effects of fast food consumption also lead to lack of energy and poor concentration. Taste, time convenience and cost are factors contribute to

adolescents consumption of fast food choices. Adolescents had a greater interest in taste. Fast food restaurant are the popular sites for adolescents .Consumption of fast food shown to have adverse effect on quality of diet due to high fat, saturated fat, added sugar and added salt. (Duta,2011)

Meat

Meat has played a central role as a symbol of wealth. Meat is a source of protein and iron and considered a good health. It symbolises strength for adolescents males. Female adolescents have a perception that meat is a fattening food. Female adolescents have a concern of being slim. Adolescents consume meat more than three to four times per week including all meat varieties. Meat also contributes to adipose tissue. Adolescents tend to fry meat adding fat. Most adolescents eat mixed courses such as pizza and processed meat (hamburgers) when going out with friends and with parents to a restaurants. Adolescents like meat because it has a good taste. (Connelly,2017)

Dairy product

Adolescents female consume more dairy product than male adolescents. Adequate calcium intake is good for bone mass. Low intake is related to displacement of milk by soft drinks. Milk intake is at lowest level. Adolescents consume one to two times a week of dairy product.(Thielemann,2012)

Fruit and vegetables

Adolescents overweight and obesity are increasing and there is a need for intervention. It was shown that adolescents consume one fruit once per week and this is far below the recommended allowance, this can be due to families are more accessible to sugary food. Fruit and vegetables have low energy density. Decreasing fruit and vegetables alone is not a cure solution for decreasing overweight and obesity. Increasing fruit and vegetables need to be coupled with decreasing high fat and high sugar food and physical activity(Shanderou,Ramezankhani,Ghaffari,2014) Availability of unhealthy food for example puffs, chips, fast food, beverages, candies and chocolates in school and home is the barrier for consumption of fruits and vegetables. Adolescents prefer unhealthy food because they are delicious. Advertisement of puffs

and candies on television leads adolescents not to consume more of fruits and vegetables. Vegetables are tansy. Adolescents do not have skill for preparing, cleaning, washing and slicing vegetable and fruits. (Shanderou et al 2014)

2.5.3 Food types

Soft drinks

Proper meals have been replaced by soft drinks by adolescents. This is because adolescents prefer the sweet taste of soft drinks. Soft drinks were preferred more than water. As the preferences for taste increases, the amount of soft drinks consumed also increases. Caffeine and sugar content in the soft drinks promote the preferences of soft drinks. Adolescent preferences and type of food differ from individual to individual. Preferences of food differ according to age, gender and knowledge. Adolescents who are ignorant of the effects of soft drinks on their health are more likely to consume large amounts of soft drinks. (Jansen2014). Sugar changes hormones and the biochemistry of the body when consumed in excess, which contributes to weight gain. Sugar content in soft drinks leads to skipping meals. American adolescents do not meet dietary guidelines because of consuming food which is low in vitamins and minerals but high in sugar. Soft drinks remained the most popular choice of snack and the portion sizes are higher. The sugar in soft drinks contributes to increased energy storage and, ultimately, to overweight (Jansen2014).

According to Waris and Sidra (2010) adolescents with lifestyle challenges are between 16 and 18 years of age. In this age group, adolescents have been found to be more concerned about body size, shape and weight and they are also influenced by peers in this regard. Furthermore, Hazzaa and Nada, (2012) found in their study that obese adolescents are less active than non-obese adolescents. Hazzaa and Nada, (2012) further revealed that the adolescent stage is characterised by a high intake of sugary beverages and fat, which is a risk factor for overweight and obesity.

Rajan, Ntuli and Skaal (2014) found that there was an increase in consumption of fizzy drinks among adolescents due to lack of knowledge about the health risk of consumption of fizzy drinks. Furthermore, Rajan et al (2014) indicated that high consumption of fizzy drinks displaces other healthier choices like water, milk, and

vegetable and fruits juices. They further indicated that adolescents were the main target in marketing industries and found that adolescents consume fizzy drink four times per week.

According to Mitko ((2015), overconsumption of fizzy drinks was associated with risk to overweight and obesity. ` Mitko ((2015) revealed that fizzy drinks consumption increases with age and peaks at adolescent stage (12-19 years) with males consuming more fizzy drinks than females.

According to Katzmarzyk ,Broyles and Zhao (2016) fizzy drinks consumption has been increasing among adolescents and causes overweight and obesity especially without physical activity. Marketing on television, boards, and certain brands of fizzy drinks seen in achievement in sports. Sometimes excessive parental restriction leads to its increased preference of fizzy drinks. Katzmarzyk et al (2016) further indicated that those who were ignorant on the health effects tend to over consumed fizzy drinks.

School and home environment are the easiest sources of soft drinks for adolescents since they spent great deal of time there. Unhealthy drinks, like soft drinks, will, therefore, be an option for adolescents. School vending machines and tuck shops sell soft drinks, which makes for easy access to these drinks by adolescents. There are also shops in nearby the school and home and adolescents get access to soft drinks on their way to and from home (Mitko, 2015),

It was indicated by Sedibe (2016) that adolescent girls who are overweight and obese are influenced by food sharing, unhealthy food joint eating at school, low cost of highly refined of carbohydrates. and quality, adolescent girls prefer externally prepared food than homemade food. Bastianelo (2012) further revealed that unavailability of traditional food is and limited accessibility to healthy food is another influence to overweight and obesity. Time of food preparation influenced adolescents to have food away from home. School relied on street vendors, vending machine, snack bars to make profit, therefore, they are likely to stock what sells easily and faster, rather than invest on healthy snacks Bastianelo (2012).

Starchy food

Starchy food gives the body energy. Wheat, bread, cereals and porridge provide complex carbohydrates which are converted into energy, which keeps one going without fatigue. It was overweight and obese adolescents tend to consume more of starch, unhealthy starch leads to overweight and obesity. Overweight and obese adolescents consume great deal of starchy food than other nutrients. There is also an indication of overconsumption of unbalanced diet, which results in adolescent overweight and obesity. Refined starchy foods are consumed by adolescents from lower household family (R00-R2500) and lower educational levels. (Gitau, Micklesfield, Pettifor & Norris, 2014).

Adolescents female preferred a snack while adolescents male preferred food. Adolescent men associate starchy food with masculinity, physical strength and toughness. Adolescent males are considered stronger than female adolescents are. Adolescents males tend to consume larger portion sizes of starchy food .large portion of starchy food lead to overweight and obesity in adolescents (Leal etal.2010)

Families of lower educational levels have lack of knowledge about nutrition .These families access only refined starchy food which leads to overweight and obesity (Gitau, Micklesfield, Pettifor & Norris, 2014).

Fatty foods

Fatty foods are the most energy dense foods. Increased energy intake promotes adiposity, which increases the body fat percentage. Adolescence is the time where food choice moves from being determined by parents to a situation where adolescents make greater choices themselves. Studies indicated that adolescents consume poor quality of food due to low frequency of meals and skipping breakfast. Fatty foods are also delivered to the home, which also contributes to adolescents not cooking when at home. The fatty foods that adolescents usually consume include hamburgers, fried red meat, fried chicken, hotdogs, salad dressing, margarine, chips and puddings. Television viewing also contributes to larger servings of fatty food (Dutta, 2011).

It was indicated by Majabadi Montazeri,Shojaeizadeh,Najat,Farahani and Djazayeni,(2016) that number of fast food restaurants are increasing worldwide, which is a public health concern. Fast food also contains high level of energy, which

contributes to overweight and obesity. Persaud (2013) revealed that fatty foods overconsumed by adolescents were hamburgers and chips. Ndlovu (2015) revealed that adolescents buy fat cakes and chips at tuck shop. Audain, Kassier, Veldman, (2014) further revealed that adolescents mostly consumed fried fish, fried chicken, bunny chow and hotdogs. Itatiro (2013) revealed that adolescents spent most of their time at school and, when they are hungry, they buy fatty foods.

Fast food consists unsaturated fat, saturated fat and simple carbohydrates which are high in energy and calories. The flavour of this food leads to weight gain by promoting excessive consumption. The power of satiety of fats is lower, compared to carbohydrates, making it difficult to adjust compensation after a meal which is high in fat. (Itatiro , 2013). Adolescents visiting fast food outlets increased their consumption of sugar sweetened beverages. Fast food is associated with high BMI and is less successful in weight loss. Fast food also creates a cycle of increased consumption, leading to a higher BMI (Itatiro, 2013). Adolescent females are the ones who do the shopping most of the time. Adolescent females tend to consume more fruits and vegetable compared to adolescent males.

Dairy products

Calcium is a major component of bones in adolescents. Dairy products include foods such as full cream milk, cheese spread and cheese. Dairy products also play a role in the bone density of adolescents. Adolescents consume less of dairy products and more of sweetened beverages, resulting in the lowering calcium in the blood. .Adolescents girls have more reduced bone mineral than boys do. It was further indicated by(Daphna and Lindsay 2013) that, in families where mother consumed more milk, adolescents were more likely to consume dairy products. Adolescents who consume full cream milk have been shown to be more overweight and obese than those consumed low fat mil.(Daphna & Lindsay, 2013).

2.6 Effects of overweight and obesity

Adolescent overweight and obesity affects quality of life and decreases life expectancy, with increased morbidity and mortality. There is an increased risk of

cardiovascular diseases like, hypertension, diabetes, dyslipidaemia, asthma, fatty liver and sleep apnoea among adolescents who are overweight and obese (Craig, 2013).

Sleeping disorders have been associated to weight gain. These disorders include heavy snoring. Adolescents who had sleep apnoea may not be able to read and concentrate in class. Less sleep increases weight gain by decreasing physical activity, which leads to fatigue and changes in the hormones that regulate energy expenditure in adolescents. Decreased sleep is often due to evening exposure to electronic media, academic workload and caffeine consumption. Sleep deprivation leads to decreased insulin sensitivity and to an alteration of leptin, which cause adolescents to choose unhealthy foods, increase their consumption of food, an increase in perceived hunger and consuming large portion sizes, which leads to overweight and obesity among adolescents (Craig, 2013).

The concentration of growth hormones is also reduced in overweight and obese adolescents. These adolescents show lower cortical bone and weakened bone structure which is by visceral fats. Worldwide, the prevention of weakness of bones is achieved through sufficient consumption of calcium-rich foods and vitamin D rich foods (Bredella, 2019).

