# THE DETERMINANTS OF OBESITY AMONG STUDENTS OF THE UNIVERSITY OF VENDA, LIMPOPO PROVINCE, OF SOUTH AFRICA

By

Aghanenu Godfrey Chukwudi

Student number: 11614206

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Master of Public Health (MPH)

Department of Public Health

School of Health Sciences

University of Venda

Supervisor: Dr Tshitangano T.G

Co-Supervisor: Ms Mbhatsane V

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## DECLARATION OF OWN WORK

I, **Aghanenu GC**, of Student No. 11614206, hereby declare that this mini-dissertation titled: "The determinants of obesity among students of the University of Venda, Limpopo Province, of South Africa" submitted to the University of Venda, School of Health Sciences, Higher Degree Committee has not been submitted before for any degree or examination at this or any other Institute; and that it is my own work in design and execution and that all sources used have been dully acknowledged.

Aghanenu Godfrey Chukwudi

22-03-2016

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## DEDICATION

This work is dedicated to my beloved wife, Mrs Aghanenu Josephine Delight and my three daughters, Amazing-Grace, Goodness and Delight Aghanenu.



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## ORGANIZATION OF THE DISSERTATION

This mini dissertation consists of six chapters. Chapter 1 is the introduction and background of the study. Chapter 2 is literature review while chapter 3 covers the methodology and methods used in the study. Chapter 4 is the interpretation of results; chapter 5 provides the discussions of the results and chapter 6 is the conclusions and recommendations.



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## LIST OF ACRONYMS

| | |
|---|---|
| BMI | Body Mass Index |
| CCHS | Canadian Community Health Survey |
| CDC | Centre for Disease Control |
| H | Height |
| g | Grams |
| $Kg/m^2$ | Kilograms per meter square |
| Kg | Kilograms |
| MVPA | Moderate to Vigorous Physical Activity |
| NCDs | Non-Communicable Diseases |
| SANHANES | South African National Health and Nutrition Examination Survey |
| SASSO | South African Society for the Study of Obesity guideline |
| SES | Socio-Economic Status |
| WC | Waist Circumference |
| WHR | Waist to Hip Ratio |
| WHO | World Health Organisation |
| W | Weight |
| < | Less than |
| ≤ | Less than or equal to |
| > | Greater than |



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## ABSTRACT

**Purpose:** The purpose of the study was to describe the determinants of obesity among students of the University of Venda.

**Methodology:** The design of the study was a quantitative correlational survey. The instrument for data collection was a questionnaire that was hand delivered to all participants. A total of 338 students (155 male and 183 female) was selected to constitute the sample size. These were registered students residing at the university hostels. The halls of residence were divided into clusters; simple random sampling and systematic sampling methods was used to select the rooms from which participants were chosen. The data was analysed using Statistical Package for Social Science (SPSS), version 22. Descriptive analyses were performed to show frequency distributions of socio-demographic and other variables that determined obesity among the sampled population. These were summarised in the form of tables and figures. Chi–square test was used to compare the relationship between obesity and socio-demographic; dietary and environmental variables among students.

**Results:** Overweight and obesity is prevalent among student population with 20% of the participants being overweight and 9.5% obese. Students' eating practices included low intakes of fruits and vegetables, high consumption of refined carbohydrates, fast-foods/snacks food/processed foods and fried foods; thus the eating practice can be seen as unhealthy. Participants engaged in physical activities, however, they are inconsistent in engaging in physical activities. Moreover, there was statistical significant difference in BMI between male and female gender with female (66%) being more obese than male (34%). Overweight and obesity was more prevalent within age 20-25 years while obesity class I and II indicating higher risks were found in the higher age bracket (31-35), therefore in terms of socio-demographic variable this study found gender and age of participants as important factor of overweight and obesity. Students eat two meals a day instead of three. More students eat breakfast in their rooms as compared to the student cafeteria. The frequency of eating breakfast is 2-3 times a week and not daily as expected.

**Conclusion and Recommendations:** This study recommendation is that regular nutrition education campaign be carried out in the university in order to motivate more healthy food choices such as daily consumption of balanced diets, fruits and vegetables as well eating of breakfast. This study also recommends a daily Moderate to Vigorous Physical Activities (MVPA) as a lifestyle among student population.

**Key words:** Obesity, Overweight, Body Mass Index, Students, South Africa



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# CHAPTER 1
# INTRODUCTION

## 1.1 Introduction

This section gives an overview of the problem to which the researcher is interested in finding solutions. The problem is obesity, and the researcher is interested in identifying the status of obesity and its determinants among the University of Venda students. The chapter discusses, among other things, the background to the study which is a broad perspective of the global "epidemic" of obesity; it stated the problem and the rationale of the study. The chapter also explained the purpose, objectives and significance of the study, as well as the conceptual and operational definitions of terms and concepts used by the researcher in this study.

## 1.2 Background to the study

Obesity is viewed as serious public health issue; it has been recognised as a global epidemic by the World Health Organisation (WHO, 1998). Obesity results from improper energy balance leading to an increased store of energy, mainly fat in the body (Michael, 2013). Body Mass Index (BMI) is one of the most common methods of measuring the weight status and obesity (Adderley, 2007). BMI measure the weight (W) in kilograms (kg) divided by height in meters$^2$ ($H^2$). According to WHO (2003), the BMI for adult population should be within the range 21-23kg/m$^2$ while the goal for individuals should be to maintain BMI in the range 18.5-24.9kg/m$^2$. WHO (2003), further explains that an adult is underweight if BMI is < 18.5 and overweight if BMI is ≥ 25.0. Within the range of 25.0 and 29.9 is pre-obese while obese class1 is BMI 30.0 – 34.9, class11is 35.0-39.9 and class111 is ≥ 40.0, WHO (2003).

Waist Circumference (WC) is another indicator for obesity status. WC helps to identify those who are overweight and are at an increased risk of obesity- related complication. According to Hammond (2004), the ideal WC of less than 94cm and less than 80 respectively for men and women is considered normal. However, Men with WC of between 94 and 102cm indicates an excess abdominal fat and consequently at high risk of obesity related conditions while for women WC of between 80 and 88 are considered excess abdominal fat even though they may have normal BMI status.

Waist-Hip-Ratio (WHR) as an indicator shows the proportion of body fat stored in waist to the fat stored in hips and buttocks. According to Barasi (2003), if the WHR is ≥ 0.9 for men and ≥ 0.8 for women, then it indicates central adiposity and increases health risks. Individuals having extra weight around the stomach and chest are at a higher risk of heart



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diseases and diabetes compared to those who carry extra weight around their hips, thighs and buttocks (Lee and Nyeman, 1996).

### 1.3 Global obesity prevalence

There are different classes of obesity prevalence among all age and gender, the world over. According to a study by Vioque, Ramos, Nararret and Garcia-de-la Hera (2009), there is an exponential increase in the number of publications on obesity research over the period 1988 to 2007. This shows the attention being given by public health practitioners to the problem of obesity. Millions of people world -wide are obese and are battling with the challenges of this chronic disease. The prevalence of obesity has been established among all age groups of different countries of the world. Scott, Debie, Lynn, Dewey, Amanda (2013) state that the prevalence of childhood and adolescent obesity in the USA from 2003 to 2010 has tripled, when compared to the rate in 1970. The greatest increase in the prevalence of obesity most, recently, in the USA has been reported in young adults of 18 to 29 years (Adderley, 2007). In other parts of the world, numerous research have confirmed the increasing prevalence rate of overweight and obesity. In Canada, Clinton (2009) establishes that the male population has a higher rate of obesity compared to their female counterparts and the rate for male increases with increasing income level while the rate decreased for higher income female population. Moreover, Clinton (2009) estimates that obesity accounted for approximately 57,000 deaths in Canada between 1985 and 2000.

Goya, Gerald, Whincup, and Walker (2004), examine the prevalence of disease burden and disability in men aged 60 – 79 years and established that in that cohort of British men, over two-third of the population were either overweight (52%) or obese (17%). Carnell, Edwards, Croker, Boniface, and Wardle (2005), in a research to assess the accuracy of parents' perception of 3 -5 years old children's weight status in the United Kingdom (UK), observed a uniform lack of awareness in UK of parents about the weight status of their children, as only 1.9% of overweight parents and 17.1% of parents of obese children described their children as overweight. According to Sevil and Nejla (2012), studies in Turkey have shown that the rate of overweight in preschool children is between 4-13% and the rate of obese children is between 9-27%.

Al Junaibi, Abdullle, Sabri, Hag-ALI, and Nagelkerke (2013), in a research conducted to estimate the prevalence and potential determinant of overweight and obesity among school children and adolescent in Abu Dhabi, United Arab Emirates (UAE), established that the prevalence rate of childhood obesity is high across all age spectrums in the UAE. High prevalence rate of overweight and obesity have also been reported among school children



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and adolescents in China (Amanuel, Jianhua, Xin, Xinmin, and Hong, 2012). Reports of the Ministry of Health and Welfare, National Health and Nutrition survey in Korea, 1998, 1999, 2001 and 2002 , indicated that in Korea, the incidence of overweight increased to 29% in 2001 from 24.3% in 1998 among the male population and to 25.9 from 23.5% among the female population during the same period. In addition, the incidence of obesity increased to 3.96% in 2001 from 1.7% in 1998 among male population and to 3.4 from 3.0% among the female population during the same period (Park, Yoon, Lee, Jo, Lee, Kim, and Shin, 2006).

In Africa, the presence of obesity epidemic is also visible. Muthuri, Francis, Wachira, LeBlance and Sampson (2014) investigated evidence of overweight and obesity transition occurring in school-aged children and adults in different countries of sub-Sahara Africa and observed a trend towards increasing proportion of overweight and obesity among school-aged children and adults. The result revealed that body composition measure was higher among girls than boys and higher in urban living and higher socio-economic status (SES) children compared to rural population or those living in rural communities or lower socio-economic status. However, there is observed persistent underweight among this population as well. A study by Mbochi, Kuria, Kimiywe, Ochale, and Steyn (2012), on the prevalence of obesity in adult women in Nairobi Province, Kenya, found that urbanisation and nutritional transition accounted for the higher prevalence rate of obesity among adult population. Teshome, Singh and Moges (2013) state that there is increasing prevalence rate of obesity among high school adolescents in urban communities of Hawassa, Southern Ethiopia and they go on to describe obesity epidemic as a hidden problem of Hawassa city. The prevalence of obesity in South Africa has progressively increased among the different ethnic groups (Van der Merwe and Pepper, 2005). Hermanus, Catharina and Margaretha (2012) express their concern on, not only the fact that the prevalence of obesity is high among children and adolescents, but also that South Africa faces a double burden of disease where under-nutrition and overweight or obesity are present in the same population, household or even in the same child.

### 1.4 Trends of obesity rates

Many countries of the world are experiencing increasing rates of overweight obesity. In the United States, the rates of overweight and obesity is on the increase. In a study by Ford, Li, Zhao and Tsai (2011) aimed at describing recent trends in obesity and abdominal obesity among adults in the United States, using data from the National Health and Nutrition Examination Survey (NHANES) 1999 – 2008, results showed varying rates. Age-adjusted mean BMI increased from 27.8kg $m^{-2}$ (1999-2000) to 28.5kg $m^{-2}$ (2000-2008); mean waist circumference increased from 99.1cm (1999 -2000) to 100.8cm (2000-2008). The



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prevalence of obesity increased from 26.9% (1999-2000) to 32.0% (2000-2008) and abdominal obesity increased from 37.8% (1999-2000) to 43.7% (2000-2008). According to Ford et al., (2011), these increases were noted among men with the least and most education. In a descriptive study of obesity prevalence in the United States, Eilerman , Herzog , Luce , FACHE, MHSA, BSN,RN; Chao , Walker, Zarzabal , Carnahan and USAF (2014) compared data from the Military Health System (MHS) with data from United States Population 2009 -2012 and in both, the data confirmed increased prevalence of overweight and obesity for non-active adults which stood at 33%.

Canada is also experiencing increased trends of overweight and obesity rates. Tremblay, Katzmarzyk and Willms (2002) studied temporary trends in overweight and obesity in Canada 1981-1996 and established that the prevalence of overweight increased from 48% to 57% among men and from 30% to 35% among women. In men the rate of obesity increased from 9% to 14 %, while in women, it increased from 8% to 12%. Among children between ages 7 and 13, the rate of overweight, among boys, increased from 11% to 33% and for girls the rate increased from 13% to 27%. The obesity rate among boys also increased from 2% to 10% and for girls it increased from 2% to 9%. Tremblay et al.,(2002) concluded that this dramatic increase in the prevalence of both overweight and obesity in Canada is a problem which is particularly pronounced among children.

A study in Israel conducted by Revital, Shuli, Jonathan, Barak and Arnon (2011) to analyse the temporary trends of obesity over time among male adolescents born between 1950 and 1986 showed that, over time, the rates of obesity have risen among all ethnic groups of adolescents from 1.54% to 4.54%. Increasing trends of overweight and obesity are also recorded in China. Ning , Zhan , Yang , Yang , Tu , Gu , Su and Wang (2014), investigated the prevalence of overweight and obesity among rural adults in Northern China between 1991 - 2011 and recorded an increased age-adjusted prevalence of overweight from 24.5% in 1991 to 42.0% in 2011, and the prevalence of obesity increased from 5.7% in 1991 to 19.6% in 2011.

Increasing trends of overweight and obesity is also being experienced in Africa. According to Abubakari, Lauder, Agyemang, Jones, Kirk and Bhopal (2008), there has been increasing trend in the rates of overweight and obesity in West Africa. In a review of twenty-eight studies on the prevalence of overweight and obesity in West Africa between 1966 and 2007, Abubakari et al., (2008) establish that the time trend analyses indicated that the prevalence of overweight and obesity in urban West Africa more than doubled (114%) and that the rate accounted for almost entirely in women. The result also showed that Gambian men recorded



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the lowest BMI range between 20.1 and 25.1 and 21.3-27.0 in women while Cameroonian and Nigerian women recorded the highest BMI.

South Africa also has increasing rates of obesity. In a study that compared data from the South African National Youth Risk Behaviour Survey in 2002 and 2008, Sasiragha, Resnicow,Shamagonam, Itumeleng, Kambaran, Omardlen, Masuka, Ronel, Vaughan and Mbewu (2012) establish rapid increase in overweight and obesity among South African adolescents. Sasiragha et al., (2012) study showes that male adolescent's overweight rate increased from 6.3% in 2002 to 11.0% in 2008. Among females the rate increased from 24.3% in 2002 to 29.0% in 2008. Obesity rate more than doubled among male adolescents from 1.6% in 2002 to 3.3% in 2008. The rate of obesity among the female adolescents also increased from 5.0% to 7.5% during the reviewed period. Sasiragha et al., (2012) also note that the increasing rates of overweight and obesity were significantly higher among urban youths than among rural youths.

### 1.5 Obesity among University Students

Overweight and Obesity are also prevalent amongst University students. In a study by Adderley (2007) conducted to determine the prevalence of overweight and obesity among undergraduate Health Sciences students in the U.S, it was found that 42.8 % of the students were obese and 24.3 per cent were overweight among a student population predominantly (84%) African- American. In Spain, a study by Cutillas, Herrero, Eustaquio, Zamora and Perez-Llamas (2013), to evaluate energy intake, energy profile of the diet and the prevalence of underweight, overweight and obesity in university students, the result showed that the prevalence of overweight was 9.3% in female and 24.2% in male. The study also reported that average energy intake was lower and in relation to energy profile of diet; it was higher in protein and fat and lower in carbohydrates compared to the recommendation in balanced diet.

Zafar, ul Haque, Butt, Mirza, Shafiq, ur Rehman and Ullah (2007), conducted a study in Pakistan to determine the relationship of body mass index and waist to hip ration measurements with hypertension in young adult medical students and the result showed that 20.5 % of the studied population was overweight and 6.2 % were obese. A study by Sakamaki, Toyama, Amamamoto, Liu, and Shinfuku (2005) conducted to assess the Nutrional knowledge, food habits and health attitude of Chinese university students showed that 5.8% of the students are overweight and 1.2% are obese. In a similar study by Karl and Supa (2012) to assess body weight and body image among South African male and female

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students, result showed that almost one-third (30.5%) of the female and 8.7% of the male students were overweight or obese.

### 1.6 Problem Statement

People who are obese are at higher risks of suffering from serious chronic diseases, many of which are life limiting. Not only are obese people affected physically, there are also considerable psychological and social effects associated with being obese (Mulvihill and Quigley, 2003). The researcher observed that many students at the University of Venda look overweight; this might indicate the possibility of high prevalence of obesity among the student population. This led the researcher to believe that, the freedom which students have in deciding to get their foods elsewhere makes it easier for them to eat different kinds of food that might negatively affect their weight status. The researcher also observed that the majority of students that look overweight do not utilise the physical exercise equipment at the gym that are provided by the University or engage in any sporting activity.

This study aimed to determine obesity status and its determinants among students of the University of Venda using Body Mass Index (BMI) and Waist-to- hip ratio (WHR) as measures of weight status.

### 1.7 Rationale of the study

Many literature from South Africa has addressed different aspects of obesity. The majority of these focused on childhood and adult obesity and they have confirmed the increasing prevalence of the obesity epidemic. However, little is known about the obesity epidemic and its determinants among University students in South Africa, particularly students from university of technology like university of Venda. This aspect of research which has been neglected has created a knowledge gap which the researcher was motivated to fill.

### 1.8 Aim of the study

The aim of the study was to describe the determinants of obesity among students of the University of Venda.

### 1.9 Objectives of the study

The following objectives were drawn to answer the research question.

- To determine obesity status of students using Body Mass Index (BMI) and Waist-to-hip ratio (WHR) as measures.
- To examine the socio-demographic factors of obesity among students.



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- To assess the eating practices of students.
- To identify the environment and physical activities students engage in.
- To determine the relationships between body status and socio-demographic variables, eating practices as well as Environment and physical activities variables.

### 1.10 The significance of the study

The study might benefit the University as the findings about the status of obesity and its determinants among students as well as the recommendations made will be useful for decision making and may serve as input into the general health policy of the University of Venda and other universities in South Africa. The findings and recommendations might also be helpful for planning of prevention interventions and strategies that would promote healthy living among students in the Universities. The findings will also contribute to existing body of knowledge about the status of obesity among university students in South Africa since there is a knowledge gap in this area of research. This study will benefit students in general as they might see the recommendations as useful and practise them for good health promotion.