Chronic overweight and obesity leads to a failure to control weight gain, which leads to depression. The more the overweight and obese an individual is, the greater the risk of suffering from mental health disorders. Depression is associated with the craving of carbohydrates. Insulin resistance and hyperphagia are associated with depression in adolescents. Adolescents who were overweight and obese tended to have low self-confidence and reduced motivation to change (Nieman & LeBlanc, 2012).

Adolescents who are overweight and obese have a higher risk of developing hypertension than adolescent girls do. This may be due to a high level of hormones, for example oestrogen, which are present during puberty. Moreover, television watching is linked to an increased risk of hypertension in overweight and obese adolescents. Excess sodium and low potassium intake is associated to overweight and obesity in hypertensive adolescents. Adolescents who were overweight and

obese tended to have cholesterolaemia (Kelly, Magnussen, Sabin, Cheung & Juonala, 2015).

Summary

In this chapter, the literature on factors associated with overweight and obesity among adolescents was reviewed. The chapter highlighted global and Sub-Saharan trends with respect to the association of overweight and obesity among adolescents in secondary schools. Generally adolescents over consumed unhealthy food, which leads to the majority of adolescents being overweight and obese. In the next chapter, the research methods which were used in the study will be discussed.

CHAPTER THREE:

RESEARCH METHODOLOGY

3.1. Introduction

In this chapter, and outline the research methodology that was used during the course of data collection will be presented. The chapter focuses on the study setting, the research design, the population and sampling method, as well as data collection and analysis. Reliability and validity, inclusion and exclusion criteria, bias, detailed ethical considerations, the study's limitations and significance of the study are also presented.

3.2 Study setting

Dendron High School is situated in Molemole Municipality, a rural area in the Limpopo Province. Dendron High School is 20km away from Senwabarwana and 90km away from Polokwane.

3.3 Research design

This study used a descriptive approach to describe factors associated with overweight and obesity among adolescents attending the Dendron High School. Quantitative research is a type of research that explains phenomena by collecting numerical data that are analysed using mathematically based methods (in particular, statistics) (Hughes, 2012). Research design is a planned structure and strategy used to investigate a phenomenon in order to obtain answers to the research questions or problem (Kumar, 1999).

3.4 Population

A population is a collection of all the individuals with certain characteristics needed by the researcher at a given time and in a given area (Wayne, 2010). The study population consisted of a total number of 1258 Grade 8 to Grade 12 learners at the Dendron High School. According to the school register, Grade 8 had 266 learners, Grade 9 had 270 learners, Grade 10 had 255 learners, Grade 11 had 278 learners and Grade 12 had 189 learners in the grade, respectively.

3.5 Sampling method and Sampling Strategy

3.5.1 Stratified random sampling

A stratified random sampling method was used. This means a sample that is taken in such a way that each combination of individuals in the population has an equal chance of being selected. This type of sampling was used because learners were in different classes. The researcher obtained a complete list of all Grade 8 to Grade 12 learners at the Dendron High School. The researcher took a register in each grade, gave every name a code, places the codes in a pot and randomly picked codes in order to select participants.

Sample Size

The formula of $S = \frac{N}{1+N(0,05)^2}$ (Morgan, 1970)

Table 3.1 :sample size

Grade	number	sample
Grade 8	266	66
Grade 9	270	67
Grade 10	255	63
Grade 11	278	69
Grade 12	189	47

N=Population

0,05=at 95%confidential interval

S=Sample size

Table 3.1 indicates the sample size for each grade, calculated using the above formula

3.6. Data collection

3.6.1 Instrument

This research used a questionnaire, which included weight, height BMI, a nutrition section and the environment, to collect data. The researcher used questions derived from other studies which had been validated. The questionnaire was a researcher administered questionnaire. The learners completed the questionnaire themselves. The questionnaire was piloted in Phala high school and learners understood it.

A questionnaire is a set of questions on a form which is completed by the respondent in respect of the research project (de Vos, Strydom, Fouche & Delport, 2005). In this case the questionnaire was closed ended questionnaire

3.6.2 Data collection procedure.

The researcher sent letters to students and parents after getting approval from University of Limpopo's Turfloop Research Ethics Committee (TREC) The purpose of the study was explained in the letter sent to parents. The researcher then waited for the return of completed and signed consent and assent forms.

The researcher did not interfere with classes and spoke to the school principal about an appropriate time to collect the data. The researcher used the period called Life Orientation and break time to collect data. The researcher used a closed ended questionnaire, which included the collection of demographic and nutrition information, to collect the data.

The researcher went inside a classroom with individual learners, in turns, in order for them to complete the questionnaire. The researcher introduced herself to the learners and informed them that their participation was confidential. After informing the learners about purpose of study, the researcher asked the learners to remove all shoes and heavy things from their bodies. The researcher measured the learner's weight and height and recorded this information on the questionnaire. The researcher placed a scale in a stable location in the classroom of each grade. The scale was adjusted to a zero before each measurement. The learners had stand up straight during the measurement. Height was taken in meters to two decimal places. Weight was recorded in kilograms to two decimal places.

3. 7 Validity

Validity is achieved when an instrument measures what it intended to measure. (Bill & Mann, 2011). Content validity was ensured by giving a project proposal to the researcher's supervisor. Research questions were checked for correctness by the dietitian. Dietitian and supervisor evaluated the relevancy of each item in the questionnaire in relation to stated objectives. The use of a digital scale ensured validity of the study data. The questions on the questionnaire were adapted from other studies.

3.8 Bias

Bias is the systematic error in data collection that has a negative effect to the outcome of the results of tests which are deemed to be not fair (Kukull & Ganguli, 2012). The researcher introduced herself and did not wear any name tag or uniform. Underrepresentation and overrepresentation of participation was prevented by doing random sampling, where everyone had chance of being selected for participation.

3.9 Reliability

To ensure reliability of data collection, a pilot study was undertaken on 10% of main study's sample size made up as follows: 7 participants from Grade 8, 7 from grade 9, 6 from Grade 10, 7 from Grade 11 and 5 participants from Grade 12. drawn from the Phala High School. The researcher used 32 learners for piloting. The Phala High School was used because it is situated in a deep rural area and is the school closest to the Dendron High School. no questions were changed because the learners in the pilot study understood what was in the questionnaire.

3.10 Data analysis

Data was analysed using SPSS version 23, a statistical software programme used to analyse frequency and means. The chi-square test were used to analyse the relationships between the variables. Weight and height were used to calculate the body mass index (BMI) of the participants according to the WHO formula as follows: Body mass index= weight (Kg) divided by square of height in meters

3.11 Selection criteria

3.11.1 Exclusion criteria

All learners did not return their signed consent and assent forms were excluded from the study.

3.11.2 Inclusion criteria

All adolescent learners who submitted and signed consent and assent forms were included in the study.

3.12 Ethical considerations

Seeking Permission.

Approval and ethical clearance to conduct the study was obtained from the University of Limpopo's Turfloop Research Ethics Committee (TREC). Permission to collect data was obtained from the Department of Education, the District office and the school principal. A request for approval was then submitted to school participants and parents for the learners to participate. Consent forms were developed to explain the aim and the objectives of the study to the participants and to inform them that participation was voluntary. The participants were allowed to withdraw from the study at any time. Parents of the participants signed the consent forms.

3.13. Confidentiality

The participants were assured that the information they provided during the study would not be used against them or be given to anyone who did not form part of the study, indicating that this information would be used only for the purpose of the study. The researcher explained that the questionnaire would be coded and would not include the identity of the participants.

The researcher also assured the participants that the answers they gave would not be given to other participants to embarrass them. Anonymity was maintained during data collection, and no names of participants were used during analysis, only identifier codes were used to capture the information. Questionnaires were handed to participants and collected immediately after completion.

3.14. Beneficence

The participants in the study did not receive any money or gifts for participation as participation was voluntary.

3.15 Summary

In this chapter, the research design, the study site, study population and sampling methods were presented. The chapter also highlighted the different methods taken in the execution of the study, the research sample that was selected through stratified random sampling, and the inclusion and exclusion criteria. The chapter also dealt with the data collection methods, how the pre-test was done and the data analysis, as well as the reliability, validity and ethical considerations. In the next chapter the findings of the study will be discussed.

**CHAPTER FOUR:
PRESENTATION OF RESULTS AND FINDINGS**

4.1 Introduction

This chapter presents the results of the study. The chapter is divided into sections namely: socio-demographic data, food consumption associated with overweight and obesity. The results are presented in tables, bar graphs and pie charts.

4.2. Socio- demographic data of the respondents.

This section presents the socio-demographic data of the respondents, which includes gender, age and grades.

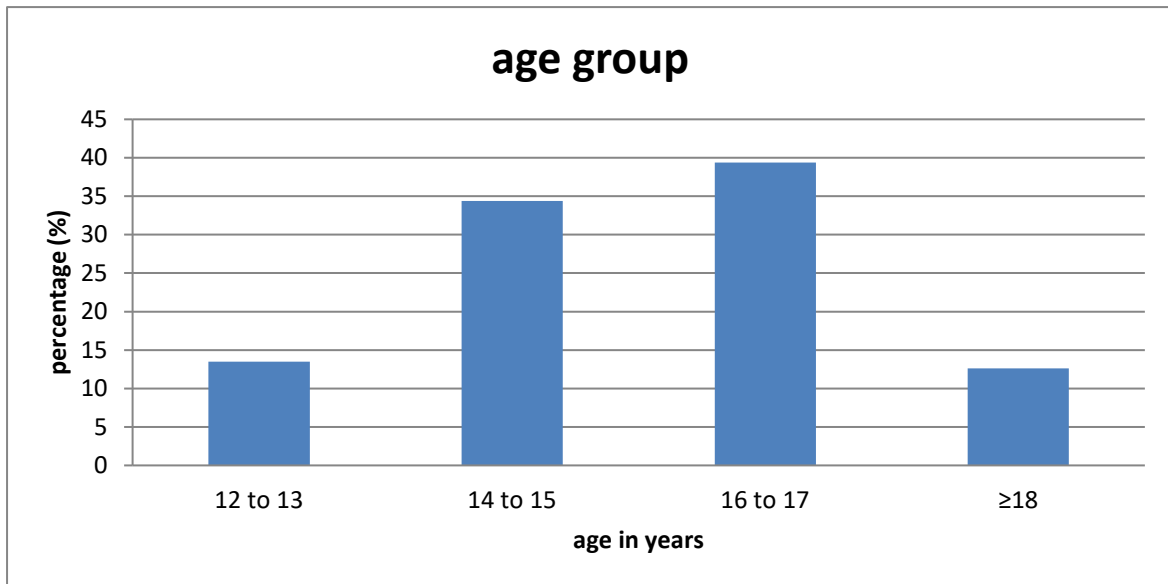


Fig 4.2 Age-group of respondents

Figure 4.2 above shows that 134 (39.4%) of respondents were 16 to 17 years of age; 117 (34.4%) were 14 to 15 years of age and 43(12.6%) were 12 to 13 years of age.