### 1.11 Definitions of concepts

**Obese:** Obesity occurs in an individual whenever there is an improper energy balance leading to an increased store of energy, mainly fat in the body (Michael, 2013). Obesity indicates excessive fat accumulation in adipose tissue (Laquatra, 2004). Obesity occurs if a student's BMI is ≥ 30.0.

**Overweight:** The term "overweight" means excessive body weight in relation to height (Laquatra, 2004).Overweight refers to a student whose BMI is ≥ 25.0 but less than 30.0.

**Body Mass Index (BMI):** Body Mass Index (BMI) was defined as the measure of weight status and obesity, (Adderley, 2007). BMI refers to the relationship between current weight and current height (BMI = kg/m2) (Hammond, 2000). BMI measures the weight (W) in kilograms (kg) over height (H) in meters$^2$ ($H^2$).

**Socio-demographic variables:** This term was defined, operationally, as personal characteristics of participants grouped under gender and age, ethnicity, educational level, place of residence and Socio-Economic Status (SES).

**Eating Practices:** This term was defined, operationally, as dietary behaviour patterns of participants.



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**Environmental and physical activity variables:** This was defined, operationally to include facilities in the environments, physical exercise and activity patterns of participants.



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# CHAPTER 2

# LITERATURE REVIEW

## 2.1 Introduction

In this section the researcher reviewed available literature on obesity, focusing on the determinants of obesity. Obesity is viewed as a serious public health issue and has been recognised as a global epidemic by WHO (1998). In view of this, the researcher looked at socio-demographic, dietary and environmental factors of obesity as well a theoretical framework which explains the multiple faceted factors contributing to weight status of a child which could be carried into adulthood.

## 2.2 Socio-demographic factors of obesity

Socio-demographic factors associated with overweight and obesity are discussed in this section. Factors of interest are gender and age, ethnicity, educational level, place of residence and socio-economic status (SES). These factors are more or less interrelated.

### 2.2.1 Gender and Age

There is high prevalence rate of overweight and obesity in the U.S., however, these rates vary according to gender, age, ethnicity and socio-economic status. Data show higher prevalence of obesity among women and children than men. According to Adderly (2007), more than half of adult U.S. women are overweight with more being obese. Data from the National Health and Nutrition Examination Survey 2007-2010 in the U.S. as reported by Fakhouri , Ogden, Carroll, Kit, and Flegal (2012), show that more than one-third of older adults aged 65 and over were obese, but the prevalence was higher among those aged 65-74 (40.8%) represented by over 8 million adults compared with those aged 75 and over (27.8%) represented by over 5million adults in both men and women. The American Heart Foundation report of obesity as presented by Go et al., (2013) state that among American adults aged 20 and older, there is a high prevalence of overweight and obesity. From this report it was found that 154.7 million are either overweight or obese (79.9 million men and 74.8 million women). Of these, 78.4 million are obese (36.8million men and 41.6million women).

Cavaco, Eriksson and Skalli (2014), in a study of the life cycle development of obesity and its determinants in six European countries, conclude that women gain weight faster than men and that this gender –specific difference in age-weight profile suggests that female and male may react differently to weight determinants. According to the Health and Social Care Information Centre (2012) a report of the Health Survey for England published in 2010 showed that the proportion of adults with normal BMI decreased between 1993 and 2010 in



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both male and female population, with a decrease from 41.0% to 30.9% among men and from 49.5% to 40.4% among women. Furthermore, during the same period, the prevalence of obesity increased for both male and female (from 13.2% in 1993 to 26.2% in 2010) and (from 16.4% to 26.1%) respectively.

In Australia, report from the obesity fact sheet of the National Heart Foundation of Australia (2012) showed that more than one in four adults (aged 18 and more) Australians were obese in 2011/2012 and when compared to 1995, the proportion of Australians who are obese in 2012 has increased by 47%.

The prevalence of obesity follows the same pattern in Korea, this is supported by Park et al., (2006), who found that women have more of a burden of diseases associated with overweight and obesity than men. However, when considering school children, the prevalence is higher among male children than female. Amanuel et al., (2012) conducted a study to determine the prevalence of overweight and obesity, and associated risk factors among school children and adolescents (aged between 7 and 18 years) in Tianjin, China. The results showed that the prevalence of overweight and obesity was 12.5% and 15.7% respectively but that there was a higher prevalence among male students than female. Similarly, a study by Al Junaibi et al., (2012) on childhood obesity in Abu Dhabi, UAE, suggested that overweight was significantly higher among females (16.7%) than males (11.6%), obesity, although not significantly so, was higher in males (21.4%) than females (18.1%).

In Africa, available literature has also confirmed that there are higher overweight and obesity rates among the female gender than male. According Michael (2013), the rate of obesity is about 10%, in West Africa, but the rate is three (3) times higher among women than men. Lancet study conducted by the Institute for Health Metrics and Evaluation at the University of Washington in 2013 analysed data between 1980 and 2013 from 188 countries, found that South Africa has the highest rate of overweight and obesity as compared to other neighbouring sub-Sahara African countries. The study showed that of the 70% of overweight South African women, 42% are obese as compared to Namibia (19.8%), Lesotho (24.1%) and Zimbabwe (33.5%). The study also showed that Eritrea only has 4.7% of obese women and Ethiopia with the least rate (1.8%).

In South Africa, the prevalence of obesity differs between male and female, with more women reported to be obese than men. A recent study in South Africa established that, seven (7) out of 10 women and four (4) out of 10 men in South Africa have significantly more body fat than what is deemed healthy and that of the 70% of overweight South African women, 42% are obese (Murray C., 2014). Findings from an extensive health and nutrition



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study conducted by the Human Sciences Research Council and Medical Research Council on South Africa in 2012 as reported by Sipokazi (2013) revealed that most women were overweight or obese, with almost 60 % in the obesity category. The report further stated that among the 12000 participants who were physically examined almost 80% of the women had a waist circumference of more than the 80cm that is regarded as the cut-off point for obesity. Six out of 10 had waist circumferences greater that 88cm putting them at even greater risk of diabetes and cardiovascular diseases. According to Hermanus, Catharina, Margaretha (2012), South Africa has been witnessing increasing rates of overweight and obesity among children and adolescents since 1990, although, the prevalence varies with age, gender and population group.

### 2.2.2 Ethnicity

Studies have shown that the rate of obesity and overweight also vary among different ethnic groups. Adderly (2007), conducted a study to determine the prevalence of overweight and obesity among undergraduate health sciences students in the U.S. It was found that over 40% of African-American women was overweight or obese (42.8%); 24.3% were classified as overweight with a BMI from 25.1 to 29.6 and 18.4% were classified as obese with a BMI over 30, confirming the fact that African-Americans women suffer from obesity at an alarming disproportionate rate when compared to women of other races. Tala et al., (2012) concur with other studies that the prevalence of obesity in the U.S. differs by race and ethnicity, however, this difference is only significant among women aged 65-74 (53.9%); the prevalence rate is not significant among men from different race and ethnicity.

According to Go , Mozaffarian , Roger , Benjamin, Berry , Borden , Bravata , Dai , Ford , Fox , Franco , Fullerton , Gillespie , Hailpern , Heit , Howard , Huffman , Kissela , Kittner , Lackland , Lichtman , Lisabeth , Magid , Marcus , Marelli , Matchar , McGuire , Mohler , Moy , Mussolino , Nichol , Paynter , Schreiner , Sorlie , Stein , Turan , Virani , Wong , Woo , Turner (2013), there is a high prevalence of overweight and obese people among adult Americans aged 20 along in terms of race/ethnicity lines. For non-Hispanic whites, 73.1% of men and 60.2% of women are overweight or obese. For non-Hispanic blacks 68% of men and 79.9% of women are overweight or obese. For Mexican-Americans, 81.3% of men and 78.2% of women are overweight or obese. Furthermore, the rate of obesity was reported as high for non-Hispanic whites, with 33.8% of men and 32.5% of women being obese. For non-Hispanic blacks 37.9% of men and 53.9% of women are obese. For Mexican-Americans, 36.0% of men and 44.8% of women are obese.

In Canada the aboriginals are more obese than the Caucasian group as noted by WHO (2005). In Kenya, the prevalence of overweight and obesity is also differentiated according to



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different ethnicity; wherein the prevalence of overweight and obesity is said to be higher among the Maasai people, (Michael, 2013). Likewise, Van Der Merwe and Pepper indicated that the prevalence of obesity in South Africa has progressively increased along the ethnic lines. Michael (2013) showed that of a sample of 7786 women aged 19-95 years old in South Africa, Black women had the highest prevalence of overweight and obesity (58.5%), followed by women of mixed ancestry (52%), White women (49.2%) and Indian women (42.8%). Furthermore, he noted that the ethnic differences in body fat distribution (central obesity) may influence the morbidity pattern and health risks associated with obesity in South Africa and feared that overweight and obesity is completely underestimated in South Africa (Michael, 2013).

### 2.2.3 Educational level

The amount of information available to an individual affects his/her level of knowledge. Health education plays a vital role in providing information which promotes healthy lifestyles. An individual's level of knowledge about obesity has a direct impact on his or her lifestyle and eating pattern. Cavaco et al., (2014) observe that the level of education of an individual or his/her mother contributes to differing rates of obesity among genders. Cavaco et al., (2014) establish that the gender difference in the rates of obesity increases faster over the age for low- educated individuals and/or for individuals whose mother is low-educated that it does for the higher educated and /or for the offspring of higher educated mothers. Lubell (2012) state that there is a relationship between the rate of obesity and an individual's level of education.

Obesity rate has been found to be higher among individuals with low level of education than those with higher education level. More educated people who earn more money have lower rates of chronic diseases including obesity, compare to people with lower education and income level (Centre for Disease Control CDC United States, Health Report, 2011). In a study of four OECD countries (Australia, Canada, England and Korea) to explore the relationship between education and obesity, Devaux, Marion, Sassi, Jody, Cecchini and Borgonovi (2011) observe a lower obesity rate among some social group and they attributed the difference to education. According to Devaux et al., (2011), a better education appears to be associated with lower likelihood of obesity, especially among educated women.

In the UK, report from the Health Survey of England Adult Obesity, 2006-2010, show that male and female who have fewer qualifications are more likely to be obese with 31.7% obesity rate, but when compared with adults who have either NVQ4-5 or a Degree, the rate of obesity is lower at 18.8 %. Part of the reason for this is that low levels of educational



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attainment are linked to levels of inequality and deprivation. In a study, conducted to explore the relationship between education and obesity, Devaux et al., (2011), identify three factors which could explain the positive effect of education on obesity:(a) greater access to health-related information and improved ability to handle such information; (b) clearer perception of the risks associated with lifestyle choices; and, (c) improved self-control and consistency of preferences over time.

### 2.2.4 Place of residence

The place of residence is a factor in obesity. Several studies have indicated variations in the prevalence rates between rural and urban dwellers. According to Van der Merwe and Pepper (2005), there has been an increasing prevalence of obesity in most African countries especially in individuals living in urban areas. Christensen et al., (2008) report that the prevalence of overweight and obesity was higher in Kenyan urban (39.8%) as compared to the rural population studied (15.8%). South Africa is divided into nine provinces with vast demographic and socio-economic differences. With a total population of 48.5 million, the Blacks/African are the highest population (79 %), Whites (9.5%), Coloured/ Mixed race (9%) and Indian/Asian (2.6%). Sixty percent of South African population live in the rural areas. The country is in a rural-to-urban transition phase and it is known that populations in a transition towards urbanisation may experience an increase in overweight and obesity (Wang, Popkin , Zhai, 1998).

The eating practices of individuals who live in the rural area may be different from those who live in urban areas and this factor is important when considering determinants of obesity. Available evidences in South Africa have confirmed higher prevalence of obesity among individuals living in urban areas than in those who live in the rural areas. Comparing data from South African youth risk behaviour survey in 2002 and 2008, Sasiragha, Resnicow, Shamagonam , Itumeleng , Kambaran , Omardien , Masuka , Sewpaul , Vaughan and Mbewu (2012) observed that the rate of obesity was significantly higher among urban youths than among rural youths. This pattern is also observed among women. The high prevalence of obesity among black South African women who live in urban areas has been attributed to the high fat and energy intakes by urban women (Kruger, Venter, Vorster, and Margetts, 2002). Steyn (2000) attributes the higher prevalence of obesity among black South African women living in urban areas to high consumption of sugar and fewer legumes than rural women.

### 2.2.5 Socio-economic status

Socio-economic status (SES) relates to the differences between groups of people caused mainly by their financial situation. There are obese people among all income levels; this is



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contrary to the old belief that obesity is a sickness of the rich. According to Kaester (2007), in the USA the highest rates of obesity have been observed among black women rather than in white women. However, considering the financial situations as a factor of obesity, Kaester (2007), state that while there was a substantial income differences between black and white the rate of obesity was the same for both. Kaester (2007), therefore concluded that higher income does not seem to project against obesity. Increasing SES rather is associated with greater risk of obesity, Sasiragha et al., (2012). This has been confirmed in a study of the prevalence and associated factors of overweight and obesity among high school adolescents in urban communities of Hawassa, southern Ethiopia by Teshome et al., (2013). It was observed in that study that the rate of obesity is higher among adolescents whose parents have higher socio-economic status than in adolescents coming from a lower socio-economic background. Cavaco et al., (2014), established that parents' SES predicts obesity in the early adulthood; however this relationship later weakens and is replaced by an individual's own SES as adult which is stronger in predicting obesity in the later stages of the life cycle. Cavaco et al., (2014), observed that an individual's SES is strongly correlated among with women's probability to be obese, and this correlation increases with the women's age.

### 2.3 Eating Practices

Eating behaviour is an important factor in obesity. Our health is affected by what we eat, therefore, it is important that we consider our health as we eat. In 2012, the South African National Health and Nutrition Examination Survey (SANHANES) report show poor or unhealthy eating practices and lack of basic nutritional knowledge was common in South Africa as: 39.7% participants in the survey consumed a diet low in dietary diversity indicative of a diet of poor nutritional quality. Almost one out of five participants consumed a diet with a high fat score (18.3%) and high sugar score (19.7%), and one out of four consumed a diet with a low fruit and vegetable score (25.6%).

The dietary intake of participants in SANHANES-1 reflects the picture of a country in the nutrition transition and urbanisation. On average, South African adults had a medium (5.26) general nutritional knowledge score out of a total of 9 points, with only one in five (22.6%) achieving a high score, the majority (62.9%) achieving a medium score and 14.5% achieving low scores. Nearly two thirds of adult females and males (62.1% and 65.8%, respectively) believed they drink and eat healthily, so there is no need for them to make changes in their diet. Almost half (48.0%) of adult South Africans reported that they eat outside the home, and 28.7% reporting doing so monthly, 20.3% more than once a month, and 28.3%weekly.



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The majority of females (76.4%) did the grocery shopping in the household. The price of food was the major determinant (64.5%) in relation to purchasing food, followed by taste (17.5%) with only approximately one in seven women considering health aspects (14.3%) when buying food. In a study on selected risk factors related to the emergence of non-communicable diseases (NCDs) in the black population of South Africa, Bourn, Lambert and Krisela (2002), established a shift in dietary intake which was occurring at an alarming rate among the black population. Bourn, Lambert and Stern (2002), confirmed an increase in fat intake and a decrease in carbohydrate intake. A shift towards Western diets was also confirmed among the rural dwellers.

Many students are obese due to eating practices such as consumption of energy dense food that is high in fat and sugar and low in vitamins. These types of food are readily available at the University cafeteria and restaurants. Unhealthy eating practices can increase the chances of obesity and its consequent many dangers such as high Blood Pressure(BP), high blood cholesterol, type 2 Diabetes, Mellitus, Insulin resistance, coronary heart disease, stroke and bladder control problems. New behaviours and lifestyles patterns formed during University life, (Takomana, and Kalimbira, 2012) are most likely to be carried into adulthood. Eating behaviours of University students are influenced by their peers, media and also the fact that fast food are always available, makes it easier for students to eat different kinds of food (Dalton, 2013). Pedersen, and Ketcham (2009), attribute the tendency of University students eating out instead of preparing their own meals, to limited choice of food types available, cost of food, convenience of eating out and also the academic timetable which students have to adhere to. Students of the University have access to a large volume of information, which includes health promotion and wellness or lifestyle information that can improve the health of students.

Students studying-Health related courses should have better understanding of the need for healthy lifestyles by nature of their training. According to Van den Berg et al., (2012), the training of health professionals at colleges and universities offer the opportunity to develop sound knowledge, attitudes and practices regarding nutrition and weight. It is based on this view that a study was conducted to assess the weight status, eating practices and nutritional knowledge among nursing students at the University of Fort Hare, Eastern Cape, South Africa. In this study, Van der Merwe, and Pepper (2012), establish that there is a high prevalence of obesity, poor eating habit and inadequate knowledge on key nutritional issues was showed by these students and may impact negatively on their efficacy as health ambassadors to the public.



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## 2.4 Environmental and Physical Activities

### 2.4.1 The environments

The environment is our surroundings or the nature around us. The environment could also be considered as the conditions that we live or work in and the way that they influence how we feel or how effectively we can work (Cambridge Advanced Learners' Dictionary, 3rd edition). We are influenced by our environment to such an extent that our health could be affected. In a study which aimed to identify and investigate specific environmental and individual determinants of obesity among young adolescents (The ENDORSE study), Klazine (2008), found that many adolescents identified seeing other people eating or drinking and smelling fast food as factors that influenced their eating and drinking patterns.

Klazine (2008), describes the availability of sport facilities, bicycle, soft drinks, television at home and availability of sidewalks and cycle lanes as part of the physical environment; having family breakfast and dinner, parenting style and practices area classified as socio-cultural environment, while income and the amount that can be spent in one week as economic environment. These environmental influences are important factors of obesity. In a study of pattern and determinants of overweight and obesity, Basu, Das, Dhār, Datta, Chattopaddhyay, Bagchi and Pal (2014), describe an important association among environmental factors, genetic predisposition and human behaviour as causes of obesity. Prince (2009) explains that the environment has the tendency to influence our body weight through facilitation of behaviours that enables weight gain such as increased calorie consumption and decreased physical activity. Mujahid , Diez , Shen , Gowda , Sanchez , Shea , Jacobs , Jackson (2008), observe lower rates of obesity in environments where there are increased access to fruits and vegetables through neighbourhood grocery stores and farmers' markets.

### 2.4.2 Physical activity

According to a report of the Public Health Agency of Canada (2014), of all the factors considered and measured through the Canadian Community Health Survey (CCHS), being inactive emerged as showing the strongest association with obesity, for both men and women. The report further establishes that an estimated 405,000 cases of male obesity and 646,000 cases of female obesity could potentially be altered or averted if inactive population became active. It is usually encouraged that those who are overweight /obese should increase their level of physical activity as this will increase the level of their energy expenditure and in the long run reduce their excess body fats; but on the contrary, Cheng and Mao (2006) found that in Canada, there is higher prevalence of physical inactivity among obese Canadian men and women.