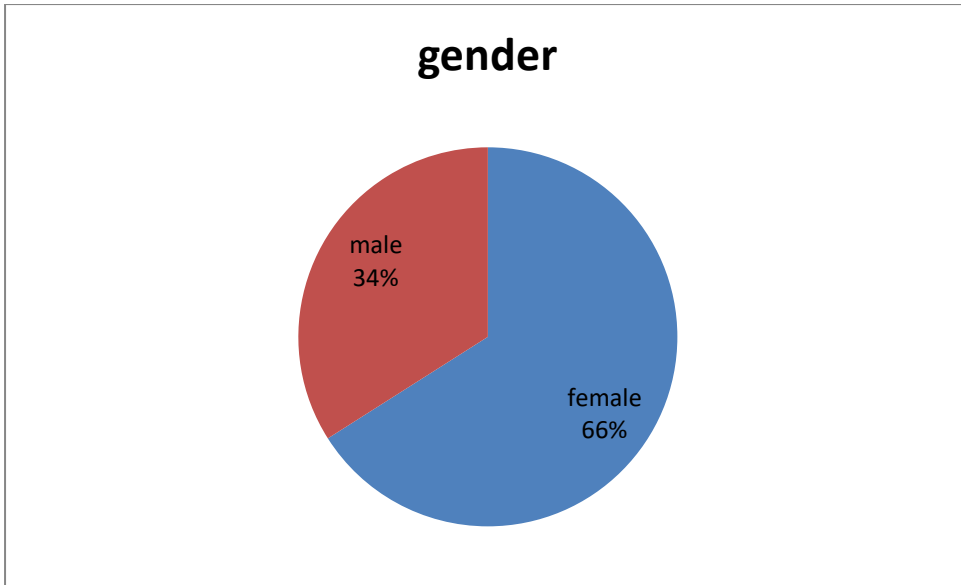


Figure 4.3. Gender distribution of respondents

Figure 4.3 shows that two thirds of respondents were female, at 225 (66%), and 115 (34%) were male.

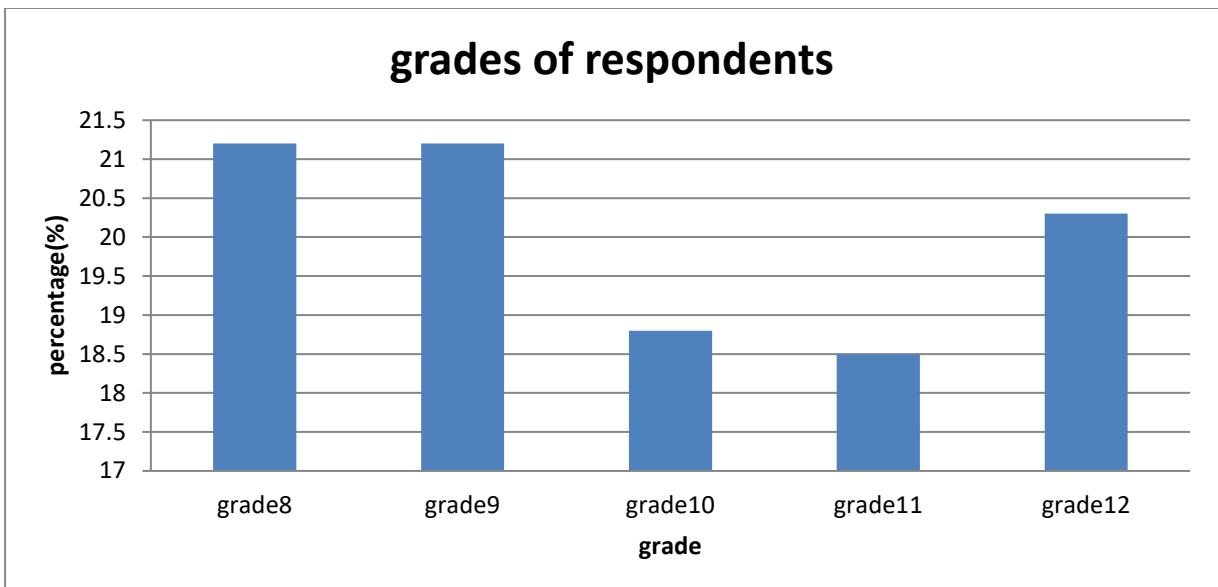


Figure 4.4 Grades of respondents

Figure 4.4 above shows that both grades 8 and 9 had 72 (21.2%) respondents per grade, while Grade 12 had 69 (20.3%) respondents and Grade 11 had 63 (18.5%) respondents.

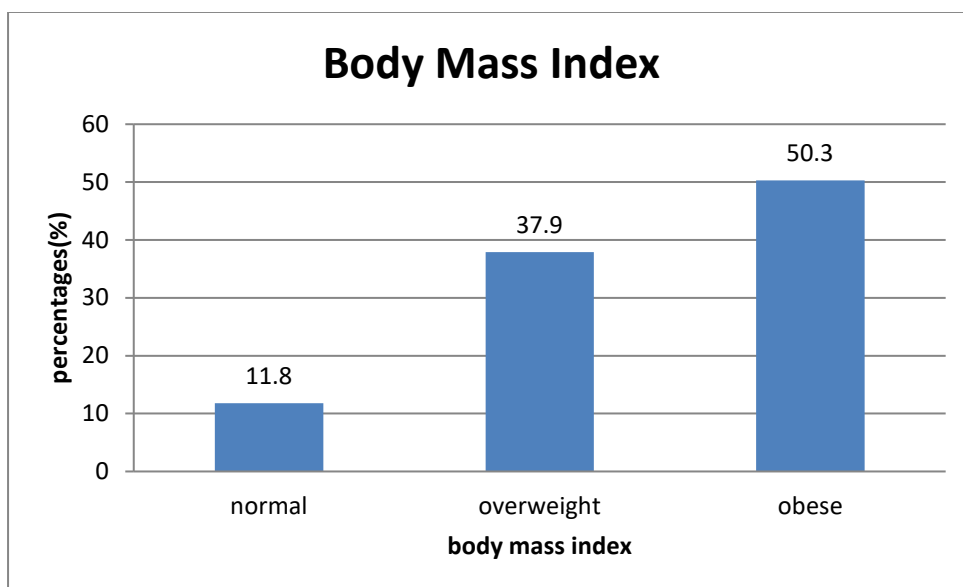


Figure 4.5 BMI Classification of Respondents

Figure 4.5 above shows that half of the respondents were obese, at 171 (50.3%), while 129 (37.9%) were overweight and 40 (11.8%) were of normal weight.

Table 4.6 BMI classification by age, gender, grade

Variables		normal	overweight	obese	p-value
Age	12-15 years(n=163)	27(16.6%)	62(38.0%)	74(45.4%)	$X^2=7.624$ $p=0,022^*$
	16>(n=177)	13(7.3%)	67(37.9%)	97(54.8%)	
Gender	Female(n=225)	24(10.7%)	89(39.6%)	112(49.8%)	$X^2=1.174$ $p=,556$
	Male(n=115)	16(13.9%)	40(34.8%)	59(51.3%)	
Grades	Grade 8 -9 (n=144)	27(18.8%)	54(37.5%)	63(43.8%)	$X^2=12.500$ $P= .002^*$
	Grade 10 -12 (n=196)	13(6.6%)	75(38.3%)	108(55.1%)	

* shows statistical significance at $p\text{-value}<0.05$

Table 4.6 above shows that there was a significant association between BMI classification, and the age and the grade of respondents ($p=0.022$ and 0.002 , respectively). Gender was found to be not statistically significantly associated to the BMI classification of respondents.

Table 4.7 Dietary intake of respondents

foodstuff	Does not consume	Moderate consumption	Over consumption
dairy foods	16(4.7%)	153(45.0%)	171(50.3%)
sweet foods	19(5.6%)	136(40.0%)	185(54.4%)
starch	0	57(16.8%)	283(83.2%)
fish	46(13.5%)	127(37.4%)	166(48.8%)
white meat	13(3.8%)	122(35.9%)	205(60.3%)
red meat	8(2.4%)	104(30.6%)	228(67.1%)
fast foods	0	34(10.0%)	306(90.0%)
Juice	0	99(29.1%)	241(70.9%)
Fast meat	98(28.8%)	87(25.6%)	155(45.6%)
other proteins	14(4.1%)	126(37.1%)	198(58.2%)
Fizzy drink	0	121(35.6%)	219(64.4%)

Table 4.7 above shows that the majority of respondents over consumed fast food, at 283 (83.2%), over consumed starch, at 241(70.99%), and over consumed juice while only 46 (13.5%) did not consume fish and 153(45.0%) moderately consumed dairy product. All food items which fall under each category were grouped together and a summation was done. Food items consumed 'once a week' or 'never' were categorised as 'does not consume', while food items consumed '2-3 times/week' were categorised as 'moderate consumption' and food items consumed '4-6 times/week' or 'everyday' were categorised as 'overconsumption'.

Table 4.8 BMI classification vs food types

Variables	Normal	Overweight	Obese	p-value

Sweet foods	Doesn't consume (n=19)	3(15.8%)	5(26.3%)	11(57.9%)	$X^2=8.84$ 2 P=0.065
	Moderate consumption (n=136)	13(9.6%)	43(31.6%)	80(58.8%)	
	Overconsumption(n=185)	24(12.3%)	81(43.8%)	80(43.2%)	
Starch	Moderate Consumption(n=57)	6(10.5%)	15(26.3%)	36(63.2%)	$X^2=4.78$ 2 P=,092
	Overconsumption(n=283)	34(12.0%)	114(40.3%)	135(47.7%)	
Fast-food	Moderate(n=34)	4(11.8%)	14(41.2%)	16(47.1%)	$X^2=0.18$ 3 p=0.913
	Overconsumption(n=306)	36(11.8%)	115(37.6%)	155(50.7%)	
Fizzy drinks	Moderate(n=121)	17(14.0%)	44(36.4%)	60(49.6%)	$X^2=0.376$ p=0.614
	Overconsumption(n=219)	23(10.5%)	85(38.8%)	111(50.7%)	

Table 4.8 above shows that there was no statistically significant ($P>0.05$) associations between BMI classification and food types.