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Evidence is very strong that a large number of South Africans follow a sedentary lifestyle (Steyn, 2007). Physical inactivity has negative health consequences. According to Joubert, Norman , Lambert , Groeneward, Bradshaw, Schneider, Bull; and the South African Comparative Risk Assessment Collaborating Group (2000), 20 men and 26 women aged 30 years and above die per day in South Africa due to lack of regular physical activity.



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## 2.5 THEORETICAL FRAMEWORK: ECOLOGICAL SYSTEM THEORY

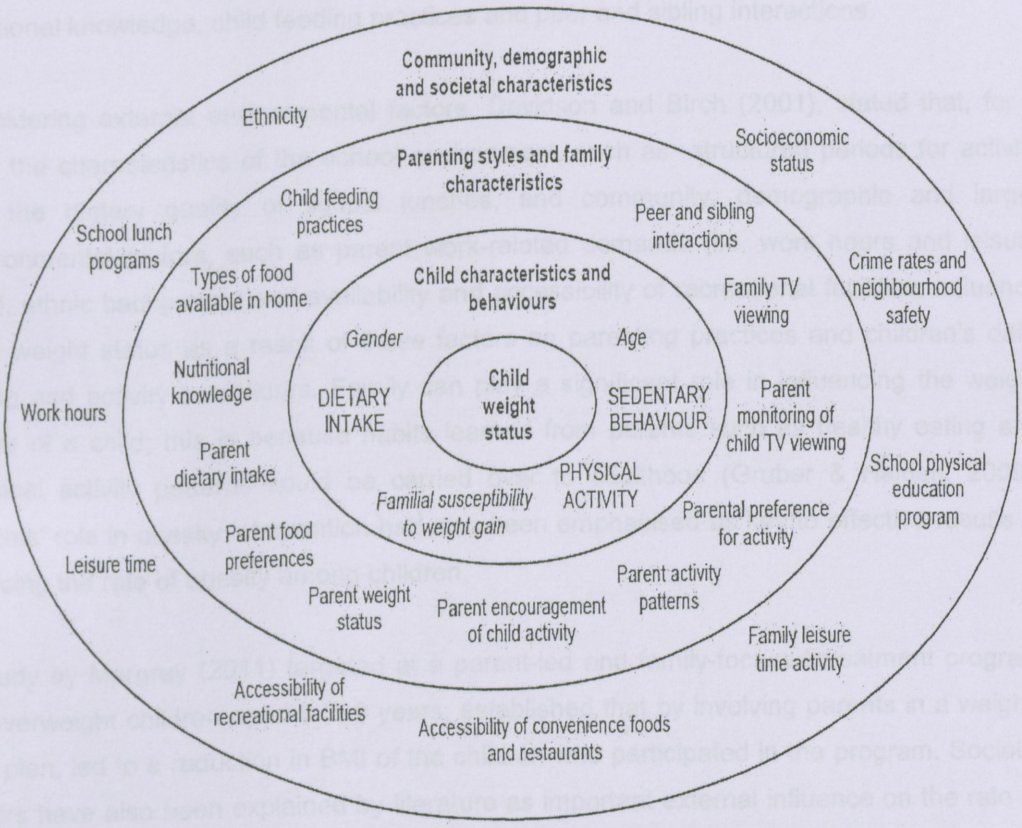



**Figure 2.1 Framework for factors associated with overweight and obesity**

Source: Davison and Birch (2001).

The Ecological System Theory (EST), a model used to explain the predictors of childhood overweight was developed by Davidson and Birch of The Pennsylvania State University, USA. (2001). According to Davidson and Birch (2001), there are complex factors from multiple contexts that interact with each other to place a child at risk of overweight. Davidson and Birch (2001), used the Ecological System Theory (EST) to conceptualise these multifaceted system as shown in Figure 2.1 and highlighted the importance of considering the context(s) or what they call 'ecological niche', in which a person is located in order to understand the emergence of particular characteristics.

This model predicts that, child behavioural patterns such as dietary intake, physical activity, and sedentary behaviour (such as TV viewing) can place a child at risk of overweight. Davidson and Birch (2001) further explain that the impact of child-risk factors on the development of overweight is moderated by child characteristics including age, gender and



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susceptibility to weight gain. The development of child risk factor is shaped by parenting styles and family characteristics, such as parent's dietary intake and activity patterns, nutritional knowledge, child feeding practices and peer and sibling interactions.

Considering external environmental factors, Davidson and Birch (2001), stated that, for a child the characteristics of the school environment, such as structured periods for activity and the dietary quality of school lunches, and community, demographic and larger environmental factors, such as parent work-related demands (i.e. work hours and leisure time), ethnic background and availability and accessibility of recreational facilities, influence child weight status as a result of these factors on parenting practices and children's daily eating and activity behaviours. Family can play a significant role in influencing the weight status of a child; this is because habits learned from parents such as healthy eating and physical activity patterns could be carried over to adulthood (Gruber & Halden, 2009). Parents' role in obesity intervention had also been emphasised as key to effective results in reducing the rate of obesity among children.

A study by Margrey (2011) targeted at a parent-led and family-focused treatment program for overweight children aged 5 to 9 years, established that by involving parents in a weight-loss plan, led to a reduction in BMI of the children who participated in the program. Societal factors have also been explained by literature as important external influence on the rate of obesity especially when considering physical activity. According to Burdette & Whitaker (2005), if a mother's perceives the neighbourhood to be unsafe, she would most likely prefer her children to always stay indoors and watch television; this sedentary act would over time contribute to higher rates of obesity among these children. Individual factors are necessary considerations in any obesity intervention program; in addition, an effective intervention must consider a child's genetic predisposition.

The researcher finds the Ecological System Theory (EST) relevant for this study because the theory explains the multiple faceted-factors contributing to weight status of a child which could be carried into adulthood.



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# CHAPTER 3
# METHODOLOGY

## 3.1 Introduction

This chapter explain the methodology for this research which include the research design, the setting (geographical area where research was conducted), the sample population and sample size; instrument used for data collection, validity and reliability of the instrument, method used for data collection and analysis as well as the ethical consideration.

## 3.2 The study design

A quantitative correlational survey design was used in this study. In this approach data was obtained from a cross-section of the population, at one point in time. The instrument for data collection was a closed ended questionnaire that was administered to all the participants.

## 3.3 The study setting

The study was conducted at the University of Venda. The University of Venda is a comprehensive, rural based academic institution located in Thohoyandou in Vhembe district of the northern region of Limpopo, South Africa. The institution had a total of 13693 registered students for the 2013 /2014 academic year. The student population is diverse with students from Botswana, Cameroon, DR Congo, Ghana, Kenya, Malawi, Nigeria, Swaziland and Zimbabwe. Students from South Africa form the majority and they are the VhaVenda, the Tsonga, the Sotho/Pedi and Zulu (Students Admission Unit, University of Venda, 2014).

There are eight halls of residence in the Campus. Riverside, F3, F4, F5, Mango Groove, Carousel, Lost City and Bernard Ncube. Three of them accommodating both male and female students while the other five accommodate either male or female students only. Riverside residence is the largest, it comprises of eight blocks (four blocks for male and four blocks for female). F3 and F4 are identical three storey buildings; F3 accommodates male students only while F4 accommodates female students only. Mango Groove accommodates male only while Carousel accommodates female students only. Lost City residence accommodates both male and female students, it comprises of four blocks in two sets of double storey structure. Bernard Ncube is the smallest hall of residence and is exclusively for female students while Prefab residence is for both male and female (Student Affairs Department, University of Venda, 2014).

## 3.4 The study population

The study population were University of Venda students who resided in the campus. In other words, all students residing on campus during the time of data collection were eligible to



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participate in the study. There were 2165 students officially accommodated in the University hostels. A total of 1176 (54.3%) of these students were females while 989 (45.7%) are males as shown in Table 3.1.

**Table 3.1: The Population Frame**

| Residence | Female | Male | Total | Percentage |
|---|---|---|---|---|
| Bernard Ncube | 58 | - | 58 | (2.7%) |
| Carousel | - | 123 | 123 | (5.7%) |
| F3 | - | 369 | 369 | (17.0%) |
| F4 | 372 | - | 372 | (17.2%) |
| F5 | 129 | - | 129 | (6.0%) |
| Lost City | 180 | 180 | 360 | (16.6%) |
| Mango Groove | 124 | - | 124 | (5.7%) |
| Prefabs | 185 | 189 | 374 | (17.3%) |
| Riverside | 128 | 128 | 256 | (11.8%) |
| **Total** | **1176 (54,3%)** | **989 (45,7%)** | **2165** | **(100%)** |

### 3.5 Sample size

For the purpose of this study, a total of 338 students (155 male and 183 female) were selected to constitute the sample size. These were registered students that were residing at the University hostels.

The sample size was calculated using Slovin's formula, where N is the total number of resident students, *n* is the sample size and *e* is accepted level of error. For this study, *e* is 0.05.

$$n = \frac{N}{1 + N(e)^2}$$

$$n = \frac{2165}{1 + 2165(0.05)^2}$$

$$n = \frac{2165}{1 + (2165) \times (0.0025)}$$

$$n = \frac{2165}{1 + 5.41}$$

$$n = \frac{2165}{}$$



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6.41

Sample size (n) = 338

**Table 3. 2 : Sample frame**

| Residence | Female | Male | Total | Percentage |
|---|---|---|---|---|
| Bernard Ncube | 9 | - | 9 | (2.70%) |
| Carousel | - | 19 | 19 | (5.62%) |
| F3 | - | 58 | 58 | (17.16%) |
| F4 | 58 | - | 58 | (17.16%) |
| F5 | 20 | - | 20 | (5.92%) |
| Lost City | 28 | 28 | 56 | (16.57%) |
| Mango Groove | 19 | - | 19 | (5.62%) |
| Prefabs | 29 | 30 | 59 | (17.46%) |
| Riverside | 20 | 20 | 40 | (11.83%) |
| **Total** | **183 (54, 14%)** | **155 (45, 86%)** | **338** | **(100%)** |

### 3.6 Sampling

Sample of students was drawn from each halls of residence. These halls were nine (9) in number. Each residence constituted a proportion of the total population depending on the number of bed spaces available in it. Simple random sampling and systematic sampling methods was used to select the rooms from which participants were chosen. Using the residential log sheets from the office of the hostel superintendent, as shown in Table 3.2, the number of participants (which represents the number of bed spaces) in each residence was drawn based on the proportion of the population in order to achieve a degree of representativeness.

Systematic sampling was used to select students room numbers, the total number of rooms was divided by the sample size to find *K* value = 2165/338. This equals 6.41, so every 6$^{th}$ room was be selected for the study. The room number on each block was written on a sheet of paper and put in a big envelope from which one room was selected at a time; systematic sampling as explained above was then used to select every 6$^{th}$ room. For instance, Benard



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Ncube residence had 58 bed spaces and this forms 2.7% of the total number of bed spaces (sample population) in the University. Therefore Benard Ncube residence comprised 2.7 % of the sample size for the study; this amounted to 9 students. Systematic sampling was used to select the exact rooms that these students were picked from. The same procedure was used with all the residences as shown in Table 3.2 above.

**Inclusion criteria:** The criteria for inclusion in this study were that participant must be a student of the University of Venda and resided in the chosen room irrespective of the level of study and age.

**Exclusion criteria:** Students who are visibly known to be pregnant was excluded from the study.

### 3.7 Data collection tool

A questionnaire was used for data collection. The questionnaire was designed in such a way that it allowed for all relevant data to be collected. The language of the questionnaire was English as the study was conducted in the University environment where the official language is English. The questionnaire had four sections namely, Section A: Anthropometric measurements of Height and Weight (for BMI calculation); waist circumference and waist-to-hip ratio (WHR); which was needed for determining body fat distribution (measure of risk). Section B: Socio-demographic data; Section C: Eating practices data and Section D: environmental and physical activities data.

### 3.8 Data collection procedures

The researcher obtained Ethical clearance (Project No: SHS/15/PH/20/2810) from the Research Ethics Committee of the University of Venda. Data collection commenced on the 2nd of November 2015 and it lasted for 22 days. The researcher introduced himself and the research assistants to the participants, and then explained the purpose of his study. After the students agreed to participate, the researcher provided them with informed consent form (Appendix 4) to sign. The questionnaire was given to those who signed the informed consent form and appointment was made with the students for a convenient time to take the anthropometric data if they were not ready for the measurements to be taken during the first visit. Anthropometric data of the female participants was taken by a female research assistant trained for that purpose. The training included how participants should stand on the



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digital scale and under the Stadiometer, measuring waist and hip as well as reading the anthropometric data.

Participants' weight, height, waist and hip measures were taken twice and average reading was recorded using the anthropometric measurements record sheet (Appendix 5). Height was measured without shoes using a Stadiometer, weight was measured in light clothing using a digital scale (Model: UC-3215 Precision Health Scale) and measuring to the nearest of 0.5kg with the person standing immobile on the weighing machine. The weighing scale was regularly checked and calibrated with known standard weight (1kg of standard weight placed on the scale when the reading is zero to see if the scale reads it as 1kg). This is done at the commencement of each session of the measurement. Waist and Hip circumferences were taken using a Tape measure and measuring to the nearest 0.1cm. The Waist-to- Hip ratio was then calculated in order to determine body fat distribution as a measure of the extent of risk of obesity. Section B of the questionnaire collected socio-demographic data; section C, data relating to student eating practices and section D collected data about the environments and physical activities of participants.

After taking these measurements, participant received an A4 sized envelope so that the completed questionnaire was sealed off and deposited at the security post for collection by the research team. Although the sample size calculated for the study is 338, a total of 372 questionnaires were distributed to include the 10% (34) of students that took part in the pre-test.

### 3.9 Validity and reliability of the research results

#### 3.9.1 Validity

In order to ensure validity, the researcher adapted an existing instruments after extensive literature search on the topic and in due consultation with my supervisors who are experts in the field of public health. The questionnaire was structured in simple English to avoid ambiguity and the participants were allowed time to go through the questionnaire while the researcher was around so as to clear any misunderstanding that might have arisen.

#### 3.9.2 Reliability

The reliability of the questionnaire was ensured using the pre-test method of reliability testing.



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### 3.9.3 Pre-test

Thirty four (10% of the sample population) students were randomly selected on day one of data collection process; the questionnaire was thereafter slightly amended to include few suggestions from students. These set of students that took part in the pre-test were then excluded from the main study. The objective of the pre-test study was to see if the instrument can reliably collect the required data.

### 3.10 Data analysis

The data was analysed using the Statistical Package for Social Science (SPSS), version 22. The questions were coded and entered into SPSS. Descriptive analyses were performed to show frequencies and percentages in order to describe the characteristics of the sample and to determine the status of overweightness and obesity in the sample. Chi–square test was used to compare the relationship between weight status and the determinants of obesity among University of Venda students.

The BMI was interpreted according to the WHO standards shown in Table 3.3. In addition, the waist circumference and Waist to Hip ratio was interpreted in accordance with Table 3.4 and 3.5.

**Table 3.3 BMI classifications**

| BMI categories | |
|---|---|
| **Definition** | **BMI range (kg/m2)** |
| Underweight | < 18.5 |
| Normal Range | 18.5 – 24.9 |
| Overweight | ≥ 25 .0 |
| Pre-obese | 25.0-29.9 |
| Obese | ≥ 30.0 |
| Obese Class I | 30-34.9 |
| Obese Class II | 35.0-39.9 |
| Obese III | ≥ 40 |

**Source:** WHO, http://www.who.int/features/factfiles/obesity/facts/en/



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Table: 3.4: Waist circumference (WC) in men and women associated with increased risk for chronic diseases of lifestyle (SASSO, 2003)

| | Ideal | Increased risk | Substantial risk |
|---|---|---|---|
| Men | <94 cm | 94.0-101.9 cm | ≥102 cm |
| Women | <80 cm | 80.0-87.9 cm | ≥88 cm |

Table: 3.5: Waist –to Hip Ratio (WHR) in men and women (Barasi M.E., 2003, Human Nutrition: A Health Perspective. 2nd E.d London Ox ford University Press Inc.)

| | Ideal | Indicative of central adiposity and Increased risk |
|---|---|---|
| Men | < 0.9 | ≥ 90 |
| Women | < 0.8 | ≥ 80 |

### 3.11 Dissemination of study findings

Findings from this study and recommendations made will be stored at the University of Venda library. A copy will also be submitted to the Department of Public Health. The findings from the study will be published in peer-reviewed and accredited national and international journals as well as presented at seminars and conferences in South Africa and abroad.

### 3.12 Study limitation

In this study, BMI is used as an objective indicator of the students' overall body fat against the subjective assessment by the students of his or her own body weight. BMI only indicates the weight status of a person as underweight, overweight or obese. It does not differentiate between muscle and fat mass. In order to improve on the study given the limitations of BMI, the researcher included additional measures by using Waist Circumference (WC) and Waist-to-Hip Ratio (WHR) to determine body fat distribution and levels of risk.

### 3.13 Ethical considerations

The basic principles of ethics were duly observed. The proposal was presented to the Higher Degree Committee of the School of Health Sciences and the University higher degree Research Ethics Committee and obtained ethical clearance/permission to conduct the research.

Ethical principles relating to human subjects were maintained during the study are as follows:

**3.13.1 Principle of respect for human dignity:** Participants have the right to self-determination and full disclosure and therefore participation in the study was on voluntary



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basis and the researcher disclosed all the important information pertaining to the study before the commencement of the study. All participants were treated with respect and dignity at all times.

**3.13.2 Informed Consent**: Those who were willing to participate were asked to voluntarily sign a consent form; the consent form was separated from the actual questionnaire in order to maintain the participants' anonymity. Participants were informed that had the at liberty to withdraw from the study if they so wish, at any time during the study.

**3.13.3 Right to Privacy**: Anonymity was assured by not including names of participants in the questionnaire; data was then reported in student categories and not individually.

**3.13.4 Confidentiality:** Confidentiality was maintained at all times during the study and afterwards. Participants were assured that the information provided by them would be treated confidentially. They were also informed that only the researcher and the supervisors were to have access to the data; and that the completed questionnaires would be kept in a safe place for five years where no other person would have access to them. Each participant was provided with an A4 size envelope in which to put the questionnaire after completion. Participants were asked to seal the envelope and submit to the security post from where the researcher picked them up.



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# CHAPTER 4

# INTERPRETATION OF RESULTS

## 4.1 Introduction

This chapter present and interprets the data obtained from the study. The results are presented as socio-demographic information of respondents, dietary practices/patterns, and physical activity patterns as well as the association between the variable and body weight status in terms of body mass index (BMI).

This was done in line with the objectives of the study which were to:

- Determine obesity status of students using Body Mass Index (BMI) and Waist-to-hip ratio (WHR) as measures.
- Examine the socio-demographic factors of obesity among students.
- Assess the eating practices of students.
- Identify the environment and physical activities students engage in.
- Determine the relationships between body status and socio-demographic variables, eating practices as well as Environment and physical activities variables.

In view of the researcher's prior observation that majority of University of Venda students look overweight, the study aimed to describe the determinants of obesity among students of the University of Venda.

## 4.2 Response rate

The response rate is the rate of participation in the study calculated by dividing the number of persons participating by the number of people sampled (Polit & Beck 2012). In this study, a total of 338 questionnaires were distributed and all the questionnaires were completed and returned. This was possible as the research and his research assistants waited for each participant to complete and return the questionnaire except for some female participants that negotiated for their anthropometric data be taken by the female research assistant at a later time.

## 4.3 Data analysis

The analysis and interpretation of the data resulted in the conclusion and recommendations made in this study.



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### 4.4 Analysis program

A statistician analysed the data collected using SPSS version 22. The statistician calculated the frequencies for the responses to individual questions.

### 4.5 Data presentation

The data is presented according to the structure of the questionnaire used to obtain the data.

- Section A: Socio-demographic information (Questions 1-8)
- Section B: Dietary practices/patterns (Questions 9-33)
- Section C: Physical activity patterns (Questions34-55)

#### 4.5.1 Socio-demographic information of the respondents

There were 338 students that participated in the study of which 155 (45.9%) were male while 183(54.1%) were female and 67.5% of these participants were within the age bracket 20-25 years. All the participants were from the black ethnic background with 96.4% of them being South African Nationality and 12 (3.6%) of them were of foreign nationals. Almost all (92.9%) of the participants were at the undergraduate level of study and 24 (7.1%) were at the post graduate level of studies. There were 10 (3%) participants who were married, 5 (1.5%) were in other kind of relationships (students in other kind of relationships did not specify which type they are involved in) however, the majority 323(95.6%) were single at the time of the study. Most of the students' (68.6%) permanent residential zones were rural areas, 18.9% from Township while 12% were from Town. In terms of socio-economic status (SES), 42.3% of the participants were from Low SES, 54.7% were from a medium/average SES and 3% from high SES (Table 4.1).



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Table 4.1 Socio-demographic information of the respondents (N=338)

| Characteristics | N | % |
|---|---|---|
| **Gender:** | | |
| Male | 155 | 45.9 |
| Female | 183 | 54.1 |
| **Age:** | | |
| 17-20years | 82 | 24.3 |
| 20-25years | 228 | 67.5 |
| 26-30years | 23 | 6.7 |
| 31-35years | 5 | 1.5 |
| **Ethnic Background:** | | |
| Black | 338 | 100 |
| **Nationality:** | | |
| South African | 326 | 96.4 |
| Non-South African | 12 | 3.6 |
| **Academic status:** | | |
| Undergraduate | 314 | 92.9 |
| Post-graduate | 24 | 7.1 |
| **Marital status:** | | |
| Married | 10 | 3 |
| Single | 323 | 95.6 |
| Other | 5 | 1.5 |
| **Permanent residential zone:** | | |
| Town | 42 | 12.4 |
| Township | 64 | 18.9 |
| Rural areas | 232 | 68.6 |
| **Socio-economic status:** | | |
| Low | 143 | 42.3 |
| Medium/average | 185 | 54.7 |
| High | 10 | 3 |



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#### 4.5.1.1 BMI distribution across demographic characteristics

The BMI pattern across the participants is presented along demographic characteristics. The BMI in terms of gender shows that of the 33 (9.8%) students who were underweight 12 (36%) of these were male while 21 (64%) were female. There were 205 (61%) participants that had normal body weight with 113(55%) of these being male and 92 (45%) female. Students that were overweight were 68 with male 19 (28%) and female 49 (72%). There were 32 (9.5%) participants that were obese, of this number, 11 (34%) were male while 21 (66%) were female.

The age distribution of participants was within the range 17-35. There were 82 (24%) participants within age 17-18 years. Of this group, 16 (48%) were underweight 48 (23%) had normal body weight, 12 (18%) were overweight and 6 (19%) obese. Majority (228) of the students, representing 67% of the participants were within the age 20-25. Of this age bracket 16 (48%) were underweight, 144 (70%) had a normal body weight, 47(69%) were overweight and 21 (66%) obese. There were 23 (6.8%) participants within age 26-30 with 1(3%) underweight, 10 (4.9%) having normal body weight, 9 (13%) overweight, 3 (9.4%) obese. Age 31 -35 represent 1.5% of the sampled population and had 3 (1.5%) participants with normal body weight and 2 (6.3%) obese.

All the participants are from the black ethnic background. In terms of Nationality, South African constituted 96% while Foreign Nationals constituted only 4%. The 33 participants who are underweight are all South African nationals; and of the 205 participants that have normal body weight 196 (96%) are South Africans while 9 (4%) are non-South African by nationality. There were 68 participants that was overweight with 67 (99%) being South Africans and 1 (1.5%) non-South African. Obese participants were 32 with South Africans being 30 (94%) and non-South African being 2 (6%).

In terms of academic status, 93% of the participants were undergraduates while 7% were at post-graduate level of studies. All 33 participants who were underweight were undergraduate students while in the normal body weight range 188 (92%) participants were undergraduates and 17 (8%) were post-graduates, 63 (93%) undergraduate students were overweight while 5 (7%) were post-graduate students. There were 30 (94%) undergraduates that were obese and 2 (6%) post-graduates students.

Participants that were married constitute 3% of the sampled population; 96% were single and 1.5% were in other kinds of relationship which was not specified. The 33 underweight participants were all single at the time of this study; of the 205 students that have normal body weight 6 (2.9%) were married, 196 (96%) were single and 3 (1.5%) in other kinds of



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relationships which was not specified. There were 2 (2.9%) overweight participants that are married; 64 (94%) single and 2 (2.9%) in other kinds of relationship which was not specified. There were 2 (6.3%) participants that were obese and married while 30 (94%) are single and obese.

Of the 33 participants that were underweight 3 (9.1%) were from Town, 3 (9.1%) from Township and 27 (82%) from the rural areas. Among normal body weight participants, 26(13%), 37(18%) and 142 (69%) were from Town, Township and the rural areas respectively. There were 7(10%) participants from town who were overweight, 16 (24%) from township were overweight while 45 (66%) from rural areas were overweight. Of the 32 participants that are obese, 6 (19%) were from town, 8 (25%) from township and 18 (56%) from the rural areas.

In terms of socio-economic status (SES) 15 (45%) have low SES,18 (55%) medium/average SES and for those with normal body weight 92 (45%) have low SES, 108 (53%) medium/average SES and 5 (2.4%) have high SES. Of the 68 participants that were overweight, 24 (35%) have low SES, 41 (60%) have medium/average SES and 3 (5%) high SES. There were 12 (38%) participants in the low SES that were obese, 18 (56%) in the medium/average SES and 2 (4%) have high SES (Table 4.2).



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Table 4.2 Socio-demographic and BMI of respondents (N=338)

| Characteristics | BMI of Respondents | | | | | | Total |
|---|---|---|---|---|---|---|---|
| | Underweight <18.5 | Normal range 18.5-24.9 | Overweight/ pre-obese 25.0 -29.9 | Obese class I 30.0 - 34.9 | Obese class II 35.0-39.9 | Obese class III ≥40 | |
| **Gender:** | | | | | | | |
| Male | 12 | 113 | 19 | 11 | 0 | 0 | 155 |
| Female | 21 | 92 | 49 | 19 | 1 | 1 | 183 |
| **Total** | **33** | **205** | **68** | **30** | **1** | **1** | **338** |
| **Age:** | | | | | | | |
| 17-19years | 16 | 48 | 12 | 6 | 0 | 0 | 82 |
| 20-25years | 16 | 144 | 47 | 21 | 0 | 0 | 228 |
| 26-30years | 1 | 10 | 9 | 3 | 0 | 0 | 23 |
| 31-35years | 0 | 3 | 0 | 0 | 1 | 1 | 5 |
| **Total** | **33** | **205** | **68** | **30** | **1** | **1** | **338** |
| **Ethnic background:** Black | **33** | **205** | **68** | **30** | **1** | **1** | **338** |
| **Nationality:** | | | | | | | |
| South African | 33 | 196 | 67 | 28 | 1 | 1 | 326 |
| Non-South African | 0 | 9 | 1 | 2 | 0 | 0 | 12 |
| **Total** | **33** | **205** | **68** | **30** | **1** | **1** | **338** |
| **Academic status:** | | | | | | | |
| Undergraduate | 33 | 188 | 63 | 28 | 1 | 1 | 314 |
| Post-graduate | 0 | 17 | 5 | 2 | 0 | 0 | 24 |
| **Total** | **33** | **205** | **68** | **30** | **1** | **1** | **338** |
| **Marital status:** | | | | | | | |
| Married | 0 | 6 | 2 | 2 | 0 | 0 | 10 |
| Single | 33 | 196 | 64 | 28 | 1 | 1 | 323 |
| Other | 0 | 3 | 2 | 0 | 0 | 0 | 5 |
| **Total** | **33** | **205** | **68** | **30** | **1** | **1** | **338** |
| **Permanent residential zone:** | | | | | | | |
| Town | 3 | 26 | 7 | 6 | 0 | 0 | 42 |
| Township | 3 | 37 | 16 | 7 | 0 | 1 | 64 |
| Rural areas | 27 | 142 | 45 | 17 | 1 | 0 | 238 |
| **Total** | **33** | **205** | **68** | **30** | **1** | **1** | **338** |
| **Socio-economic status:** | | | | | | | |
| Low | 15 | 92 | 24 | 10 | 1 | 1 | 143 |
| Medium/average | 18 | 108 | 41 | 18 | 0 | 0 | 185 |
| High | 0 | 5 | 3 | 2 | 0 | 0 | 10 |
| **Total** | **33** | **205** | **68** | **30** | **1** | **1** | **338** |

### 4.5.2 Dietary practices/Patterns



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#### 4.5.2.1: Number of meals per day.

In terms of number of meals per day, 51% of the participants eat twice a day, 39% eat three times a day, 9% eat once a day and 1% eats four times and more (Table 4.3).

#### 4.5.2.2 Patterns of breakfast

Majority of the participants (70%) eat breakfast, while 30% skip breakfast. Of the 238 participants that eat breakfast, 37% eat breakfast daily, 22% eat breakfast 2-3 times a week and 11% eat

breakfast 4-6 times a week (Figure 4.1).

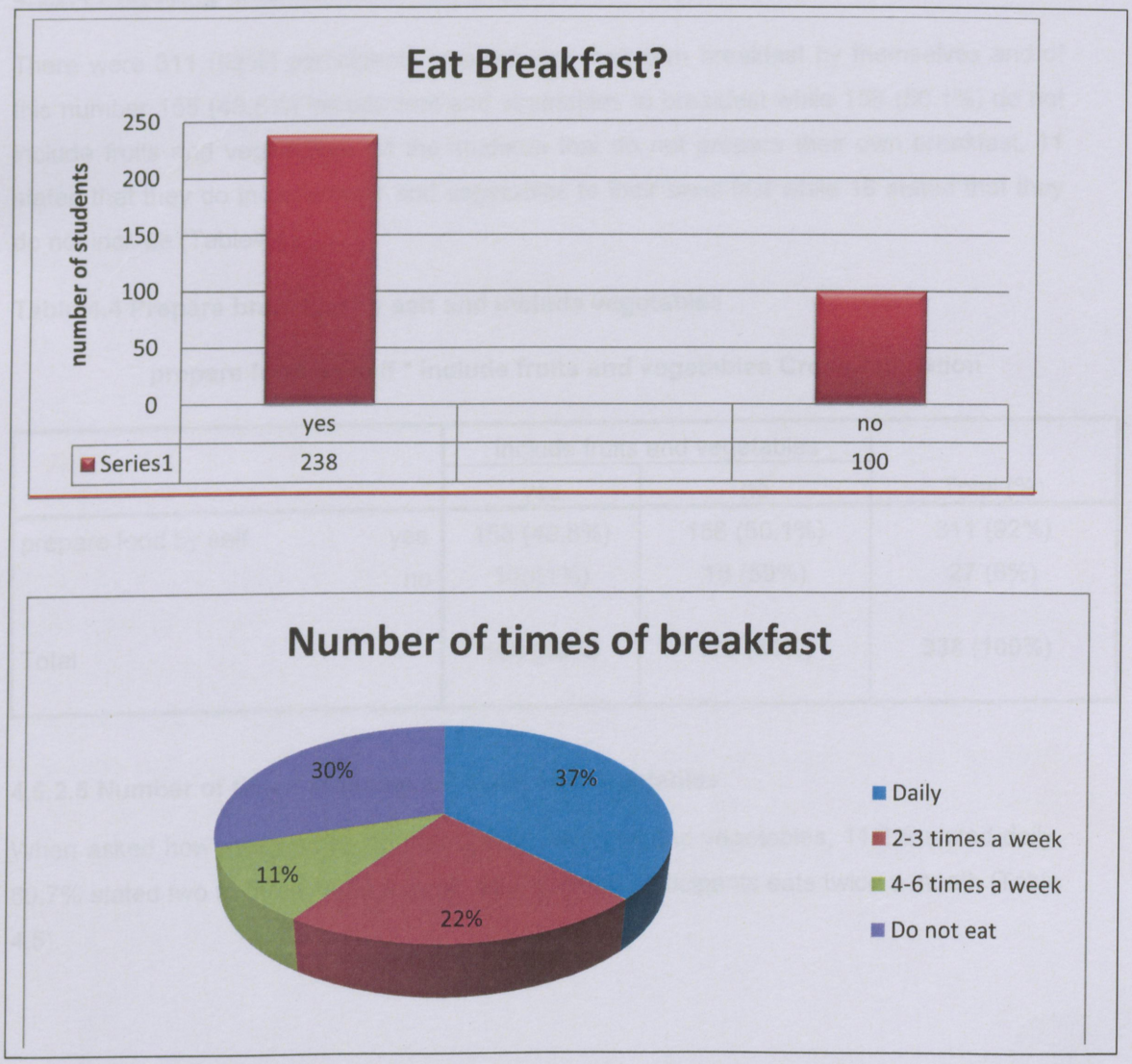



**Figure 4.1 Pattern of breakfast**

#### 4.5.2.3 The place of breakfast

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When asked where they eat their breakfast, 19.2% stated that they eat their breakfast in the cafeteria, 50.3 of the participants eat their breakfast in their rooms and 0.9% eats breakfast at restaurants outside the school (Table 4.3).

**Table 4.3 the place of breakfast**

| Where do you eat breakfast | Frequency | Percent % |
|---|---|---|
| Do not eat | 100 | 29.6 |
| at the cafeteria | 65 | 19.2 |
| in my room | 170 | 50.3 |
| at restaurants outside the school | 3 | .9 |
| **Total** | **338** | **100.0** |

### 4.5.2.4 Preparing breakfast and Including fruits and vegetables

There were 311 (92%) participants who prepare their own breakfast by themselves and of this number 155 (49.8%) include fruit and vegetables to breakfast while 156 (50.1%) do not include fruits and vegetables. Of the students that do not prepare their own breakfast, 11 stated that they do include fruits and vegetables to their breakfast while 16 stated that they do not include (Table4.4).

**Table 4.4 Prepare breakfast by self and include vegetables**

**prepare food by self * include fruits and vegetables Cross-tabulation**

| | | include fruits and vegetables | | |
|---|---|---|---|---|
| | | yes | no | Total (%) |
| prepare food by self | yes | 155 (49.8%) | 156 (50.1%) | 311 (92%) |
| | no | 11(41%) | 16 (59%) | 27 (8%) |
| Total | | **166 (49%)** | **172 (51%)** | **338 (100%)** |

### 4.5.2.5 Number of times students eat fruits and vegetables

When asked how many times do participants eat fruits and vegetables, 11.2% stated daily, 60.7% stated two to three times a week, 19.8% of the participants eats twice a month (Table 4.5).



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Table 4.5 Number of times students eat fruits and vegetables

| Number of times | Frequency | Percent % |
|---|---|---|
| Daily | 38 | 11.2 |
| two to three times a week | 205 | 60.7 |
| twice a month | 67 | 19.8 |
| do not eat | 28 | 8.3 |
| **Total** | **338** | **100.0** |

#### 4.5.2.6 Student's choice of snack

In-between meals, students eat the following as snacks: fruit 22.2%, nick-naks 0.5%, 20.1% eat chocolates/sweets and 7.7% eat peanuts. When asked who the participants eat snack with at school, 74% states that they eat their snacks with friends and 26% eat their snack alone (Table 4.6).

Table 4.6 what students eat as snack

| Type of Snack | Frequency | Percent |
|---|---|---|
| Fruits | 75 | 22.2 |
| nick naks | 169 | 0.5 |
| chocolates/ sweets | 68 | 20.1 |
| Peanuts | 26 | 7.7 |
| **Total** | **338** | **100.0** |

#### 4.5.2.7 Student's time spent on TV and programme choice

There were 223 (66%) of the students that like watching TV, 32.5% of these watch soapies as their favourite programme, 8.3% watch youth programme, 10.1% watch Drama as their favourite programme, Movies 29.9% and sports/soccer/rugby 19.2%. The participants also stated the number of time per day that they watch their favourite programmes. Majority (37.3%) watch once, 24.9% watch twice and 19.5% watch three times per day. For each time they viewed TV, 23.1% spent 30min-1hr; 32.2% spent 1hr 30min – 2hrs and 25.4% spent 2hrs 30 and more watching their favourite programme (Table 4.7).