Table 4.9: Associations between Food types by age and gender

Food types	P-VALUES	
	AGE	GENDER
Sweet foods	0.016	0.725
Starch	.018	.208
Fast-food	.000	.688

Fizzy drinks	.000	.554
Sephatlo and vetkoek	.012	.820

Table 4.9 above shows that there is a statistically significant association between all food types and age ($p < 0,05$), while no statistically significant association was found between all food types and gender ($p > 0.05$)

Table 4.10 Multinomial logistic Regression Analysis BMI and Age and Gender

Variables	OR	P-value	CI
Obese			
Age	1.127	.075	.988 – 1.285
gender	.931	.758	.593- 1.463
Overweight			
Age	1.021	.761	.893 – 1.167
Gender	1.225	.379	.767- 1.956

Table 4.10 above shows that age and gender are not significant predictors of BMI for both overweight and obese {OR < 2; P > .05; CI > 1 at 95%CI}.

4.11 Summary

This chapter presented the research findings regarding the socio demographic data, dietary intake among adolescents in secondary school and the statistically significance between BMI and food types.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Introduction

In this chapter, the results presented in Chapter 4 will be discussed. The discussion will be related to the literature about factors associated with overweight and obesity among adolescents who are high school learners. The aim of the study was to investigate factors associated to overweight and obesity among adolescents attending the Dendron High School, in the Limpopo Province. The objectives were as follows:

- To determine the social demographic profile associated with overweight and obesity among adolescents at the Dendron High School.
- To determine the dietary intake of adolescents at the Dendron High School.
- To determine which food types are associated with overweight and obesity among adolescents at the Dendron High School

5.2 DISCUSSION

Objective 1: To determine social demographic profile associated with overweight and obesity among adolescents at Dendron High School.

The results of this study revealed that over half of adolescents were over 15 years of age. Adolescents of 15 years and over are more to control on what they buy at school and how much they would spend per day. This means that less parental control. Adolescents aged 15 years and older needed to participate in the study so that they can know more about overweight and obesity. Most adolescents associate themselves being overweight or obese. (Waris et al., 2010) It was also easier to recruit adolescent aged 18 years because they are able to sign their own consent form and return them back. Lower aged adolescents had to take the consent form home for parents to sign. Some forgot to give to parents which lead to adolescent below 15 years having lower number.

It has been shown that older adolescents who are independent and under less parenteral control have a greater ability to buy highly palatable food, rich in calories, than younger adolescents are, which leads to overweight and obesity.(Waris et al.,2010)

The results of this study revealed that more female adolescents are overweight, at 89 (39.6%), and obese, at 112 (49.8%), than are male adolescents. Culturally adolescents girls associate overweight being healthy without diseases. Studies report that there are weight variations between boy and girl adolescents. Tamara(2010) found that overweight and obesity was more prevalent in adolescent girls than in adolescent boys. In contrast, Bibiloni et al. (2013) found that overweight and obesity is higher among boys than girls.

According to Gattario (2013), society has a greater influence on body size, where adolescent girls are slenderer than boys are, which indicates that overweight adolescent girls are lazy, lack control and are incompetent, and that their overweight or obesity is a sign of self-indulgence. Being thinner, on the other hand, is associated with happiness, being healthier and being better looking.

The results of this study revealed that there was no statistically significant difference between BMI and gender. In this study, adolescent girls were slightly more overweight than the boys were and, interestingly, similarly (Gitau et al., 2014) found that adolescent girls were more overweight than boys.

In contrast, a study conducted by Bibiloni et al. (2013) showed that boys were $\geq 10\%$ more often overweight than girl adolescents were in nine European countries.

Adolescents girls consume more sugary food, such as cakes, while adolescent boys consume more of fruits and vegetables (Gitau et al., 2014).Adolescents girls spent more time on television viewing and adolescent boys spent more time engaging in sports activities (Gitau et al., 2014). Furthermore, it has been reported the societal perception that adolescent boys with muscular body show signs of physical strength and athletic success. (Gitau et al., 2014). It has been found that females tend to weigh themselves more often and engage in unhealthy dieting behaviours and, because of

peer pressure, they tend to find comfort in overeating. Food advertising industries target adolescents from an early age, thus ensuring that their products are familiar, even to an older age (Gitau et al., 2014).

Objective 2: To determine dietary intake of adolescents in Dendron High School.

Soft drinks

This study revealed that adolescents had a moderate to overconsumption of sugary foods. Adolescents are vulnerable to high sugary food environment. (Claro et al., 2015). Dendron high school has vendors that sell them soft drinks during lunch time and after school. Parents give adolescents lot of money which make them buy lot of soft drinks. Adolescents in Dendron high school tend to buy different kind of soft drinks because their different colours and taste. The colour of soft drinks also attracts adolescents in Dendron high school to buy them. Adolescents in Dendron high school when they are thirsty tend to buy soft drinks because they are easily accessible.

Starchy food

Overconsumption of starchy food by adolescents results in overweight and obesity. Adolescents over consume starchy foods in the form of hamburgers and fried chips at school. Adolescents buy and share starchy foods in large quantities which leads to overweight and obesity. (Craig, 2013).

Adolescents in Dendron high school tend to buy refined food like white bread because is soft. Adolescents buy white bread together with soft drink .They eat in a group. Adolescents do not count number of slices when they eat, they eat until they become full which make them overweight or obese.

Fast food

This study revealed that the majority of adolescents had a moderate to overconsumption of fatty foods. Dutta (2011) revealed that there was over consumption of fatty foods among adolescents, because adolescents like foods that are quick to prepare. There are vendors in Dendron high school that sell chips, processed food and fat cakes which all leads to overweight and obesity in adolescents. Adolescents in Dendron high school do not bring along lunch box to school, and do

not eat snack which make adolescents buy fatty foods .Adolescents in Dendron high school visit canteens at Dendron and buy unhealthy food like bunny chow.

Meat

This study revealed that there is overconsumption of meat product. Adolescents in Dendron high school also tend to buy unprocessed food like vienna, russian , polony and hamburger. Adolescents in Dendron high school also buy fried food because they taste good and are attracted by the smell. At home they also add lot of fat in preparation of meaty product.(Connelly,2017)

Dairy product

This study revealed that there is overconsumption of dairy product. Adolescents in Dendron high school tend to buy sweetened dairy product which are sold by vendors and nearest supermarkets in Dendron. Sweetened dairy product are high in sugar which leads to overweight and obesity. (Thielemann,2012)

Objective 3: To determine which food type were associated to overweight and obesity among adolescents in Dendron High School.

Soft drinks

This study revealed the majority of adolescents had a moderate to overconsumption of sugary foods. This is not surprising because adolescents have been found to be more vulnerable to poor nutrition and are more exposed to high sugary food environment. This is especially true at schools where there is no control of what is sold within and outside the school premises (Gebregers, Yesuf & Beyen, 2013). Stacey, Field and Beebe, (2015) found that adolescents like to indulge in sweet foods like ice cream, cake, chocolate and candy. According to Gebregers et al, (2013), adolescents who showed psychological stress also showed increased intake of foods high in sugar content (Gebregers et al., 2013). According to Nymoer (2008), adolescents who consume sugary liquids get hungry more quickly than those who take solid sweet foods. This means that those adolescents who indulge in sugary liquids will have to consume more liquids to satisfy their hunger, further increasing their risk of obesity. Overconsumption of sugary foods is not unique to adolescents in South Africa. Adolescents in other countries, like in China, have also been found to consume sugary

foods (Nami, Shin and Yoon, 2017). Nami, et al. (2017) further indicated that those adolescents who over consumed sweet foods were also those adolescents who lacked knowledge linking sweet food intake to the risk of obesity. Patcheep (2011) warns that sweet foods contain high calories and sugar, and that an increased consumption of sweet foods can be influenced by mass media advertisements, which increase the desirability and consumption of sweet foods by adolescents. The fact that there are billboards close to schools that advertise all sorts of foods in Dendron make it more enticing for the adolescents to easily buy sweet and fatty foods without thinking of the long term consequences of their actions. Elham (2012) found that many sweet foods are more accessible to adolescents because of where they are placed and how they are packaged. This is especially true in supermarkets which put sweet foods next to the till, making it easy for consumers to take on their way to the till.

Furthermore, the results of this study revealed that the consumption of sugary food had no influence on the BMI of respondents. However, the majority of those who reported overconsumption of sugary foods were more overweight and obese, more so than those who moderately consumed or did not consume sugary foods. Benoit, Lamarche and Despres (2017) found that sugary foods provide unnecessary calories with no nutrients and do not contribute to immediate satiety which, unfortunately, leads to overweight and obesity.

This study revealed that age influenced the consumption of sugary foods, where older adolescents were found to consume more sugary foods than the younger ones did. On the contrary Wuenstel, Wadolowska, Slowinska, Niedzwiedza, Kowalkowska and Antoniak (2015) found that adolescents 15 to 16 years of age showed a greater consumption of sugary food than adolescents of 17-18 years old. Older adolescents had more opportunity to select and buy sugary foods outside of their homes.

The results of this study revealed that gender did not influence consumption of sugary foods. This means that there was no difference in consumption of sugary foods between adolescent girls and boys. In contrast, Wuenstel et al. (2015) found that overconsumption of sugary food was higher among adolescent boys than among adolescent girls. However, Ferreira et al (2015) found that there was a greater overconsumption of sweet foods among adolescent girls than among adolescent boys.

Adolescents girls reported to spend much time watching television, which is a factor promoting consumption of sugary rich food. Adolescents girls are mostly responsible for buying food at home.

Starch

This study revealed that the majority of adolescents had a moderate to overconsumption of starchy foods. Mpofo (2015) said that starchy food comprises of carbohydrates, which provide the body with energy, with the consumption of whole grains leading to enhanced memory function and quick energy boost. A study by Solberg (2014) said that processed starchy food has low fibre with low health benefits. According to Feeley (2012), there is an increase in the consumption of refined starchy foods and the most consumed staple starchy food in most countries is maize meal.

According to Bejarano (2016), there is generally an overconsumption of starchy food by most populations, resulting in an overload of energy, which can result in obesity

Furthermore, this study found that there was no significant association between consumption of starchy food and BMI classification. However, adolescents who overconsumed starchy foods were found to be more obese than those who moderately consumed starchy foods. In Durban, according to Hlambelo (2012), there was a high calorie content in starchy food and that adolescents tended to buy and overconsume these starchy foods in the form of hamburgers and fried chips at school. A large number of adolescents do not bring along lunch to school, preferring eating in a group.