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Table 4.7 Student's TV times and programme choice (N=338)

| Question | Number | Percentage |
|---|---|---|
| **Do you like watching TV?** | | |
| Yes: | 223 | 66 |
| No: | 103 | 30.5 |
| Do not know: | 12 | 3.6 |
| **What is your favourite programme?** | | |
| Soapies: | 110 | 32.5 |
| Youth Programme: | 28 | 8.3 |
| Drama: | 34 | 10.1 |
| Movies: | 101 | 29.9 |
| Sports/Soccer/Rugby: | 65 | 19.2 |
| **How many times per day do you watch TV?** | | |
| Once: | 126 | 37.3 |
| Twice: | 84 | 24.9 |
| Three times: | 66 | 19.5 |
| Do not watch: | 62 | 18.3 |
| **How long do you view television each time?** | | |
| 30 min-1hr | 78 | 23.1 |
| 1h30-2hr | 109 | 32.2 |
| 2h30 and more | 86 | 25.4 |
| Not applicable | 65 | 19.2 |

#### 4.5.2.8 Influence of advertised commercial foods

There are 61% of the participants that like advertised commercial foods, 25% do not like and 14% were indecisive. Participants identified commercial foods that are advertised on TV and which are most likely to influence them to eat. More participants (181) representing (54%) named soft drinks, 71 (21%) identified Chips (16%) named cake and 32 (9%) stated other kinds of advertised commercial foods (Figure 4.2).



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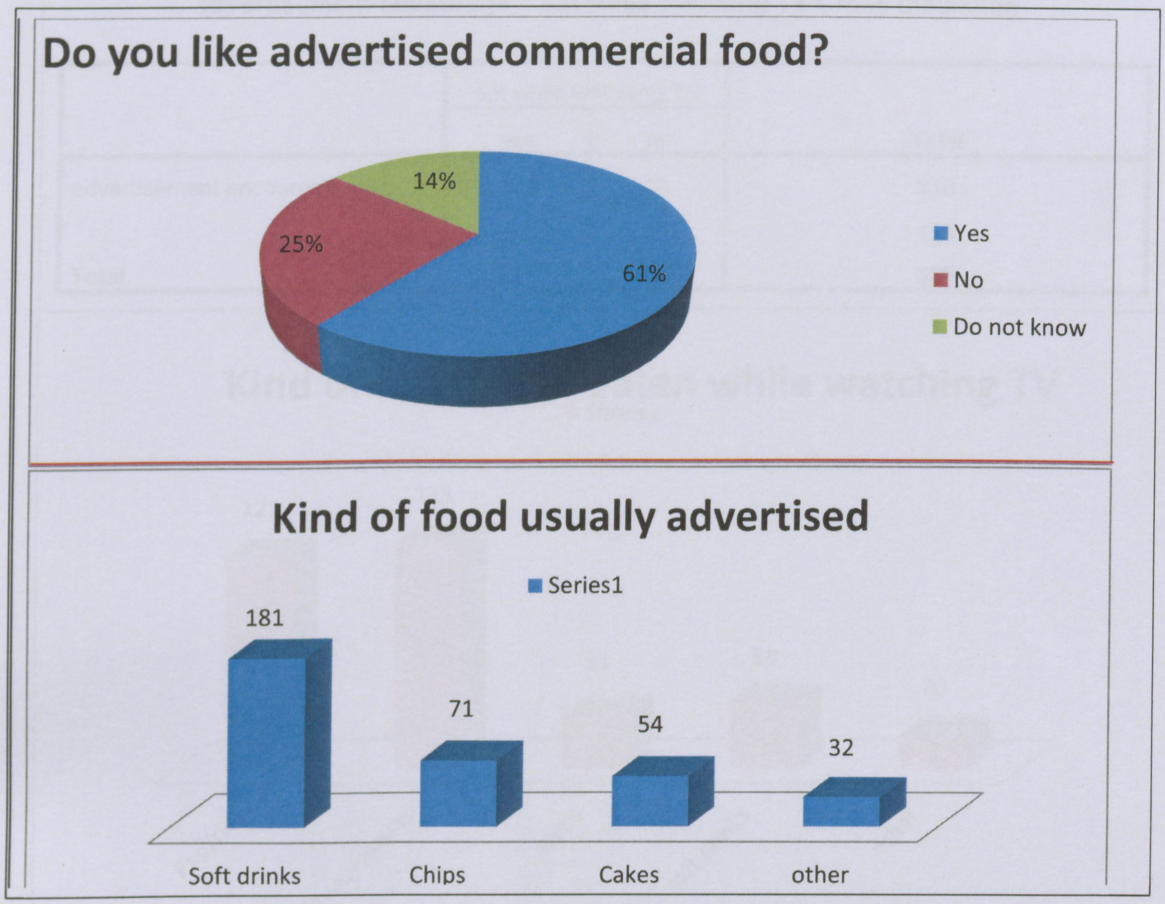



**Figure 4.2 Preference of advertised food**

Of the 221 participants that eat while watching TV, 154 (70%) stated that they are encouraged by advertisement to eat and 67(30%) stated otherwise. The kind of food they eat while watching TV also was asked. About 36% of the participants stated Pap/rice, 39% named nik-naks/sweets; 9% eat chips, 11% stated soft drinks and 6% named other kinds of food (Figure 4.3).

**advertisement encourage * eat while watching TV Cross tabulation**

| | | eat while watching TV | | Total |
|---|---|---|---|---|
| | | yes | no | |
| advertisement encourage | yes | 154 | 56 | 210 |
| | no | 67 | 61 | 128 |
| **Total** | | **221** | **117** | **338** |

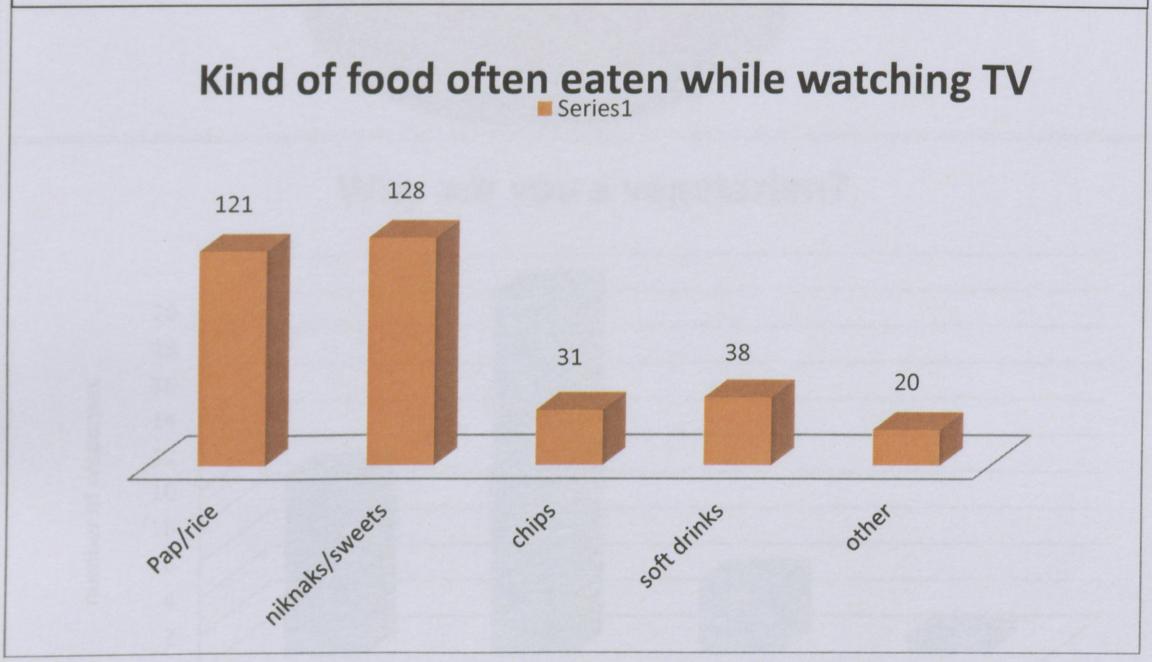



**Figure 4.3 Does the advertised food encourage you to eat/ do you eat while watching TV**

### 4.5.2.9 Participants that are vegetarian and the reason for being vegetarian

Participants who are vegetarian represent 10% of the sampled population. They stated the reasons for becoming a vegetarian as follows: personal choice 29%, health reasons 57%; religion 11% and sibling influence 2.9% (Figure 4.4).

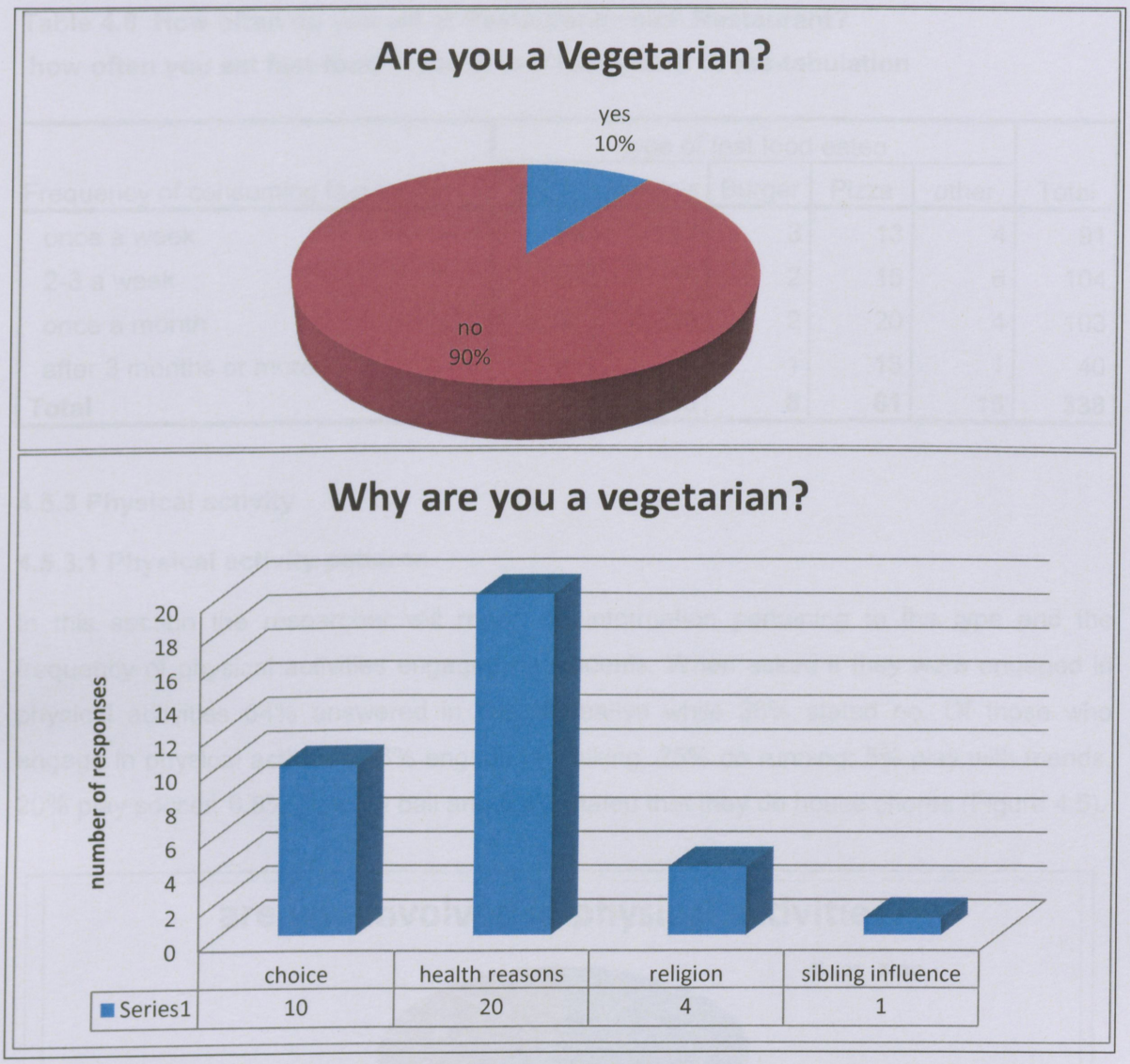



**Figure 4.4 Participants who are vegetarian**

#### 4.5.2.10 The number of times students eat at Restaurant/fast food choice

When participants were asked about the type of Food outlet/Restaurants or food choice, majority (59%) of student choose KFC, 16% chose Nandos; 2.4% named Burger, 18% chose Pizza and 4% stated other restaurants/fast foods. In terms of how often they eat at these restaurants, 27% eat once a week, 31% eat 2-3 times a week; 30% eat once a month and 12% eat after 3 months or more (Table 4.8).

**Table 4.8 How often do you eat at Restaurant/which Restaurant?**
**how often you eat fast-food * type of fast food eaten Cross-tabulation**

| Frequency of consuming fast foods | type of fast food eaten | | | | | Total |
|---|---|---|---|---|---|---|
| | KFC | Nando's | Burger | Pizza | other | |
| once a week | 54 | 17 | 3 | 13 | 4 | 91 |
| 2-3 a week | 63 | 18 | 2 | 15 | 6 | 104 |
| once a month | 61 | 16 | 2 | 20 | 4 | 103 |
| after 3 months or more | 21 | 4 | 1 | 13 | 1 | 40 |
| **Total** | **199** | **55** | **8** | **61** | **15** | **338** |

### 4.5.3 Physical activity

#### 4.5.3.1 Physical activity patterns

In this section the researcher will report on information pertaining to the type and the frequency of physical activities engaged by students. When asked if they were engaged in physical activities 64% answered in the affirmative while 36% stated no. Of those who engage in physical activities 36% engage in walking, 25% do running; 5% play with friends, 20% play soccer; 6.8% play net ball and 6.8% stated that they do house chores (Figure 4.5).

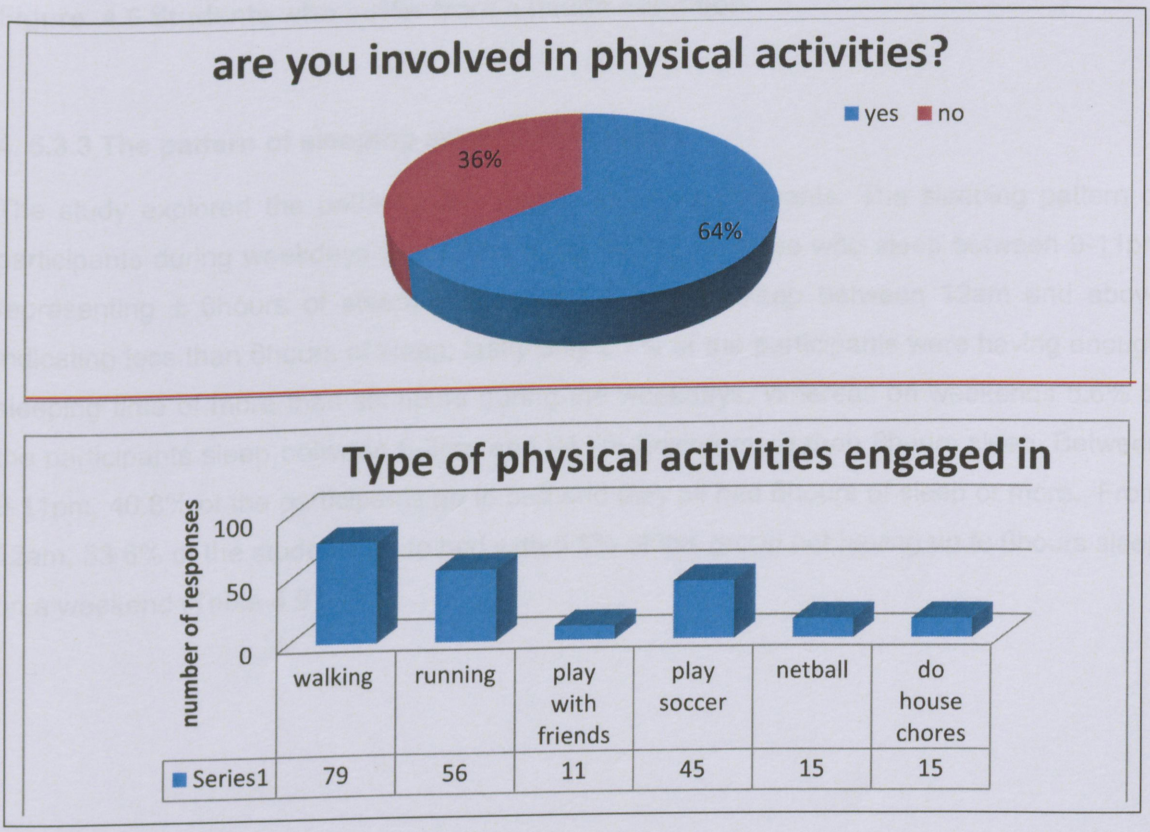



**Figure 4.5 Involvement in physical activities**

### 4. 5.3.2 Health conditions among participants

With regards to the health status/ conditions among the participants, the results reveal that majority (88%) had no form of illness, 3.8% were hypertensive and 5% had breathing and asthmatic problems/conditions, see Figure 4.6).

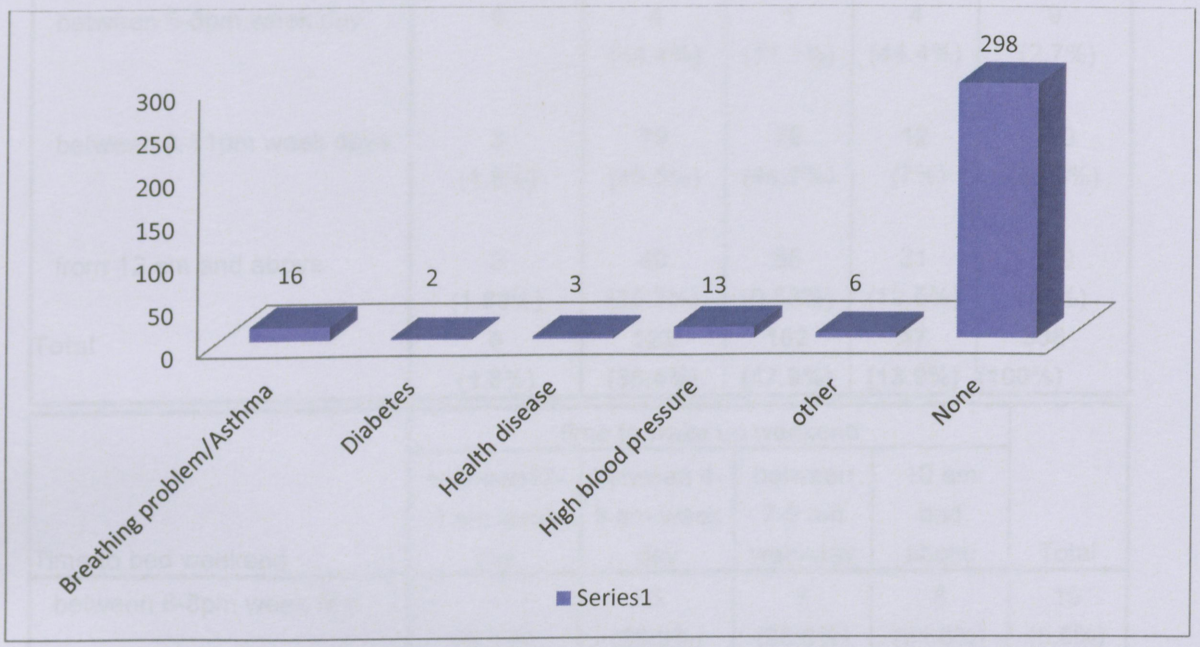



**Figure 4.6 Students who suffer from a health condition**

### 4. 5.3.3 The pattern of sleeping among participants

The study explored the patterns of sleeping among participants. The sleeping pattern of participants during weekdays was found to be 50.3% for those who sleep between 9-11pm representing ± 6hours of sleep; followed by 47% who sleep between 12am and above indicating less than 6hours of sleep; lastly only 2.7% of the participants were having enough sleeping time of more than six hours during the weekdays. Whereas on weekends 5.6% of the participants sleep between 6-8pm and 94.7% having more than 8hours sleep. Between 9-11pm, 40.8% of the participants go to bed and they all had 6hours of sleep or more. From 12am, 53.6% of the students go to bed with 5.5% of this group not having up to 6hours sleep on a weekend (Table 4.9).

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**Table 4.9 The pattern of sleeping**

| Time to bed weekdays | time to wake up weekdays | | | | Total |
|---|---|---|---|---|---|
| | between12-3 am week day | between 4-6 am week day | between 7-9 am weekday | 10 am and above | |
| between 6-8pm week day | 0 | 4 (44.4%) | 1 (11.1%) | 4 (44.4%) | 9 (2.7%) |
| between 9-11pm week days | 3 (1.8%) | 79 (46.5%) | 76 (44.7%) | 12 (7%) | 170 (50.3%) |
| from 12 am and above | 3 (1.88%) | 40 (25.2%) | 85 (0.53%) | 31 (19.5%) | 159 (47%) |
| **Total** | **6 (1.8%)** | **123 (36.4%)** | **162 (47.9%)** | **47 (13.9%)** | **338 (100%)** |

| Time to bed weekend | time to wake up weekend | | | | Total |
|---|---|---|---|---|---|
| | between12-3 am week day | between 4-6 am week day | between 7-9 am weekday | 10 am and above | |
| between 6-8pm week end | 1 (5.3%) | 5 (26.3%) | 7 (36.8%) | 6 (31.6%) | 19 (5.6%) |
| between 9-11pm week end | 3 (2.17%) | 30 (21.7%) | 78 (56.5%) | 27 (19.6%) | 138 (40.8%) |
| from 12 am and above | 6 (3.3%) | 14 (7.7%) | 77 (42.5%) | 84 (46.4%) | 181 (53.6%) |
| **Total** | **10 (3.0%)** | **49 (14.5%)** | **162 (47.9%)** | **117 (34.6%)** | **338 (100%)** |

### 4. 5.3.4 Hours of TV or Video watched per day

Participants were asked about time they spend watching TV/video per day; during the weekday before 6pm and after 6pm as well as on weekend before and after 6pm. The finding of the study suggest that on a weekday before 6pm about 26.3% of the participants watch TV for less than 1hour a day and the rest (5.6%) watch it for ±4hours a day. Those who watch TV on a weekday after 6pm accounted for 30.8% spending 1-2hours. However, on a weekend before 6pm the time spent is distributed to 16.9% for less than 1hour a day



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and 21% for 2-3 hours a day. More or less time was distributed to participants watching TV/Video on a weekend after 6pm, see (Table 4.10).

**Table 4.10 Hours of TV or Video watched per day**

| Hours of TV or Video watched per day | Average for the last 12 Months | | | | | |
|---|---|---|---|---|---|---|
| | None | Less than 1hr a day | 1 to 2hrs a day | 2 to 3 hrs a day | 3 to 4hrs a day | More than 4hrs a day |
| On a weekday before 6pm | 125 (37.0%) | 89 (26.3%) | 62 (18.3%) | 27 (8.0%) | 16 (4.7%) | 19 (5.6%) |
| On a weekday after 6pm | 67 (19.8%) | 71 (21.0%) | 104 (30.8%) | 51 (15.1%) | 21 (6.2%) | 24 (7.1%) |
| On a weekend before 6pm | 84 (24.6%) | 57 (16.9%) | 65 (19.2%) | 71 (21.0%) | 27 (8.0%) | 35 (10.4%) |
| On a weekend after 6pm | 76 (22.5%) | 43 (12.7) | 59 (17.5%) | 53 (15.7%) | 55 (16.3%) | 52 (15.4%) |

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#### 4. 5.3.5 Activities in and around the residence

In terms of activities in and around the residence, participants estimated the number of hours each week on the average for the last 12 months spent on the following activities: preparing food, cooking and washing, shopping for food and groceries; cleaning the room, and doing the laundry and ironing. For the time spent preparing food, cooking and washing, 48.5% spent between 1 to 3 hour; 30.8% spend less than 1 hour a day and 0,6% more than 10 hours. Time spent shopping for food and groceries were also recorded as 45.6% spent between 1 to 3 hour; 23.4% spent less than 1 hour a day; and 1.2% more than 10 hours. The participants recorded the time they spend cleaning their rooms. There were 65.1% that recorded less than 1 hour a day, 18.6% stated that they spent between 1 to 3hours and 0.6 spend 6 to 10 hours. Students recorded the time spent doing the laundry and ironing as



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follows: 44.7% recorded 1 to 3 hours, 29.3% spent less than 1 hour a day and 0.3% recorded more than 10 hours a day doing the laundry and ironing (Table 4.11).

**Table 4.11 Activities in and around the residence**

| Approximate number of hours each week | Average for the last 12 Months | | | | | |
|---|---|---|---|---|---|---|
| | None | Less than 1hr a day | 1 to 3hrs a day | 3 to 6 hrs a day | 6 to 10hrs a day | More than 10hrs a day |
| Preparing food, cooking and washing | 35 (10.4%) | 104 (30.8%) | 164 (48.5%) | 30 (8.9%) | 3 (0.9%) | 2 (0.6%) |
| Shopping for food and groceries | 28 (8.3%) | 79 (23.4%) | 154 (45.6%) | 65 (19.2%) | 8 (2.4%) | 4 (1.2%) |
| Cleaning the room | 37 (10.9%) | 220 (65.1%) | 63 (18.6%) | 16 (4.7%) | 2 (0.6%) | 0 (0.0%) |
| Doing the laundry and ironing | 35 (10.4%) | 99 (29.3%) | 151 (44.7%) | 46 (13.6%) | 6 (1.8%) | 1 (0.3%) |

#### 4.5.3.6 Recreation activities

Participants are involved in various recreational activities. The top five activities in this study are walking (73%), Jogging (50.3%); Exercising with weight (46.4%), Competitive running (33.4%) and Dancing (31.3%). The least activity in this study was boxing (7.3%). Of the 73% of participants engaged in in walking, about 27.2% walk 2-3 times in a week and the least (8.6%) do it once a month. Out of 50.3% of participants who jog, 22.2% exercise for less than once in a month and the least 0.6% jog 6 times or more a week. Of the 46.4% that exercise with weight, about 14.5% do it 2-3 times a week and the least 3.3% exercise more often by doing it 4-5 times a week. Of the 33.4% of participants engaged in competitive running, about 13.9% run for less than once a month and the least (1.5%) run 6 times or more a week. Out of 31.3% of participants who engage in dancing, 21.3% dance for less than once in a month and the least 0.3% dance 6 times or more a week, (see Table 4.12).



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Table 4.12 Recreation activities

| Approximate numbers of hour each week | Engaged in recreation activity | | Less than once a month | Once a month | 2 to 3 times a week | 4 to 5 times a week | 6 times or more | Average time per episode | |
|---|---|---|---|---|---|---|---|---|---|
| | Yes | No | | | | | | | |
| Walking for pleasure | 248 (73%) | 90 (26.6%) | 62 (18.3%) | 29 (8.6%) | 92 (27.2%) | 27 (8.0%) | 38 (11.2%) | 1 | 12 |
| Exercises with weights | 157 (46.4%) | 181 (53.6%) | 40 (11.8%) | 39 (11.5%) | 49 (14.5%) | 11 (3.3%) | 18 (5.3%) | 0 | 30 |
| Dancing | 106 (31.3%) | 232 (68.6%) | 72 (21.3%) | 21 (6.2%) | 11 (3.3%) | 1 (0.3%) | 1 (0.3%) | 0 | 30 |
| Competitive running | 113 (33.4%) | 225 (66.6%) | 47 (13.9%) | 32 (9.5%) | 23 (6.8%) | 6 (1.8%) | 5 (1.5%) | 2 | 00 |
| Jogging | 170 (50.3%) | 168 (49.7%) | 75 (22.2%) | 50 (14.8%) | 33 (9.8%) | 10 (3.0%) | 2 (0.6%) | 2 | 00 |
| Tennis | 43 (12.7%) | 295 (90.0%) | 10 (3.0%) | 17 (5.0%) | 6 (1.8%) | 1 (0.3%) | 9 (2.7%) | 1 | 00 |
| Football, rugby | 96 (28.4%) | 242 (71.6%) | 15 (4.4%) | 23 (6.8%) | 22 (6.5%) | 20 (5.9%) | 16 (4.7%) | 1 | 30 |
| Netball, volleyball or basket | 59 (17.4%) | 279 (82.5%) | 22 (6.5%) | 9 (2.7%) | 12 (3.6%) | 6 (1.8%) | 10 (3.0%) | 2 | 00 |
| Snooker | 70 (20.7%) | 268 (79.3%) | 21 (6.2%) | 17 (5.0%) | 22 (6.5%) | 4 (1.2%) | 6 (1.8%) | 0 | 30 |
| Musical instrument | 70 (20.7%) | 268 (79.3%) | 23 (6.8%) | 13 (3.8%) | 19 (5.6%) | 5 (1.5%) | 10 (3.0%) | 2 | 00 |
| Boxing | 25 (7.3%) | 313 (92.6%) | 11 (3.3%) | 4 (1.2%) | 3 (0.9%) | 2 (0.6%) | 5 (1.5%) | 0 | 30 |



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### 4.5.4 Waist Circumference

The waist circumference was measured in order to determine the possibility of risk of obesity among male and female participants. Ideal circumference among male was recorded as 85.2%, 14.2% recorded increased risk while 0.6% had substantial risk. For female, 76% has ideal waist circumference; 21.9% has increased risk and 2.1% recorded substantial risk of obesity (Table 4.13).

**Table 4.13 Waist Circumference of Participants**

| Male | Frequency | Percentage |
|---|---|---|
| Ideal | 132 | 85.2 |
| Increased risk | 22 | 14.2 |
| Substantial risk | 1 | 0.6 |
| **Total** | **155** | **100** |
| **Female** | **Frequency** | **Percentage** |
| Ideal | 139 | 76 |
| Increased risk | 40 | 21.9 |
| Substantial risk | 4 | 2.1 |
| **Total** | **183** | **100** |

### 4.5.5 Waist-hip ratio

The waist to hip ratio of participants was measured in order to determine central adiposity and increased risk of obesity among male and female. Ideal waist - hip ratio among male was recorded as 83.2%, while16.8% recorded central adiposity and increased risk of obesity. For female, 83% has ideal waist to hip ratio; 17% recorded central adiposity and increased risk of obesity (Table 4.14).

**Table 4.14 Waist-Hip Ratio distribution by gender**

| Male | Frequency | Percentage |
|---|---|---|
| Ideal | 129 | 83.2 |
| Central adiposity and increased risk | 26 | 16.8 |
| **Total** | **155** | **100** |
| **Female** | **Frequency** | **Percentage** |
| Ideal | 152 | 83 |
| Central adiposity and increased risk | 31 | 17 |
| **Total** | **183** | **100** |

## 4.6 Association between BMI and socio-demographic variables

### 4.6.1 Association between BMI and Gender



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There was a statistical significant difference in BMI between the male and female group. There were more female than male who are either overweight or obese (Table 4.15).

**Table 4.15 Gender and BMI cross-tabulation**

| Gender of respondent | Norm for BMI | | | | | | Total |
|---|---|---|---|---|---|---|---|
| | Normal Body weight | Obese class 1 | Obese class 11 | Obese class 111 | Overweight/ Pre-obese | Underweight | |
| **female** | 92 (50.3) | 19 (10.4%) | 1 (0.55%) | 1 (0.55%) | 49 (26.8%) | 21 (115%) | **183 (54.1%)** |
| **male** | 113 (72.9%) | 11 (7.1%) | 0 | 0 | 19 (12.3%) | 12 (7.7%) | **155 (45.9%)** |
| **Total** | **205 (60.7%)** | **30 (8.9%)** | **1 (0.55%)** | **1 (0.55%)** | **68 (20.1%)** | **33 (9.8%)** | 338 (100%) |

**Chi-Square Tests**

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 19.791[a] | 5 | .001 |
| Likelihood Ratio | 20.953 | 5 | .001 |
| N of Valid Cases | 338 | | |

a. 4 cells (33.3%) have expected count less than 5. The minimum expected count is .46.

### 4.6.2 Association between BMI and Academic status

There was no statistical significant difference in BMI between the undergraduate group and the post-graduate group (Table 4.16).



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**Table 4.16 Academic status and BMI cross-tabulation**

| Academic status of respondent | Norm for BMI | | | | | | Total |
|---|---|---|---|---|---|---|---|
| | Normal Bodyweight | Obese class 1 | Obese class 11 | Obese class 111 | Overweight / Preobese | Under weight | |
| Undergraduate | 188 (59.8%) | 28 (8.9%) | 1 (0.32%) | 1 (0.32%) | 63 (20.1%) | 33 (10.5%) | 314 (92.9%) |
| postgraduate | 17 (70.8%) | 2 (8.3%) | 0 | 0 | 5 (20.8%) | 0 | 24 (7.1%) |
| **Total** | **205 (60.7%)** | **30 (8.8%)** | **1 (0.32%)** | **1 (0.32%)** | **68 (20.1%)** | **33 (10.5%)** | **338 (100%)** |

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 3.132[a] | 5 | .680 |
| Likelihood Ratio | 5.591 | 5 | .348 |
| N of Valid Cases | 338 | | |

a. 7 cells (58.3%) have expected count less than 5. The minimum expected count is .07.

### 4.6.3 Association between BMI and Socio-economic status

There was no statistical significant difference in BMI among all the different weight status of the participants (Table 4.17).

**Table 4.17 Socio-economic status and BMI cross-tabulation**

**socio-economic status of respondents * Norm for BMI Cross-tabulation**

| Socio-Economic Status of respondent | Norm for BMI | | | | | | Total |
|---|---|---|---|---|---|---|---|
| | Normal Bodyweight | Obese class 1 | Obese class 11 | Obese class 111 | Overweight/ Preobese | Underweight | |
| Low | 92 (64.3%) | 10 (7%) | 1 (0.7%) | 1 (0.7%) | 24 (16.8%) | 15 (10.5%) | **143 (42.3%)** |
| medium/average | 108 (58.4%) | 18 (9.7%) | 0 | 0 | 41 (22.2%) | 18 (9.7%) | **185 (54.7%)** |
| High | 5 (50%) | 2 (20%) | 0 | 0 | 3 (30%) | 0 | **10 (3.0%)** |
| Total | **205 (60.7%)** | **30 (8.8%)** | **1 (0.7%)** | **1 (0.7%)** | **68 (20.1%)** | **33 (10.5%)** | **338 (100%)** |



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**Chi-Square Tests**

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 8.223[a] | 10 | .607 |
| Likelihood Ratio | 9.561 | 10 | .480 |
| N of Valid Cases | 338 | | |

a. 9 cells (50.0%) have expected count less than 5. The minimum expected count is .03.

### 4.6.4 Association between BMI and number of meals

There was no statistical significant difference in BMI and the number of meals per day (Table 4.18).

**Table 4.18 BMI and number of times of meal**

**Norm for BMI * number of times of meals a day Cross-tabulation**

| | number of times of meals a day | | | | |
|---|---|---|---|---|---|
| Norm for BMI | once | twice | three times | four times and more | Total |
| Normal Bodyweight | 20 (9.8%) | 109 (53.2%) | 74 (36.1%) | 2 (0.98%) | 205 (60.7%) |
| Obese class 1 | 1 (3.3%) | 12 (40%) | 17 (56.7%) | 0 | 30 (8.9%) |
| Obese class 11 | 0 | 0 | 1 (100%) | 0 | 1 (0.29%) |
| Obese class 111 | 0 | 1 (100%) | 0 | 0 | 1 (0.29%) |
| Overweight/Pre-obese | 9 (13.2%) | 31 (45.6%) | 28 (41.2%) | 0 | 68 (20.1%) |
| Underweight | 1 (3%) | 19 (57.6%) | 13 (39.4%) | 0 | 33 (9.8%) |
| Total | **31 (9.2%)** | **172 (50.9%)** | **133 (39.4%)** | **2 (0.59%)** | **338 (100%)** |



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**Chi-Square Tests**

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 12.034[a] | 15 | .676 |
| Likelihood Ratio | 13.922 | 15 | .531 |
| N of Valid Cases | 338 | | |

a. 14 cells (58.3%) have expected count less than 5. The minimum expected count is .01.

### 4.6.5 Association between BMI and number of times of fruits and vegetables

There was no statistical significant difference in BMI and number of times of fruits and vegetables (Table 4.19).

**Table 4.19 BMI and number of times of fruits and vegetables**

**Norm for BMI * number of times for fruits and vegetables Crosstabulation**

| | number of times for fruits and vegetables | | | | |
|---|---|---|---|---|---|
| Norm for BMI | daily | two to three times a week | twice a month | do not eat | Total |
| Normal Bodyweight | 24 | 116 | 46 | 19 | 205 |
| Obese class 1 | 4 | 20 | 5 | 1 | 30 |
| Obese class 11 | 1 | 0 | 0 | 0 | 1 |
| Obese class 111 | 0 | 1 | 0 | 0 | 1 |
| Overweight/Pre-obese | 7 | 42 | 13 | 6 | 68 |
| Underweight | 2 | 26 | 3 | 2 | 33 |
| Total | **38** | **205** | **67** | **28** | **338** |

**Chi-Square Tests**

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 16.225[a] | 15 | .367 |
| Likelihood Ratio | 13.800 | 15 | .541 |
| N of Valid Cases | 338 | | |

a. 12 cells (50.0%) have expected count less than 5. The minimum expected count is .08.