This study revealed that there was no difference in the consumption of starchy foods between male and female adolescents. However, according to Leal et al. (2010), male adolescents over consumed starch to a greater degree than female adolescents did. Adolescents female prefer to snack while adolescent males prefer starchy foods. Adolescent men associate starchy food with masculinity, physical strength and toughness. Adolescent males are considered stronger than female adolescents are. Adolescent males tend to consume larger portion sizes of starchy food (Leal et al., 2010).

Fatty foods

This study revealed that the majority of adolescents had a moderate to overconsumption of fatty foods. Dutta (2011) revealed that there was a high consumption of fatty foods among adolescents, because these foods are cheap and quick to prepare. Sadly, in most cases, adolescents who overconsume fast foods do so while watching television and spend less time exercising. Fast food is associated with high BMI and less successful weight loss. Fast food also creates a cycle of more consumption, leading to high BMI (Itatiro, 2013).

This study found that adolescent boys overconsumed fatty foods to a greater extent than adolescent girls did. This concurs with studies done by Ndlovu (2015) and Feeley (2012) which found that adolescent males over consumed fatty foods far more than adolescent females did. Adolescent females do the household shopping in most of the time.

Dairy products

This study revealed that there is an overconsumption of dairy products. In America, Gresser (2015) also reported that dairy products play a pivotal role in health benefits, like weight management. Increased consumption of fat free or low fat milk suppresses serum PTH and 1,25 dihydroxyvitaminD which leads to decreased lipolysis and an increase in lipogenesis. Increased calcium intake does not affect fat oxidation. Calcium also inhibits fat absorption from intestines by binding fatty acids. High consumption of dairy products was also found to be associated with bone growth and physical growth. The results of this study revealed that there was no statistically significant association between dairy intake according to age and gender. Milk and dairy products provide carbohydrates, proteins, lipids, vitamins and minerals. (Daphna & Lindsay, 2013)

Conclusion.

From this study there was high overweight and obesity among adolescents. More respondents were the older adolescents. The study revealed that more female adolescents than male adolescents participated in the research. This study revealed that the majority of adolescents had a moderate to overconsumption of soft drinks. This study revealed that the majority of adolescents had a moderate to

overconsumption of starchy food. This study revealed that the majority of adolescents had a moderate to overconsumption of fast foods. This study revealed that there is an overconsumption of dairy products. Furthermore, this study found that there was no significant association between consumption of starchy food and BMI classification. This is due to Dendron high school has vendors which sell unhealthy food to adolescents.

5.4 Recommendations

Health promotion:

There is a need to offer nutrition educational to adolescents and educators in order to reduce overweight and obesity. Nutritional promotion campaigns should be a continual effort. This will also raise public awareness of the importance of good nutrition.

School environments should be preferred by health promoters and should be better places to develop to establish healthy lifestyles among adolescents.

School nutrition programmes are considered to run effectively and efficiently and should also be the platform where adolescents can learn healthy eating habits. This can be achieved through the provision of variety of food, education on portion size, and healthy cooking of food. Schools should be equipped with sufficient equipment for portion size control. Qualified nutrition professionals should provide close monitoring of food quality, according to acceptable standards, in schools.

School policy on nutrition:

School food policies should also engage adolescents to plan school nutrition programmes. Efficient and effective school food policies should be implemented for the provisioning of quality food. Schools should invite experts in nutrition and physical activities to assist in equipping all stakeholders involved in school activities with knowledge. Schools should have placards/charts on the importance of good nutrition and physical activities.

Teachers should be expected to attend training in nutrition so that they are able to provide basic information on the importance of nutrition to adolescents.

Tuck shop owners and street vendors must also be trained by qualified nutrition professional on healthy eating, and on what they should sell to adolescents. Tuck shop owners and street vendors should be educated about healthy food first so that they can sell according to acceptable food standards.

5.5. Recommendation for further research.

Further research looking at the overweight and obesity situation all rural high school would be beneficial in order to make the study more generalizable to all rural adolescents in South Africa.

5.6 Limitations

The study was conducted at one secondary school in the Limpopo Province, so the study is not generalizable to other areas of the Province.

5.7 Concluding remarks.

It is of much concern that the majority of adolescents in this study, and worldwide, were overweight and obese. This shows that there is lack of nutrition education among adolescents, parents and educators. There is also a lack of physical activity among adolescents because of a lack of resources. The environment that adolescents live in contributes to their being overweight and obese. Adolescents buy unhealthy foods regularly because they stay at school for a long time.

REFERENCES:

- Adesuwa. Oliemen, Ifeoma, Nwadiuto (2012). Weight status of adolescence in Secondary schools in Port Harcourt using Body Mass Index (BMI) in *Italian Journal Of Pediatrics*38(1):31 .
- Ahmed J, Laghari A, Naseer M and Mehraj V(2013).Prevalence of and factors associated with obesity among Pakistani school children: a school-based, cross-sectional study. *East Mediterranean Health Journal*.2013Mar;19(3):242-7.
- Al-Shamsi, Reem Saeed (2008).The Prevalence and Selected Determinants of Overweight and Obesity Among Children and Adolescent in the City of Al-Ain, UAE. Doctoral dissertation
- Audain, K. (2014). A Comparative Analysis of the Nutrition Status, Nutrition Knowledge and Food Frequency of Adolescents Attending an Urban Versus a Peri-Urban School in Hilton, Kwazulu Natal. *South African Journal Clinical Nutrition* ,24(7):20
- Bastianello, J.; Epkey, M.; and McMullin, K., (2012) "The Nature of Social Support: Self-Efficacy in Overweight and Obese Adolescents" *Mental Health*.
- Bejarano, C. M., (2016). Motivation and Hedonic Hunger as Predictors of Self-Reported Food Intake in Adolescents: Disentangling Between Person and Within – Person Processes. Unpublished M.A Dissertation. University of Kansas.
- Bibiloni, M., Pong, A. & Tur, J. (2013). Prevalence of Overweight and Obesity in Adolescents: A Systematic Review. *ISRN Obesity* (2013)
- Biro, F., & Wien, M. (2010). Childhood obesity and adult morbidities. *The American Journal of Clinical Nutrition*, 1499-1505.
- Bredella MA (2019). Highlights of the special scientific sessions of the 45th Annual Scientific Meeting of the International Skeletal Society(ISS)2018, Berlin, Germany. *SkeletalRadiol*.2019Feb;48(2):187-189.
- Centers for Disease Control and Prevention. Emergency Management Accreditation Program (EMAP) frequently asked questions (FAQ) [cited 2017 Jul 21].

https://esp.cdc.gov/sites/ophpr/DEOv2/Documents/One%20Pager_Emergency%20Management%20Accreditation%20Program_20131112.pdf

Codjoe, A. B. (2015) Physical Activity, Overweight /Obesity and Lung Function Among Junior High School Students in the Tema Metropolis, Ghana. Unpublished MPH thesis, University of Ghana.

Connelly,P.M.(2017).Adolescent food purchasing patterns and the association with dietary intake and body mass index in rural communities in Kentucky and North Carolina.https://uknowledge.uky.edu/foodsci_etds/55.

Daphna K Drora and Lindsay H Allen, 2013. Dairy product intake in children and Adolescents in developed countries: trends, nutritional contribution, and a Review of association with health outcomes.<https://doi.org/10.1111/nure.12078>

Daradkeh, G., Muhannadi, C. P., & Hajr, M. (2018). Fast Food v/s Healthy Food Intake and Overweight /Obesity Prevalence among Adolescents in the State of Qatar. *Journal of Obesity Treatment and Weight Management*. 1(1),1-4.

David, Y.C., Huang, H., Lanza, I., & Anglin, M.D. (2013) Association between Adolescent Substance Use and Obesity in Young Adulthood: A Group-based Dual Trajectory Analysis. *Addict Behaviour* ,38(11):2653-2660

De Vos, A.S.; Strydom, H.;Fouché, C.B. and Delport,C.S.L(2005).Research at grass Roots for the Social Sciences and Human Service Professions.3rd edition.Pretoria: VanSchaik Publishers

Drost. 2012, Validity and Reliability in Social Science Research, Education Research and Perspectives, 38(1):105-123

Dutta, S. 2013. An assessment of the factors affecting food choices and their corresponding association with overweight and obesity among school going children in urban Guwahati in the age group of 13-18 years. Achutha Menon Centre for Health Science Studies.<https://www.Semanticscholar.org.2018/11/13>.

Elham, A. J. (2017). Factors affecting nutritional status and eating behaviours of adolescent girls in Saudi Arabia. Department of Clinical Nutrition, King Abdulaziz University, Jeddah, Saudi Arabia.www.researchgate.net.2018/11/06

Ellulu, M., Abed, Y., Rahmat, A., Ranneh, Y., & Ali, F. (2014). Epidemiology of obesity in developing countries: challenges and prevention, *Global Epidemic Obesity*,35(1):93-99

Fazah, A. (2011). Physical activity and obesity in Lebanese adolescents: prevalences, measurements and associations.<https://tel.archives.ouvertes.fr/tel-00596383>.2018/11/09.

Feeley, A. B. (2012). The Impact of Dietary Habits and Practices During Adolescents on the Risk of Obesity: The Birth to Twenty Cohort. South Africa.Wiredspace.wits.ac.za.2019/04/09.

Ferreira, N. L., Claro, R. M., & Lopes, A. C. S. (2012). Consumption of sugar-rich food products among Brazilian students: National School Health Survey (PeNSE 2012). Brazil.

Galfo, M., Addezio, L. D., Censi, L., Roccaldo, R., & Marto, D. (2016) overweight and Obesity in Italian Adolescents: Examined Prevalence and Socio-Demographic Factors. *Centre European Public Health*,24(4):262-267

Gattario, K. H. (2013). Body Image in Adolescence. Through the lenses of Culture, Gender, and Positive Psychology.<https://gupea.ub.gu.se>.2019/04/06

Gebregergs, G. B., Yesun, M. E., & Beyen, T. K. (2013). Obesity and Weight Loss Therapy. Overweight and Obesity, and Associatiated Factors among High School Student in Gondar Town, North West Ethiopia.

Graig, M. E. (2013), Child and Adolescent obesity: prevalence and risk factors in a rural South Africa population

Hoops, V. I. (2011). The relationship between resting metabolic rate and body composition in adolescents from different ethnicity: The PAHL Study.