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### 4.6.6 Association between BMI and number of hours watching TV

There was no statistical significant difference in BMI and number of hours watching TV (Table 4.20).

**Table 4.20 BMI and number of hours watching TV**

**Norm for BMI * time spent Crosstabulation**

| Norm for BMI | time spent | | | | Total |
|---|---|---|---|---|---|
| | 30min-1hr | 1hr30-2hr | 2hr30 and more | not applicable | |
| Normal Bodyweight | 41 (20%) | 58 (28.3%) | 56 (27.3%) | 50 (24.4%) | 205 (60.7%) |
| Obese class 1 | 11 (36.7%) | 6 (20%) | 7 (23.3%) | 6 (20%) | 30 (8.9%) |
| Obese class 11 | 0 | 1 (100%) | 0 | 0 | 1 (0.3%) |
| Obese class 111 | 1 (100%) | 0 | 0 | 0 | 1 (0.3%) |
| Overweight/Preobese | 11 (16.2%) | 31 (45.6%) | 15 (22.1%) | 11 (16.2%) | 68 (20.1%) |
| Underweight | 9 (27.3%) | 13 (39.4%) | 8 (24.2%) | 3 (9.1%) | 33 (9.8%) |
| **Total** | **73 (21.6%)** | **109 (32.2%)** | **86 (25.4%)** | **70 (20.7%)** | **338 (100%)** |

**Chi-Square Tests**

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 22.044[a] | 15 | .107 |
| Likelihood Ratio | 21.515 | 15 | .121 |
| N of Valid Cases | 338 | | |

a. 8 cells (33.3%) have expected count less than 5. The minimum expected count is .21.

### 4.6.7 Association between BMI and advertised food

There was a statistical significant difference in BMI between the group of students who stated that advertisement encouraged them to eat the commercial foods that were advertised on TV and the group that stated that advertisement does not encourage them to eat the commercial foods that were advertised on TV (Table 4.21).



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**Table 4.21 BMI and advertised food**

**Norm for BMI * advertisement encourage Cross-tabulation**

| Norm for BMI | advertisement encourage | | Total |
|---|---|---|---|
| | yes | no | |
| Normal Bodyweight | 121 (59%) | 84 (41%) | 205 (60.7%) |
| Obese class 1 | 15 (50%) | 15 (50%) | 30 (8.9%) |
| Obese class 11 | 0 | 1 (100%) | 1 (0.3%) |
| Obese class 111 | 0 | 1 (100%) | 1 (0.3%) |
| Overweight/Pre-obese | 48 (70.6%) | 20 (29.4%) | 68 (20.1%) |
| Underweight | 26 (78.8%) | 7 (21.2%) | 33 (9.8%) |
| **Total** | **210 (62.1%)** | **128 (37.9%)** | **338 (100%)** |

**Chi-Square Tests**

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 11.957[a] | 5 | .035 |
| Likelihood Ratio | 12.916 | 5 | .024 |
| N of Valid Cases | 338 | | |

a. 4 cells (33.3%) have expected count less than 5. The minimum expected count is .38.

### 4.6.8 Association between BMI and physical activities

There was no statistical significant difference in BMI between the group of participants that are involved in physical activities and the group that are not involved in physical activities (Table 4.22).

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Table 4.22 BMI and physical activities

**Norm for BMI * involvement in physical activity Crosstabulation**

| Norm for BMI | involvement in physical activity | | Total |
|---|---|---|---|
| | yes | no | |
| Normal Bodyweight | 137 (66.8%) | 68 (33.2%) | 205 (60.7%) |
| Obese class 1 | 19(63.3%) | 11(36.7%) | 30 (8.9%) |
| Obese class 11 | 1 (0.3%) | 0 | 1 (0.3%) |
| Obese class 111 | 1 (0.3%) | 0 | 1 (0.3%) |
| Overweight/Preobese | 41 (60.3%) | 27 (39.7%) | 68 (20.1%) |
| Underweight | 19 (57.6%) | 14 (42.4%) | 33 (9.8%) |
| Total | **218 (64.5%)** | **120 (35.5%)** | **338 (100%)** |

**Chi-Square Tests**

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 2.821[a] | 5 | .728 |
| Likelihood Ratio | 3.453 | 5 | .630 |
| N of Valid Cases | 338 | | |

a. 4 cells (33.3%) have expected count less than 5. The minimum expected count is .36.



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# CHAPTER 5

## DISCUSSION OF RESULTS

### 5.1 Introduction

The study aimed at describing the determinants of obesity among students of the University of Venda and also ascertained the relationships between body status and socio-demographic variables, eating practices as well as environment and physical activities variables among the sample population. The results are discussed and compared with available literature within the context with the aim of the study.

### 5.2 Limitations of the study

Limitations that might be associated with this study are mainly with the instrument used in data collection. The questionnaire did not request information about pregnancy; therefore there is possibility that female participants in early stages of pregnancy might have participated unnoticed, this could have influenced such participants' weight status.

### 5.3 BMI distribution across demographic characteristics

This study found that malnutrition among participants exists in the form of under and over nutrition. The study also revealed gender differences among the types of malnutrition. Wherein female participants were more underweight, overweight and obese than their male participants, notably more male participants have normal bodyweight than that their female counterparts.

These findings were similar to the findings of Murray (2014) in South Africa which established that, seven (7) out of 10 women and four (4) out of 10 men in South Africa have significantly more body fat than what is deemed healthy and that of the 70% of overweight South African women, 42% are obese. Further studies that confirmed the findings of this study include study conducted by Pengpid and Peltzer (2014) among University students in India. In their study normal weight was higher in male than in female but an aspect of this finding differs with Pengpid and Peltzer (2014) in terms of overweight where in their study, male were more overweight than female however, central obesity was more in the female than in male. On the contrary to this findings, in a similar study by Sardinha, Santos,Silva,Coelho-e-Silva and Raimundo et al,(2012) on the prevalence of overweight, obesity, and abdominal obesity in a representative sample of Portuguese adults; their findings show that overweight and obesity were predominantly prevalent among the male than in the female. The findings by Nwachukwu, Nwagha, Obikili,Ejezie, Okuosa, Nweke and Ezeh (2010) in their study titled "assessment of body mass index and blood pressure among



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University students in Enugu, south east, Nigeria" is similar to those of Sardinha et al, (2012). Nwachukwu et al, (2010) findings show that more females than males were underweight, more males than female were overweight and more males than females were obese.

The prevalence of underweight, overweight and obesity was noticed within all age brackets however, overweight and obesity was more prevalent within age 20-25 years while obesity class I and II which indicates higher risks were found in the higher age bracket (31-35). In a similar study by Basu, Das, Dhar,Datta,Chattopaddhyay, Baghi and Pal (2014) the result showed that obesity among students age less than 20 years were less (12.5%) that the rate of obesity (28.3%) among students in higher ages.

Other ethnic background did not participate in the study because University of Venda is in predominantly black ethnic community so all the participants were from the black ethnic background. South African constituted 96% while Foreign Nationals constituted 4% of the participants. All underweight participants and more than 95% of participants that have normal body weight were South African nationals; and almost all (99%) overweight and obese participants were South Africans. These findings concurred to those of Malhotra, Hoyo, Ostbye,Hughes, Schwartz,Tsolekile, Zulu and Puoane (2008) where in their study titled the determinants of obesity in urban South Africa found that Black population residing in an urban Township showed a higher prevalence of obesity than those residing in the rural areas.

There was prevalence of underweight; overweight and obesity in both the undergraduate and post-graduate levels. However, more than 90% of the different weight statuses were concentrated within the undergraduate level of study. This is in agreement with the findings of Lubel (2012); Stephens (2013) that linked high obesity rate to lower educational. More so, this findings agreed with the Centre for Disease Control CDC United States, Health Report, (2011) which state that obesity rate was found to be higher among individuals with low level of education than those with higher education level. More educated people who earn more money have lower rates of chronic diseases including obesity, compare to people with lower education and income level.

The Participants that are married constitute only 3% of the sampled population; 96% were single and 1.5% were in other kinds of relationship which were not specified. The underweight participants were all single at the time of this study; of the students that have normal body weight 2.9% were married, 96% were single and 1.5% in other kinds of relationships which were not specified. There were 2.9% overweight participants that are



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married; 94% single and 2.9% in other kinds of relationship which were not specified. There were 6.3% of participants that are obese and married while 94% are single and obese.

Of the 33 (9.8%) participants that were underweight 3 (9.1%) are from Town, 3 (9.1%) from Township and 27 (82%) from the rural areas. Among normal body weight participants, 13%, 18%and 69% were from Town; Township and the rural areas respectively. There were 7(10%) participants from town who are overweight, 16 (24%) from township are overweight while 45 (66%) from rural areas were overweight. Of the 32 (9.5%) participants that were obese, 6 (19%) are from town, 8 (25%) from township and 18 (56%) from the rural areas.

In terms of socio-economic status (SES) 42.3% has low SES, 18 (54.7%) medium/average SES and 3% have high SES. However there is higher prevalence of underweight, overweight and obesity among participants with medium/average SES. This finding is contrary to the findings by O"Dea (2008) which showed that obesity is more prevalent among students from a low SES than those from a high SES in Australia. Similarly, Ogben, Lamb, Carroll and Flegal (2010) findings in the USA study showed that obesity prevalence in male is more or less the same at all income levels except where it changed along different ethnicity with non-Hispanic black and Mexican-American men having increased obesity along higher income levels. Moreover Ogben et al (2010) also found that women on the other hand, had an opposite trend, showing lower obesity rates at higher income levels and higher obesity at lower income levels.

### 5.4 Dietary practices/Patterns

#### 5.4.1: Number of meals per day

Participants mostly eat twice instead of three times a day; moreover, 30% skip breakfast. This is not good dietary practice as breakfast is considered the most important meal. These findings were partly in agreement with those of Sakamaki et al, (2005) where it was established that majority of university students in Korea (58.9%) and in Japan (81%) eat twice a day; however majority of these students skip breakfast.

#### 5.4.2 The place of breakfast / Including fruits and vegetables

There are more (50.3%) participants who eat their breakfast in their rooms, however,19.2% have their breakfast at the University cafeteria while 0.9% eats breakfast at restaurants outside the school. The importance of fruits and vegetables in breakfasts has been recognised by 50% of students that stated that they include fruit and vegetables to their breakfast while the other 50% do not include fruits and vegetables. The number of times they include fruits and vegetables differs. Majority (60.7%) include fruits and vegetables two to three times a week. Daily consumption of fruits and vegetables is a healthy dietary



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practice which University students in China had adopted. and this The findings of Sakamaki et al, (2005) show that majority (80%) of students in the University of China eats fruits and vegetables daily.

### 5.4.3 Restaurant/fast food choice, snacking and being vegetarian

Unhealthy eating practices can increase the chances of obesity and its consequent many dangers such as high blood Pressure, high blood cholesterol, type 2 Diabetes, Insulin resistance, coronary heart disease, and stroke and bladder control problems. Modern/urban lifestyle of eating western diets in fast-food restaurants has been gaining popularity in post-independent South Africa and this is also observed among the student population. Majority (59%) of student regularly patronise KFC and Nandos as their choice restaurants; Furthermore, in-between meals, students eat majority of participants (74%) eat snacks with friends; this show a high rate of influence by friends on the choice of snacks in between meals. This is in agreement with the findings of Klazine (2008) that many adolescents identified seeing other people eating or drinking and smelling fast food as factors that influenced their eating and drinking patterns.

This finding confirms nutrition transition in South Africa from a traditional home-made food/diet to a modern/urban high- dense fat, refined carbohydrate, fried foods. It also agrees with the South African National Health and Nutrition Examination Survey (SANHANES, 2012) report which shows that poor or unhealthy eating practices and lack of basic nutritional knowledge was common in South Africa as: 39.7% participants in the survey consumed a diet low in dietary diversity indicative of a diet of poor nutritional quality. Almost one out of five participants consumed a diet with a high fat score (18.3%) and high sugar score (19.7%), and one out of four consumed a diet with a low fruit and vegetable score (25.6%). Similarly, Van der Merwe, and Pepper, (2012), findings established that there was a high prevalence of obesity, poor eating habit and inadequate knowledge on key nutritional issues by university students. Study by Singh, Arthur, Orlich, James, Purty, Job, Rajaram and Sabate'(2014)also confirm nutritional transition in Indian where even the vegetarians are transiting from whole plant food (fruits, vegetables, nuts,seeds, unrefined whole grains) to refined carbohydrates,fast-foods/snacksfood/processed foods and fried foods. Students who are vegetarian represent 10% of the participants and they stated the reasons for becoming a vegetarian, health reasons was the highest (57%).

### 5.4.4 Student's time spent on TV and programme choice (Sedentary behaviour)

Majority of participants (66%) like watching TV and with watching soapies as their favourite programme. The participants also stated the number of time per day that they watch their



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favourite programmes. Majority (37.3%) watch once, 24.9% watch twice and 19.5% watch three times per day. For each time they view TV, 23.1% spent 30min-1hr; 32.2% spent 1hr 30min – 2hrs and 25.4% spent 2hrs 30 and more watching their favourite programme.

As students spend time watching TV, frequently they are presented with advertisements of diverse kinds of commercial food which might influence their choice for these foods. This was confirmed in their responses when asked if they like these advertised commercial foods, 61% of the participants liked advertised commercial foods, 25% do not like and 14% were undecided. Participants identified commercial food that are advertised on TV and are most likely to influence them to eat. Majority 181 (54%) named soft drinks, 71 (21%) identified chips (16%) named cake and 32 (9%) stated other kinds of advertised commercial foods. Furthermore, of the 221 participants that eat while watching TV, 154 (70%) stated that they are encouraged by advertisement to eat and 67(30%) stated otherwise. The kind of food they eat while watching TV also was asked and 36% stated Pap/rice, 39% named nik-naks/sweets; 9% eat chips, 11% stated soft drinks and 6% named other kinds of food. This finding agreed with findings of Beales III and Kulick (2013), which found positive relation between TV viewing and the influence of TV advertisement on obesity.

Time spent watching TV during weekdays before 6pm and after 6pm as well as on weekend before and after 6pm was asked in order to determine how long they spend time viewing TV. Those who do not watch TV before 6pm represents 37% of the participants. However, of those that watch TV before 6pm on weekdays, 18.3% watch for less than 1 hour; 26.3% watch for 1to 2hours per day, 8% watch for 2 to 3 hours per day, 4.7% watch for 3-4 hours per day and 5.6% watch TV for more than 4 hours per day before 6pm. After 6pm during the weekdays 19.8% do not watch TV, 21% watch for less than 1 hour a day, 30.8% watch for 1to 2 hours a day; 15.1% watch TV between 2 to 3hours per day, 6.2% watch between 3 to 4 hours per day and those that watch TV for more than 4 hours represents 7.1% of the participants. This finding show that more of the students watched TV after 6pm than before 6pm. During weekend before 6pm, 24.6% do not watch TV, 16.9% watch TV for less than 1hour a day; 19.2% watch between 1 to 2 hours per day. Between 2 to 3 hours per day, 21% of the participants watch TV per day; 8% watch TV between 3 to 4 hours and 10.4% watch TV for more than 4 hours a day. After 6pm on a weekend, 22.5% do not watch TV; 12.7% watch for less than 1 hour per day, those that watch between 1 and 2 hours represents 17.5% of the participants, 15.7% watch TV for 2 to 3 hours per day; 16.3% watch TV between 3 to 4 hours per day and 15.4% watch TV for more than 4 hours per day. This findings show that more students view TV before 6pm on weekends than after 6pm. In this study, the reported time spent by students viewing TV was less than that reported by Hamer,



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Weiler and Stamatakis (2014), were an average of 5 hours was reported as time spent viewing TV, however Hamer et al, (2014) study showed that the male participants spent more time than female watching TV and programme mostly viewed was sports, it was concluded that there was an association between watching of sports on TV and obesity.

## 5.5 Physical activity

### 5.5.1 Physical activity patterns

The section C of the questionnaire asked questions pertaining to the type and the frequency of physical activities engaged by students. When asked if they are engaged in physical activities 64% answered in the affirmative while 36% stated no. Of those who engaged in physical activities 36% engaged in walking, 25% do running; 5% play with friends, 20% play soccer; 6.8% play net ball and 6.8% stated that they do house chores. The level of physical activity among participants was more than 30 minutes per episode. Majority (88%) stated that they do not have any form of ill health that may hinder them from engaging in physical activities; however, 5% have breathing/asthmatic conditions; 0.6 diabetes, 0.8% health disease; 3.8 high blood pressure and 1.8% stated other forms of health conditions. Engaging in moderate to vigorous physical activities (MVPA) is one the most often suggested ways of reducing overweight and obesity but consistency or making it a daily habit increases the rate of reduction in overweight and obesity. Findings of this study show that participants were not consistent in their physical activity patterns as majority (94%) do not engage daily in physical activities and so there was no difference in BMI among participants in terms of physical activities as overweight and obesity were prevalent among those who claimed to engage in physical activities and those that do not. This is consistent with the findings of study by Labree, van de Mheed, Rutten, Rodenburg, Koopmans and Foets (2015), which showed that physical activities was not associated with BMI and the prevalence of overweight and obesity among the study population.

### 5.5.2 Activities in and around the residence

The activities in and around the residence was mainly for the purpose of preparing food, cooking and washing, shopping for food and groceries; cleaning the room ,and doing the laundry and ironing. However on the average, majority of the participants spent between 1 -3 hours a day doing different activities.



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### 5.5.3 Recreation activities

Engaging in vigorous physical activity is an encouraging healthy lifestyle seen among the participants. Walking for pleasure (73.4%), exercises with weights (46.6%); dancing: 31.4%, competitive running: 33.4%, jogging: 50.3%; tennis: 10 %. Football, rugby: 28.4%. Netball, volleyball or basket: 17.5%. Snooker: 20.7%. Musical instrument: 20.7%. Boxing:7.4% does boxing but with varying amount of time per week/month and average time per episode recorded as 30 minutes.

### 5.5.4 The pattern of sleeping among students

During weekdays majority (97%) slept between 9-12am. However, on weekends more students kept awake until very late. Notwithstanding the fact that student slept late, majority (91.4%) had more than 6 hours sleep by waking up late in the mornings on weekends, however, about 8.4% slept for less than 6 hours. In Pengpid and Peltzer (2014), study show association between shorted duration of sleep and overweight/obesity among male and female.