Gitau, T.M., Micklesfield, L. K.,Pettifor.J.M.,Norris,S.A (2014).Changesineating attitudes, body esteem and weight control behaviours during adolescence in a South African cohort. eCollection2014.

Gresser, M. (2015). *The Consumption of Dairy and Dairy Alternatives and the Perception of Dairy in College Students*. (Electronic Thesis or Dissertation). Retrieved from <https://etd.ohiolink.edu> (2015).

Hazzaa, M. A., & Nada, A. (2012) Lifestyle Factors Associate with Overweight and Obesity among Saudi Adolescents. College of Education, King Saud University, Riyadh, Saudi Arabia. alhazzaa@ksu.edu.sa

Harris, C., & Flexeder, C. (2015) Changes in dietary intake during puberty and their determinants: results from the GINplusbirth cohort study. *BioMed Central Public Health* ,15(841):1-10.

Herman, CP, Polivy, J, Deo, R. 2010: Getting a bigger slice of the pie. Effects on Eating and emotion in restrained and unrestrained eaters. University of Toronto,

Hlambelo, N. (2012). Determining the Contributing of Lunchbox Content to the Dietary Intake of Girls (13-18 years old) in a High School in Lindelani. Department of Food and Nutrition Consumer Sciences, Faculty of Applied Sciences at the Durban University of Technology

Hughes G , Puoane T , Clark B , Wondwossen T , Johnson Q, Folk W, 2012. Prevalence and predictors of traditional medicine utilization among persons Living with AIDS (PLWA) on antiretroviral (ARV) and prophylaxis treatment in both Rural and urban areas in South Africa. *African Journal Traditional Complement Alternation Medicines* (2012) 9(4)470-484

Itatiro, J. (2013). The association of school food environment with eating habits of school going adolescents in Tanzania. M.A Dissertation in Faculty of Bioscience Engineering, Gent Universiteit.

Jansen, V. (2014). Determinants of Soft drink consumption. Differences by socioeconomic status. M.A Dissertation, Wageningen University.

Katzmarzyk, P. T., Broyles, S. T., & Zhao, P. (2016). Relationship between Soft Drink Consumption and Obesity in 9-11 Years Old Children in a Multi-National Study. M.A. Bath University.

Keats, Emily C., Aviva I. Rappaport, Reena Jain, Christina Oh, Shailja Shah, Zulfiqar A. Bhutta. 2018. Diet and Eating Practices among Adolescent Girls in Low- and Middle-Income Countries: A Systemic Review. Arlington, VA: Strengthening Partnerships, Results, and Innovations in Nutrition Globally (SPRING) project. Keller. (2012). Advertising and Consumption in the Food Industry

Keino, S, Plasqui, G., ETTYANG, G., & 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):167-178

Kim, K, Hong, S. A., Yun, S.H., Ryou, J., Lee, S. S., & Kim, M.K. 2012. The effect of a healthy school tuck shop program on the access of students to healthy foods. *Nutrition Research and Practice*, 6(2):138-145

Kukull, W. A., & Ganguli, M. (2012). Generalizability, the trees, the forest, and the low-hanging fruit. *Neurology (2012) Juns*; 78(23):1886-1891

Kautiainen, S. (2008). Overweight and Obesity in Adolescent. Secular Trends and associations with perceived weight, sociodemographic factors and screen time. M.A Dissertation, University of Tampere.

Kelly AS, Barlow SE, Rao G, Inge TH, Hayman LL, Steinberger, J, Urbina EM, Ewing LJ, Daniels SR, 2014. Severe obesity in children and adolescents: identification, Associated health risks, and treatment approaches: a scientific statement from the American Heart Association.

Kelly, R., Magnussen. C. G., Sabin, M. A., Cheung, M., & Juonala, M. (2015). Development of hypertension in overweight adolescents: a review. Menzies Institute for Medical Research, University of Tasmania, Hobart, Australia

Klutse, CM. (2015). An investigation into the adolescents Nutritional and Dietary Requirements among Secondary Schools in the Volta Rgion of Ghana. *Global Research Journal of Science and Nature*, 1(1):1-5.

Leal, G., Philippi, S., Matsudo, S., & Toassa, E. (2010). Food intake and meal patterns of adolescents, Sao Paulo, Brazil.

Lebres, V.F. (2014). Adolescents Nutrition and Physical Activity Knowledge and Practices. PhD Thesis in the Faculty of Sport, University of Porto.

Leila, B., Muhamad, H. Nor,A, Ahama, Z. F.A.& Ariyo, M.(2014) Socio Demographic Factors and Physical Activity Associated with Overweight and Obesity among Iranian Adolescents. *Pensee Journal* ,76(6):1-9

Majabadi, H. A., Solhi, M., Montazeri, A., Shojaeizadeh, D., Nejat, S., Farahani, F. K.,& Djazayeri, A.(2016). Factors Influencing Fast Food Consumption Among Adolescents in Tehran: A Qualitative Study. *Iran Red Crescent Med Journal*,1-9

Mitko, V. (2015). *Understanding Consumption of Sugar-Sweetened Beverages by Adolescents with Dental Caries*. (Electronic Thesis or Dissertation). Retrieved from <https://etd.ohiolink.edu/>.(2015)

Mohammad, Mouzan, Foster, Abdulla, Herbish, Ahmad, Omer, Quarachi, Tatjana,2010. Prevalence of overweight in preschool children using the new WHO growth standards. in e-SPEN the Europeane-Journal of Clinical Nutrition and Metabolism 5(1) · February2010.

Monyeki KD, Monyeki MA, Brits SJ, Kemper HCG, Makgae PJ. Development and Tracking of Body Mass Index from Preschool Age into Adolescence in Rural South African Children : Elliras Longitudinal Growth and Health Study .*Journal Health Population and Nutrition* 2008;26(4):405–417.

Mpofu, M. (2015). Impact of Dietary on Academic Performance of Zimbabwean College Student. DeD Curriculum Studies. University of Venda

Murage,E.W.K.,Kahn, K., Pettifor, J. M.,Tollman,S. M., Klipstein, K., Norrish, S.A. (2011). Predictors of adolescent weight status and central obesity in rural South Africa, *Public Health Nutrition*,14(6):1114-1122.

Musaiger, O. A, (2011). Overweight and Obesity in Eastern Mediterranean Region: Prevalence and Possible Causes. Nutrition and Health Research Unit, Deanship of

Scientific Research, University of Bahrain and Arab Center for Nutrition, Manama, Bahrain.

Nagasawa, S. (2013). Girls and Physical Activity: A Multi-Method Qualitative Exploration. Unpublished Thesis for Doctor of Philosophy, Graduate Department of Applied Psychology and Human Development. Ontario Institute for Studies in Education. University of Toronto.

Nami, J., Shin, K. K., & Ji, Y. Y. (2017). High School Students Sugar Intake Behaviours and Consumption of Sugary Processed Food Based on the Level of Sugary –related Nutrition Knowledge in Seoul Area. *Korean Journal Community Nutrition*, 22(1), 1-12.

Ndlovu, P. (2015). Exploring Food Habits and Nutritional Behaviours in Adolescents at a Secondary School in South Africa. Master of Public Health. UNISA.

Nicole., Hoeven, M., & Namukolo, C. (2016). Food environment, health and nutrition in South Africa. Centre for Poverty, Land and Agrarian Studies (PLAAS), University of Western Cape

Nieman., P., & LeBlane. C. M. A. (2012). Psychosocial aspects of child and adolescent obesity. Canadian Paediatric Society.

Organisation for Economic Co-operation and Development (2013), Organisation for Economic Co-operation and Development *Guidelines on Measuring Subjective Well-being*, Organisation for Economic Co-operation and Development Publishing, Paris, <https://doi.org/10.1787/9789264191655-en>

Patcheep, K. (2011). Factors Influencing Thai Adolescents Eating Behaviour. East Anglia. PhD Thesis. School of Nursing Sciences, Faculty of Medicine and Health Sciences. University of East Anglia.

Patsopoulou, A, Tsimtsiou, Z, Katsioulis, A, Rachiotis, G, Malissiova, E, Hadjichristodoulov, C, 2015. Prevalence and Risk Factors of Overweight and obesity among adolescents and their parents in Central Greece (FETA Project) *International Journal of Environmental Research and Public Health*: 1-10.

Peltzer, K, Pengpid, S. (2011). Overweight and Obesity and Associated Factors among School –Aged Adolescents in Ghana and Uganda, *International Journal of Environmental Research and Public Health*, 8:3859-3870

Persaud, D. C. (2013). Gender Differences and Fast Food Preferences Among U.S. College Students. Florida.

Phoku, N. T. (2013). Cardiovascular Risk Factors among 15-20 years old Rural Subareas Residing in Dikgale Demographic Surveillance Site (DDSS), Limpopo Province. Department of Medical Sciences, Public Health and Health Promotion, University of Limpopo (Turfloop Campus), Polokwane, South Africa.

Pretorius. & Joubert, N.2014.The experiences of individuals with Multiple Sclerosis in the Western Cape, South Africa. *Health SA Gesondheid*,19(1),
Public Health England. (2013). Obesity and the environment: increasing physical activity and active travel. Briefing paper from Public Health England.

Randall-Arell, J. L., & Utley, R. (2014). The Adolescent Female's Lived-Experience of Obesity. *The Qualitative Report*, 19(23), 1-15.

Raj, M, Kumar, K, (2010). Obesity in Children and Adolescents, *Indian Journal Medical Science*, 132:598-607.

Rajan, A., Ntuli, T.S., & Skaal., L. (2012). Soft Drink Consumption Among Grade 11 and Grade 12 Learners at a Secondary School in Gauteng, South Africa. Masters' in Public Health. University of Limpopo.

Reilly, J. J., & Kelly, J. (2011). Long –term impact of overweight and obesity in childhood and adolescence on morbidity and premature mortality in adulthood: systematic review, *International Journal of Obesity* 35:891-898

Ren Zhao 2011: Zhang,Jianhua&Pan,Lingxin&Xu,Yan&Wu,Changhao&Wang, Changhui& Cheng,Ziping & Zhao,Ren.(2011).Total cholesterol content of Erythrocyte membranes in acute coronary syndrome: Correlation with apolipoprotein A-I and lipoprotein (a). *Coronary artery disease*. 22. 145-52.

10.1097/MCA.0b013e328343fbbb

RSA. 2016. Strategy for Prevention and Control of Obesity in South Africa, 2015-2020. Department of Health, Pretoria.

Rosiek, A., Macciejewska, A. F., & Leksowski, K (2015). Effect of Television on Obesity and Excess of Weight and Consequences of Health. International Journal Environmental Research and Public Health, 12-9408-9426

Rossouw, H., Grant, C., & Viljoen, M. (2012). Overweight and obesity in children and adolescents: The South African problem, *South African Journal of Science, 108 (5):2-7*

Salvy, S. J, & Bowker, J. C.(2014).Peers and Obesity during Childhood and Adolescence: A Review of the Empirical Research on Peers ,Eating ,and Physical Activity. RAND Corporation, Santa Monica, CA, USA.

Sedibe, M. H. (2016). Dietary and Lifestyle Practices in Rural and Urban South African Adolescents. South Africa. PhD Thesis. University of Witwatersrand.

Silangwe, B. N. (2012). Nutritional Status and Dietary Intake of Adolescent Girls in Mandlenkosi High School –Lindelani. Durban. Centre for Sustainable Agriculture, Rural Development and Extension, UFS, S.A.

Shokrvash, B., Majlessi,F, & Shojaeezadeh, D. (2013) Correlates of Physical activity in adolescence: a study from a developing country. Department of Health Education and Promotion, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran.

Solberg, S. L. (2014). The application of a new classification of food based on degree and purpose of processing. A quantitative study of Norwegian food sales from representative sample of retail stores. *Public Health Nutrition, Volume 21, Special Issue 1*

Sonya, G.& Brennan, D. (2013) Are All Proximity Effects Created Equal? Fast Food near School and Body Weight among Diverse Adolescents. *Journal of Public Policy & Marketing.,32(1):116-128*

Tamara, L.E. (2010). Development of overweight in adolescents. *Public Health Nutrition* 21(Issue 1):210-217 · January 2018 *with* 228 Reads

Tanja, V.E & Faith S, Myles. (2006). Influences on Child Eating and Weight Development from a Behavioral Genetics Perspective. *Journal of pediatric psychology*.34.596-605.10.1093/jpepsy/jsn03

Tesfalem, T., Pragya, S., & Debebe, M. (2013) Prevalence and Association Factors of Overweight and Obesity Among High School Adolescents in Urban Communities of Hawessa, Southern Ethiopia. *Current Research in Nutrition and Food Science*, (1);23-26mm

Tirosh A, Shail, Afek A, Dubnov-Raz G, Ayalon N, Gordon B, Derazne E, Tzur D, Shamis A, Vinker S, Rudich A. 2011. Adolescent BMI trajectory and risk of Diabetes versus coronary disease. *New England Journal of Medicine* .2011

Tiwari, H. C., Dwivedi, S., Bali, S. & Parveen, K. (2014). Overweight and Obesity and its Correlates Among School Going Adolescents of District Allahabad-S Cross Sectional Study. *Indian J. Prev. Soc. Med.* Vol. 45 No. 1-2, 2014.

Thielemann, B. (2012). Assessment of nutritional knowledge and eating behaviour on the weight and obesity of college student. *General woman and environmental science undergraduate honours* .http://scholarworks.Uark.edu/ghe_suht13

Toriola, A., Moselakgomo, V., Shaw, B., & Goon, D. (2012). Overweight, obesity and Underweight in rural black South African children. *South African Journal of Clinical Nutrition*, 25(2), 57-61. Retrieved from <http://www.sajcn.co.za/index.php/SAJCN/article/view/557>

Turid, K. B. S., Knut, L., Per, L., Kari, G., & Solvi, H. (2018) Overweight adolescents' views on physical activity –experiences of participants in an internet –based intervention: a qualitative study. *BioMedCentral Public Health* ,18(448):2-10

Unicef. (2011). *Adolescence: An Age of Opportunity. The State of the World Children.* United Nations Children's Fund (UNICEF) February 2011. www.unicef.org.2018/04/09.

Unicef, (2011). The State of the world's children 2011. Adolescence an age of opportunity. United Nations Children's Fund (UNICEF) February 2011. www.unicef.org.2018/04/09

Vaughn, J. B. (2016). The Effect of Adolescents Girls Drugs on Academics and Social Development. Department of Counselor Education, Kean University, New Jersey, USA.

Vashisht, B. M., Vikram, A., & Anvesha (2018). Association of socio demographic factors with overweight and obesity among rural school going adolescents in Rohtak district, Haryana. *Global Journal of Medicine and Public Health* .7(1):1-10

Vidgen, H. A, Gallegos, D. (2014). Defining food literacy and its components, School of Exercise and Nutrition Sciences, Faculty of Health, Queensland University of Technology, Victoria Park Rd, Kelvin Grove, Queensland 4059, Australia

Vorster, H. H., Badham, J. B., & Venter, C. S, (2013). Food –Based Dietary Guideline for South Africa: An introduction to the revised food –based dietary guidelines for South Africa. *South African Journal of Clinical Nutrition* 2013; 26(3):5-12

Yah, C. S. (2014) The Association Between Dietary Intake and Risk of Overweigh Among 17 years old Adolescents in Soweto, Johannesburg, South Africa. Unpublished M.A. in the Faculty of Health Sciences, University of the Witwatersrand,

Waris, Q. Sidra, I., & Maheen, R., (2010). Adolescent Lifestyle and Behaviour: A Survey from a Developing Country. Department of Family Medicine, Aga Khan University, Karachi, Pakistan,

Wayne, D. (2010). Biostatistics Basic Concepts and Methodology for Health Sciences, 9th edition, Asia

World Health Organisation, (2009). Prevalence of Overweight and Obesity in Children and Adolescents, Europe. ENHIS, FACT SHEET 2.3 z December

Wuenstel, J., Wadolowska, L., Slowinska, M. A., Niedzwiedzka, E., Kowalkowska, J., & Antoniak, L. (2015). Consumption Frequency of Fruit Juices and Sweetened

Beverages: Differences Related to Age, Gender and the Prevalence of Overweight Among Polish Adolescents. *Polish Journal Food Nutrition. Science*, 65(3),211-221.

Young, J.W. (2013). Guidelines for Test Development Practices to Ensure Validity and Fairness for International English Language Proficiency Assessments. John W. Young, Young soon So & Gary J. Ockey



Annexure A: Participant information leaflet

Title: Factors associated to overweight and obesity among adolescents at Dendron High School Limpopo province South Africa.

I Mapaya M.M.M doing research on the above topic registered at University of Limpopo Turf loop campus, currently working at Helene Frans Hospital as a Dietician since 2007 to date. Contact number=0726003268

I would like to invite your child to take part on research project which mentioned above as the topic. Please read the information carefully so that you can understand. The child participation is voluntarily and is free to withdraw any time before completion, no contribution of finance needed from parents or learner.

Reason for the study

There is a high rate of mortality and morbidity rate worldwide, there are also high rate for adolescents obesity worldwide and there is also increased risk factors which leads to death.

Procedure

Learner will be measured weight and height which are harmless/would not cause any pain to the learner. Calculate BMI and interviewed.

Benefits

Participants will benefits on changing dietary habits and behaviour and weight management.



Annexure B, consent form to the parent.

Mapaya M.M.M

School of public health

0726003268/0725034725

Please send this form back to school the following day

I----- as the parent/caregiver understand the importance of my child taking part in the research project, this project will not harm my child physically, emotionally and spiritually and no costs will be needed from a parent for the research project.

I hereby -----parent/caregiver of-----
(learner name) ----- (date of birth), allow my child to participate in research project.

Signature ----- Date -----

ANNEXURE C



To: Dendron High School Principal.

Dear Sir

I am Mapaya Mercy studying masters of public health in university of Limpopo conducting research and my topic is Factors associated to overweight and obesity among adolescents at Dendron High School, Limpopo Province. My supervisor is DR Ramalivhana N. J and co-supervisor is Prof Skaal.

Strict confidentiality will be adhered to, no names of learners will be written in the questionnaire. No personal information will be disclosed. I consider the research project worthwhile and of benefit to the learners. In order to gather information for my research I will need to measure learners' body weight and height. No physical harm to student. The research will not disturb any teaching time. Together with my supervisor and co-supervisor we will be happy if you can allow us to conduct the study in the school.

Regards

Mapaya Mercy

ANNEXURE D



To: Phala High School Principal.

Dear Sir

I am Mapaya Mercy studying masters of public health in university of Limpopo conducting research and my topic is Factors associated to overweight and obesity among adolescents at Dendron High School, Limpopo Province. My supervisor is DR Ramalivhana N.J and co-supervisor is Prof Skaal. Phala High School was chosen for piloting.

Strict confidentiality will be adhered to, no names of learners will be written in the questionnaire. No personal information will be disclosed. I consider the research project worthwhile and of benefit to the learners. In order to gather information for the research, I will need to measure learners body weight and height. No physical harm to student. The research will not disturb any teaching time. Together with my supervisor and co-supervisor we will be happy if you can allow us to pilot in Phala High School.

Regards

Mapaya Mercy



University of Limpopo
Department of Research Administration and Development
Private Bag X1106, Sovenga, 0727, South Africa
Tel: (015) 268 2212, Fax: (015) 268 2306, Email:noko.monene@ul.ac.za

**TURFLOOP RESEARCH ETHICS
COMMITTEE CLEARANCE CERTIFICATE**

MEETING: 08 September 2016

PROJECT NUMBER: TREC/130/2016: PG

PROJECT:

Title: Factors associated to overweight and obesity among adolescents at Dendron High School, Limpopo Province, South Africa
Researcher: Ms MMM Mapaya
Supervisor: Dr NJ Ramalivhana
Co-Supervisor: Prof L Skaal
School: Health Care Sciences
Degree: Masters in Public Health


PROF FAB MASHEGO
CHAIRPERSON: TURFLOOP RESEARCH ETHICS COMMITTEE

The Turfloop Research Ethics Committee (TREC) is registered with the National Health Research Ethics Council, Registration Number: **REC-0310111-031**

Note:

- i) Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee.
- ii) The budget for the research will be considered separately from the protocol.
PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.



LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

**DEPARTMENT OF
EDUCATION**

Ref: 2/2/2 Enq: MC Makola PhD, Tel No: 015 290 9448 .E-mail: MakolaMC@edu.limpopo.gov.za

Mapaya MM
University of Limpopo
Private bag x1106
SOVENGA
0727

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH

1. The above bears reference.
2. The Department wishes to inform you that your request to conduct research has been approved. Proposed research topic:

"FACTORS ASSOCIATED TO OVERWEIGHT AND OBESITY AMONG ADOLESCENTS AT DENDRON HIGH SCHOOL, LIMPOPO PROVINCE, SOUTH AFRICA."
3. The following conditions should be considered:
 - 3.1 The research should not have any financial implications for Limpopo Department of Education.
 - 3.2 Arrangements should be made with the Circuit Office and the schools concerned.
 - 3.3 The conduct of research should not anyhow disrupt the academic programs at the schools.
 - 3.4 The research should not be conducted during the time of Examinations especially the fourth term.
 - 3.5 During the study, applicable research ethics should be adhered to; in particular the principle of voluntary participation (the people involved should be respected).
 - 3.6 Upon completion of research study, the researcher shall share the final product of the research with the Department.