### 5.6 Waist Circumference/ Waist-hip ratio

The waist circumference of participants was measured in order to determine the possibility of risk of obesity among male and female. The current study shows that more female participants had increased and substantial risk of obesity while male had higher ideal waist circumference. Likewise, waist to hip ratio revealed central adiposity and increased risk of obesity to be more prevalent in female participants than male. The waist to hip ratio of participants was measured in order to determine central adiposity and increased risk of obesity among male and female. This concurred with the result of study by Chamieh, Moore, Summerbell ,Tamim, Sabai and Hwalla, (2015) which showed that women had a higher elevated waist circumference compared to men of which it was statistically significant.

### 5.7 Association between BMI and variables

There was no statistical significant difference in BMI between the undergraduate and the post-graduate group. Overweight and obesity was prevalent in both levels of study. This finding agreed with a similar study by Adderley (2007) where there was no statistical significant difference in BMI between the students in different levels of studies in the USA. Also there was no statistical significant difference in BMI and socioeconomic status. Among all the different weight status there was participants from different SES. Contrary to this finding is the result of a similar study by Alaba and Chola (2014) in which there was a statistical significant difference between obesity and socioeconomic status. There was no



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statistical significant difference in BMI and the number of meals per day. There are underweight, overweight and obesity status prevalent across all the different meals patterns per day. Similarly, there was no statistical significant difference in BMI and number of times of fruits and vegetables. Although participants stated that they include fruits and vegetable in their meals, however, that did not show any difference in BMI.

There was no statistical significant difference in BMI and number of hours watching TV rather there was a statistical significant difference in BMI between the group of students who stated that advertisement encouraged them to eat the commercial foods that were advertised on TV and the group that stated that advertisement does not encourage them to eat the commercial foods that were advertised on TV. There was no statistical significant difference in BMI between the group of participants that are involved in physical activities and the group that are not involved in physical activities. This result did not concur with the study by Dabrowska, Dabroska-Galas, Nawoska and Wodarska (2015) in which there was significant correlation between BMI and physical activities among females who participated in that study. This study concurred with the findings of study be Pengpid and Peltzer (2014) in which there was no association between physical activity, sedentary behaviour; poor dietary behaviour and overweight/obesity.

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# CHAPTER 6

## CONCLUSIONS AND RECOMMENDATIONS

### 6.1 Introduction

This study focused on determining the obesity status of students using Body Mass Index (BMI) and Waist-to-hip ratio (WHR) as measures. Examined the socio-demographic factors of obesity among students; assessed the eating practices of students; Identify the environment and physical activities students engage in and also determined the relationships between body status and socio-demographic variables, eating practices as well as Environment and physical activities variables. In this chapter the researcher presents the conclusion from the findings of the study and the recommendations.

### 6.2 Conclusions

Overweight and obesity is prevalent among student population with 20% of the participants being overweight and 9.5% obese. Factors contributing to difference in weight status are multifaceted and include socio-demographic variables, dietary practices and physical activities. Moreover, there was statistical significant difference in BMI between male and female gender with female (66%) being more obese than male (34%). Overweight and obesity was more prevalent within age 20-25 years while obesity class I and II indicating higher risks were found in the higher age bracket (31-35), therefore in terms of socio-demographic variable this study found gender and age of participants as important factor of overweight and obesity.

Students eat two meals a day instead of three. More students eat breakfast in their rooms as compared to the student cafeteria. The frequency of eating breakfast is 2-3 times a week and not daily as expected. Furthermore, they choose unhealthy snacks such as nick-naks, chocolates, sweet, peanuts and less fruits and vegetables in their diet. Moreover majority, (74%) of participants stated that they eat their snacks with friends; this show a high rate of influence by friends on the choice of snacks in between meals.

Comparing socioeconomic status (SES), number of meals per day; including fruits and vegetables and BMI did not show significant differences in weight status and so was not sufficient in explaining the prevalence of overweight and obesity found among students population. Overweight and obesity was found among students in all classes of SES.



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Engaging in physical activities and also the number of times spent watching TV was compared with BMI, but did not show significant differences in explaining the overweight and obesity found in students. Those that engaged in physical activities were not consistently doing it and so overweight and obesity were found not only in the group that does not engage in physical activities but also in the group that does physical activity. Likewise there was no variation in the BMI of those that do not watch TV, those that watch TV for either one hour or more in a day. However, there was statistical significant difference in BMI between the group of students who stated that advertisement encouraged them to eat the commercial foods that were advertised on TV and the group that stated that advertisement does not encourage them to eat the commercial foods that were advertised on TV.

### 6.3 Recommendations

The findings from eating practices showed that students engaged in unhealthy eating practise. This study recommendation is that regular nutrition education campaign be carried out in the university in other to motivate more healthy food choices such as daily consumption of balanced diets, fruits and vegetables as well eating of breakfast daily.

Students engaged in physical activities but were not consistent in doing their activities. Engaging in moderate-to- vigorous physical activity (MVPA) can yield the expected result of reducing overweight and obesity at a faster rate when MVPA becomes a daily habit. This study therefore recommends a daily MVPA as a lifestyle among student population.

### 6.4 Future research

This study aimed to identify the determinants of obesity among students of the University of Venda and also determined the relationships between body status and socio-demographic variables, eating practices as well as environment and physical activities variables. Further research should be done on overweight and obesity among students but using a prospective research design in order to follow up on the pattern/ trend of the weight statuses of the first year students from when they are admitted into the University through to their completion of a three year's degree program and the factors that explain the pattern/ trend in weight status.





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## APPENDICES

## APPENDIX 1: REQUEST TO CONDUCT RESEARCH

P.O.Box 3535
Makhado
0920
23 March, 2015

The University Management
University of Venda
P/Bag x5050
Thohoyandou 0950

Dear Sir/Madam

**RE: REQUEST TO CONDUCT A RESEARCH PROJECT ABOUT THE DETERMINANTS OF OBESITY AMONG STUDENTS**

I, Aghanenu Godfrey Chukwudi, a Masters Student at the Department of Public Health of the University of Venda hereby requests for permission to undertake a study on the campus entitled **The Determinants of obesity among students of the University of Venda.** This study has been prompted by the problem of overweight and obesity which is prevalent in our communities. Overweight is a modifiable risk factor of cardiovascular, respiratory, metabolic (type 2 diabetes) and muscular skeletal disorders. The researcher also observed that the majority of students do not utilise the physical exercise equipment at the gym that are provided by the University or engage in any sporting activity. This study aims to determine overweight and obesity status and factors causing this in University of Venda using BMI, WC and WHR as measures. The study therefore will describe the association between these determinants and weight status.

The study will involve the following processes; identifying the participants, giving of information to them about the aim of the study and eventually giving them a questionnaire to complete. Body weight and height will be measured as well as waist and hip circumferences. All information gathered in this study will be kept strictly confidential. A respondent's decision to participate in this research will be voluntary and he/she can withdraw from the study at any time.

I trust my request will meet with your approval. Thanking you in advance for your cooperation.

Sincerely

Aghanenu Godfrey Chukwudi
Student No: 11614206
godfreygoc@gmail.com Cell: 0783486064



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## APPENDIX 2: UNIVERSITY OF VENDA RESEARCH ETHICS COMMITTEE APPROVAL

RESEARCH AND INNOVATION
OFFICE OF THE DIRECTOR

NAME OF RESEARCHER/INVESTIGATOR:
**Mr GC Aghanenu**

**Student No:**
11614206

PROJECT TITLE: **The determinants of obesity among students of the University of Venda, Limpopo Province of South Africa.**

PROJECT NO: **SHS/15/PH/20/2810**

SUPERVISORS/ CO-RESEARCHERS/ CO-INVESTIGATORS

| NAME | INSTITUTION & DEPARTMENT | ROLE |
|---|---|---|
| Dr TG Tshitangano | University of Venda | Supervisor |
| Ms HV Mbhatsani | University of Venda | Co-Supervisor |
| Mr GC Aghanenu | University of Venda | Investigator - Student |

ISSUED BY:
UNIVERSITY OF VENDA, RESEARCH ETHICS COMMITTEE

Date Considered: October 2015
Decision by Ethical Clearance Committee Granted
Signature of Chairperson of the Committee: .....
Name of the Chairperson of the Committee: Prof. G.E. Ekosse

University of Venda
PRIVATE BAG X5050, THOHOYANDOU, 0950λ LIMPOPO PROVINCEλ SOUTH AFRICA
TELEPHONE (015) 962 8504/8313 FAX (015) 962 9060
*"A quality driven financially sustainable, rural-based Comprehensive University"*



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## APPENDIX 3: REQUEST TO INVOLVE STUDENTS IN THE RESEARCH

P.O.Box 3535
Makhado
0920
09 October, 2015

The Student Affairs Directorate
University of Venda
P/Bag x5050
Thohoyandou 0950

Dear Sir/Madam

**RE: REQUEST TO CONDUCT A RESEARCH PROJECT ABOUT THE DETERMINANTS OF OBESITY AMONG STUDENTS**

I, Aghanenu Godfrey Chukwudi, a Masters Student at the Department of Public Health of the University of Venda hereby requests for permission to undertake a study on the campus entitled **The Determinants of obesity among students of the University of Venda.** This study has been prompted by the problem of overweight and obesity which is prevalent in our communities. Overweight is a modifiable risk factor of cardiovascular, respiratory, metabolic (type 2 diabetes) and muscular skeletal disorders. The researcher also observed that the majority of students do not utilise the physical exercise equipment at the gym that are provided by the University or engage in any sporting activity. This study aims to determine overweight and obesity status and factors causing this in University of Venda using BMI, WC and WHR as measures. The study therefore will describe the association between these determinants and weight status.

The study will involve the following processes; identifying the participants, giving of information to them about the aim of the study and eventually giving them a questionnaire to complete. Body weight and height will be measured as well as waist and hip circumferences. All information gathered in this study will be kept strictly confidential. A respondent's decision to participate in this research will be voluntary and he/she can withdraw from the study at any time.

I trust my request will meet with your approval. Thanking you in advance for your cooperation.

Sincerely

Aghanenu Godfrey Chukwudi
Student No: 11614206
godfreygoc@gmail.com Cell: 0783486064



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## APPENDIX 4: CONSENT FORM

My name is **Aghanenu Godfrey Chukwudi** student No. 11614206. I am a Masters student at the University of Venda registered for Masters in Public Health degree (MPH). My research focuses on **The Determinants of obesity among Students of the University of Venda.** This study has been prompted by the problem of overweight and obesity which is prevalent in our communities. It is for this reason that the researcher finds it necessary to carry out this study in order to determine obesity status of students using BMI, WC and WHR as measures. The study will also identify the determinants of obesity among the study population and describe the association between these determinants and weight status.

The process will involve the following: giving of information to participants about the aim of the study and eventually handing over to them a copy the questionnaire to complete. Participants' weight and height will then be measured as well as their Waist and hip circumferences. All information gathered in this study will be kept strictly confidential, and no information will be used for the purposes other than those intended for. A respondent's decision to participate in this research will be voluntary and he/she can withdraw from the study at any time.

I am inviting you to participate in this study. Please note that any information you will provide will be treated as confidential and therefore will not be divulged to anyone without your consent. As indicated earlier your participation is voluntary, say you are therefore free to pull out at any time should you feel uncomfortable during the course of the study.

Signature of researcher…… Date……

I …… have read and understood the contents and terms of this invitation to participate in this study. I hereby declare that I am voluntarily participating in this research.

Respondent signature…… Date……

For more information contact:

Aghanenu G.C (Researcher)-0783486064 or

e-mail godfreygoc@gmail.com



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## APPENDIX 5:

## ANTHROPOMETRIC MEASUREMENTS RECORD SHEET

| Measurement | First recordings | Second recordings | Average |
|---|---|---|---|
| 1. Weight | Wt 1<br>.....kg | Wt 2<br>.....kg | Average |
| 2. Height | Ht1<br>.....cm | Ht2<br>.....cm | |
| 3. Body Mass Index | Weight<br>.....<br>Height | Weight<br>.....<br>Height | |
| Waist | _____ | | |
| Hip | _____ | | |
| Waist/Hip Ratio | _____ | | |
| | _____ | | |



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APENDIX 6:

DETERMINANTS OF OBESITY QUESTIONNAIRE (DOOQ)

## SECTION A: SOCIO-DEMOGRAPHIC INFORMATION

1. Gender: Male ☐ Female ☐

2. Age: (17 -19) ☐ (20-25) ☐ (26-30) ☐ (31-35) ☐ (36-40) ☐ Above 40 ☐

3. Ethnic Background: Black ☐ White ☐ Coloured ☐ Indian ☐

4. Nationality: South African ☐ Non-South African ☐

5. What is your academic status? Undergraduate ☐ Post-graduate ☐

6. What is your marital status? Married ☐ Single ☐ Other: Specify.....

7. Where is your permanent residential zone? Town ☐ Township ☐ Rural areas ☐

8. In terms of socio-economic status (SES) ie. Income Levels, How would you classify yourself/your parents? Low ☐ Medium/average, ☐ High ☐

## SECTION B: DIETARY PRACTICES/PATTERNS

9. How many times do you eat meals per day?

1. Once ☐ 2. Twice ☐ 3. Three times ☐ 4. Four times and more

10. Do you eat breakfast?

1. Yes ☐ 2. No ☐

11. How often do you eat breakfast?

1. Daily ☐ 2. 2-3 times a week ☐ 3. 4-6 times a week ☐ 4. Do not eat ☐

12. Where do you usually eat breakfast?

1. At the cafeteria ☐ 2. In my room ☐ 3. At Restaurants outside the School ☐

13. Do you prepare food by yourself?

1. Yes ☐ 2.No ☐

14. Do you include fruits and vegetables in your daily intake?



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1. Yes ☐ 2. No ☐

15. How often do you eat fruits and vegetables?

1. Daily ☐ 2. 2-3 times a week ☐ 3. Twice a month ☐ 4. Do not eat ☐

16. What do you usually eat as a snack?

1. Fruits ☐ 2. Nik-naks ☐ 3. Chocolate/sweets ☐ 4. Peanuts ☐

17. Who do you usually eat food with at school?

1. Friends ☐ 2. Alone ☐

18. Do you like watching television?

1. Yes ☐ 2. No ☐ 3. Do not know ☐

19. What is your favourite programme?

1. Soapies ☐ 2.Youth programme ☐ 3. Drama ☐ 4. Movies ☐ 5. Sports/ soccer/rugby ☐

20. How many times do you watch television per day?

1. Once ☐ 2. Twice ☐ 3. Three times ☐ 4. Do not watch ☐

21. How long do you view television each time?

1. 30 min-1hr ☐ 2. 1h30-2hr ☐ 3. 2h30 and more ☐ 4. Not applicable ☐

22. Do you like commercial foods that are being advertised on television?

1. Yes ☐ 2. No ☐ 3. Do not know ☐

23. What kinds of food that are usually advertised?

1. soft drinks ☐ 2.chips ☐ 3.cakes ☐ 4.other (specify).....

24. Do these advertisements encourage you to eat these foods?

1. Yes ☐ 2. No ☐

25. Do you eat while you are watching television?

1. Yes ☐ 2. No ☐



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26. If yes, what kind of foods do you usually eat while watching television?

1. Pap/ rice ☐ 2. Nik-naks/ sweets ☐ 3.Chips ☐ 4.Soft drink ☐

5. other (specify).....

27. Are you a vegetarian?

1. Yes ☐ 2. No ☐

28. Why did you become a vegetarian?

1. Choice ☐ 2. Health reason/disease ☐ 3. Religion ☐ 4. Sibling's influence ☐

29. How often do you eat fast food/ at restaurant?

1. Once a week ☐ 2. 2-3 a week ☐ 3. Once a month ☐ 4. After 3 months or more ☐

30. What type of fast food do you usually eat?

1. KFC ☐ 2.Nando's ☐ 3.Burger ☐ 4.Pizza ☐

5. other (specify).....

31. Are you involved in any type of physical activity?

1. Yes ☐ 2.No ☐

40. What type of activity do you do?

1. Walking ☐ 2. Run ☐ 3. Play soccer ☐ 4. Netball ☐ 5. Play with frien ☐ 6. Do house chores ☐

41. Do you suffer from the following condition?

1. Breathing problem/ Asthma ☐ 2. Diabetes ☐ 3. Heart disease 4. ☐ High blood pressure ☐ 5. other (specify).....



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## SECTION C: PHYSICAL ACTIVITY PATTERNS

### 42. GETTING UP AND GOING TO BED

*Please put a time in each box*

| DAY OF THE WEEK | AVERAGE OVER THE PAST YEAR | |
|---|---|---|
| | At what time do you normally go to bed? | At what time do you normally get up? |
| On a week day | | |
| On a weekend | | |

### 43. TV OR VIDEO VIEWING

| Hours of TV or Video watched per day | AVERAGE OVER THE LAST 12 MONTHS | | | | | |
|---|---|---|---|---|---|---|
| | None | Less than 1 hr a day | 1to2 hrs a day | 2 to 3 hrs a day | 3 to 4 hrs a day | More than 4hrs a day |
| On a weekday before 6pm | | | | | | |
| On a weekday after 6pm | | | | | | |
| On a weekend before 6pm | | | | | | |
| On a weekend after 6pm | | | | | | |



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## 44. ACTIVITIES IN AND AROUND THE RESIDENCE

| APPROXIMATE NUMBER OF HOURS EACH WEEK | AVERAGE OVER THE LAST 12 MONTHS | | | | | |
|---|---|---|---|---|---|---|
| | None | Less than 1 hr a day | 1to3 hrs a day | 3 to 6 hrs a day | 6 to 10 hrs a day | More than 10 hrs a day |
| Preparing food, cooking and washing | | | | | | |
| Shopping for food and groceries | | | | | | |
| Cleaning the room | | | | | | |
| Doing the laundry and ironing | | | | | | |

## 45. RECREATION (The following questions ask about how you spent your leisure time)

Please give an answer for the following NUMBER OF TIMES you did activities in the last 12 months and the AVERAGE TIME you spent on each activity.



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| APPROXIMATE NUMBERS OF EACH HOUR EACH WEEK | | | | | | | Average time per episode | |
|---|---|---|---|---|---|---|---|---|
| | None | Less than once a month | Once a month | 2 to 3 times a week | 4 to 5 times a week | 6 times or more | Hours | Minutes |
| Walking for pleasure | | | | | | | | |
| Exercises with weights | | | | | | | | |
| Dancing | | | | | | | | |
| Competitive running | | | | | | | | |
| Jogging | | | | | | | | |
| Tennis | | | | | | | | |
| Football, rugby | | | | | | | | |
| Netball, volleyball or basket | | | | | | | | |
| Snooker | | | | | | | | |
| Musical instrument | | | | | | | | |
| Boxing | | | | | | | | |



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