REQUEST FOR PERMISSION TO CONDUCT RESEARCH: MAPAYA MM
CONFIDENTIAL

Cnr. 113 Biccard & 24 Excelsior Street, POLOKWANE, 0700, Private Bag X9489, POLOKWANE, 0700
Tel: 015 290 7600, Fax: 015 297 6920/4220/4494

The heartland of southern Africa - development is about people!

4. Furthermore, you are expected to produce this letter at Schools/ Offices where you intend conducting your research as an evidence that you are permitted to conduct the research.
5. The department appreciates the contribution that you wish to make and wishes you success in your investigation.

Best wishes.



Mutheiwana NB
Acting Head of Department.

26/09/2016
Date

ANNEXURE G



To: Department of education

Dear Sir

I am Mapaya Mercy studying masters of public health in university of Limpopo conducting research and my topic is factors associated to overweight and obesity among adolescents at Dendron High School Limpopo Province, my supervisor is DR Ramalivhana N.J and co-supervisor is Prof Skaal. Phala High School chosen as a piloting school.

Strict confidentiality will be adhered to, no names of learners will be written in the questionnaire. No personal information will be disclosed. I consider the research project worthwhile and of benefit to the learners. In order to gather information I am going to measure learner's body weight and height. No physical harm to student. The research will not disturb any teaching time. Together with my supervisor and co-supervisor will be happy if you can allow us to conduct the study in the school.

Regards

Mapaya Mercy

Annexure F: Demographic information



Demographic information

1. Learner code -----
2. Interview date-----
3. Age -----
4. Sex -----
5. School -----
6. Grade -----
7. Weight -----
8. Height -----

A. Nutrition Questionnaire:

1. What type of bread do you usually eat:

White bread whole wheat Low GI bread

Brown bread Don't eat bread other -----

2. Which of these do you spread on your bread

Brick margarine tub margarine

Don't use any fat spread

If you use margarine, what is it made from :

sunflower oil Canola oil olive oil Avocado oil other -----

3. If you eat breakfast cereal, what type:

high fiber (e.g. All Bran) unsweetened (e. g. Corn Flakes)

Sweetened (e.g. Crunch) I don't eat breakfast others-----

4. What other breakfast meal do you eat

Fried eggs boiled eggs Meats (bacon, fish, and sausage)
chips

others -----

5. Do you take

Multi-vitamin pill yes no

Do you take a separate iron pill yes No

Do you take a separate fluoride supplement yes No

If yes to any of the above pills, how often:

Every day 4-6 times a week 1-3 times a week Less than one
time a

Week

6. Do you eat fried food at home:

No yes

If yes, how often

Every day 4–6 times a week 1–3 times a week Less than one
time a
week

If yes, what type of fat do you use to fry at home:

Butter margarin sunflower oil canola oil
olive oil Holsum

7. Are homemade cookies, cake or pies baked at your home:

No yes

If yes, how often do you eat home-baked cookies, cake or pies?

Every day 4–6 times a week 1–3 times a week less than once a week
Never

If yes, what type of fat do you use to bake at home: (you can tick more than 1 block)

Butter margarin sunflower oil canola oil olive oil

Others (specify) -----

If you have money at school where do you buy food/snack?

Tuck shop street vendors other (specify)

If you buy which food /snack? fat cake sephatlo other (specify)

B: What Have You Been Eating Lately?

1. During the past week, how often did you eat or drink what is listed below

	Never	Once a week	2 – 3 times/week	4 – 6 times/week	Everyday
Milk					
Hot chocolate					
Cheese, plain or in sandwiches					
Yogurt					
Ice cream (cones, sandwiches,)					
Pudding					

2. During the past week, how often did you eat a serving of each of the foods listed here?"
tick only one for each food

	Never	Once a week	2 – 3 times/week	4 – 6 times/week	Everyday
Beans (baked, chili, or other)					
Rice					
Spaghetti or other pasta					
Pizza					
Pap					
Macaroni and cheese					
Hot dogs					
Sausage					
Hamburger					
Tuna salad					
Fried fish, fish fingers					
Other fish					
Cold cuts (polony, ham, salami)					
Fried chicken, chicken nuggets					
Other chicken or turkey					
Pork or ham					
Roast beef or steak, lamb					
Liver					
Mala Mogodu					
Peanut butter					
Bread (slice) toast, roll, or pita					

Which fast food shops are available within your community? (tick all the applicable options and give the number)

Shop	Yes	No
KFC; chicken licken, other fried chicken outlets		
McDonalds		
Wimpy		
Debonair's; Scooter's, Roman's pizza		
Nando's		
Pie shop (or similar pie shops)		
Steers		
Food stands/Street vendors (vetkoek, hotdogs)		
Cooldrink vendor		
Others (specify		

Oja dijo tša kapela tše dife gaka?

Shop	Once /week	2-3 times a week	3-4 times a week	5 – 6 times	everyday
KFC; chicken licken, fried chicken					
Burgers					
Chips					
Pizza					
Nando's grilled chicken					
Pies, hotdogs					
Spareribs					
Fried Fish & Chips					
vetkoek,					
Cooldrink (coke, Fanta)					
Juice					
Others (specify)					



Boitsibiso bja go bapatsa

9. Moithuti khoutu -----
10. Letsatsi la go hlahlobela-----
11. mengwaga -----
12. bong -----
13. Sekolo -----
14. mphato -----
15. boima bja mmele -----
16. botelele bja mmele -----
17. BMI-----

Translation: A. phepo la diputsiso:

7. ke mofuta ofe wa borotho wo o go jago:

borotho bjo b[] koro e[] tsetsego bo[] bja go bat lase ka GI

Borotho bjop[] o ga ke je bo[] tse dingwe-----

8. O tlotsa eng borothong

Setena sa mats[] a ka[] ga setshelo

Ga ke tlotsa makhura []

: matsarine a dirilwe ka eng?

Oil ya senob[] ([] oil [] oll ya mohlare[] Avocado oil
tsedingwe -----

9. Ge oja dijo tsa mesong: ke tse dife:

faeba ya kogodimo (eg. A[]) go hloka swekere (eg. corn Flakes)

tse swekere (e.g. Crunch) [] ga ke je dijo tsa g[] tsedingwe-----

10. Ke dijo dife tsa goseeng tse dingwe o dijago

mae a go a[] ka makhura [] mae a go apewa ka meetse [] nama []
nama ya kolobe, hlapa, and disoseje) ditshephese
tsedingwe -----

11. O hwetsa

dipilise tsa vitamine ee [] aowa []

o hwetsa pilisi tse aroganego tsa iron [] [] aowa

disaplemente tsa fluoride tsa go tlatsisa [] ee [] aowa

ge o tseya dipilisi : o tseya gaka:

tsatsi ka tsa [] 4-6 ka beke [] 1-3 ka beke [] go sefete ga tee ka
beke

[]

12. O ja dijo tsa go apewa ka makhura a mantsi:

aowa eng

ge o eja :ga kae

tsatsi ka ts 4-6 ka beke 1-3 ka beke go sefete ga tee ka
beke

O gadika ka eng dijo:

Potoro matsarin sonob b canola d
olive oil Holsum

7. o paka dikuku ka gae?

aowa ee

geo di ja, odija ga kae ?

tsatsi ka ts 4-6 ka beke 1-3 ka beke sefete ga tee ka beke
ga ke je

ge le paka dikuku le somisa makhura afe ka gae: (o ka swaya go feta gatee)

potoro matsarin sonobolo l car l d il
tsedingwe -----

Ge ona le tshetele o reka kae dijo/seneke?

Tene lebenkele barekisi baseterateng

Ge oreka o reka dijo dife?

Makwinya _____ sephatlo _____ tse dingwe (hlalosa) _____

B: o jele engmorago ga nako?

1. Oja ga kae dijo tse dinwadilwego

	Ga keje	Gatee mo bekeng	2 – 3 mo be keng	4 – 6 mo bekeng	Tsatsi ka tsatsi
Maswi					
tshokholete					
tsheese					
yoghurt					
Ice cream					
pudding					

2. Ka nako e feteleng, ojele dijo tse kana kang?

Swaya ye tee

	Never	Ga tee ka beke	2 – 3 ka beke	4 – 6 ka beke	Tsatsi ka tsatsi
dinawa					
Rice					
makaroni					
Pizza					
bogobe					
Makaroni le tsheese					
Hot dogs					
Sausage					
Hamburger					
Tuna					
hlapi ya go gadikiwa					
Hlapi tse dingwe					
poloni					
Kgogo ya gogadikwa					
Kgogo tse dingwe					
kolobe					
Kgomo ya go rostiwa					
Di betana					
Mala Mogodu					
Peanut butter					
borotho					

Ke mabenkele afe ago rekisa dijo tsa ka pela mo motseng wa geno

lebenkele	eng	aowa
KFC;		
McDonalds		
Wimpy		
Debonair's; Scooter's, Roman's pizza		
Nando's		
Pie shop (or similar pie shops)		
Steers		
Food stands/Street vendors (makwinya hotdogs)		
Cooldrink vendor		
tsedingwe		

O reka kae dijo tsa ka pela, lebenkele ? ga kae

lebenkele	Once ka beke	2-3 ka beke	3-4 ka beke	5 – 6	Tsatsi ka tsatsi
KFC;					
Burgers					
ditshepese					
Pizza					
Nando's					
Pies, hotdogs					
Spareribs					
Hlapi ya go gadikiwa le di tshepese					
makwinya					
senotsedidi					
Juice					
tsedingwe					

Gant chart indicate when to do particular activity.

December 2015	March2016	April2016	May2016	July2016	September2016
Submit proposal			✓		
Submit letter of request to perform research project to department of education,				✓	
Submit letter of request to perform research project to district office				✓	
Submit letter of request to perform research project to principal				✓	
Distribution of consent form to school				✓	
piloting				✓	
Collection of data				✓	
Data analysis				✓	
Discussion of result					✓

Submit dissertation	mini					✓
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