

**PREVALENCE AND FACTORS ASSOCIATED WITH OBESITY
AMONG NEWLY ADMITTED UNDERGRADUATE STUDENTS AT
THE UNIVERSITY OF IBADAN, NIGERIA.**

BY

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FEBRUARY, 2016

DEDICATION

This work is dedicated to the Almighty God for His grace and unending love. To my wonderful parents Elder & Deaconess M.O.Olufayo.

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ATTESTATION

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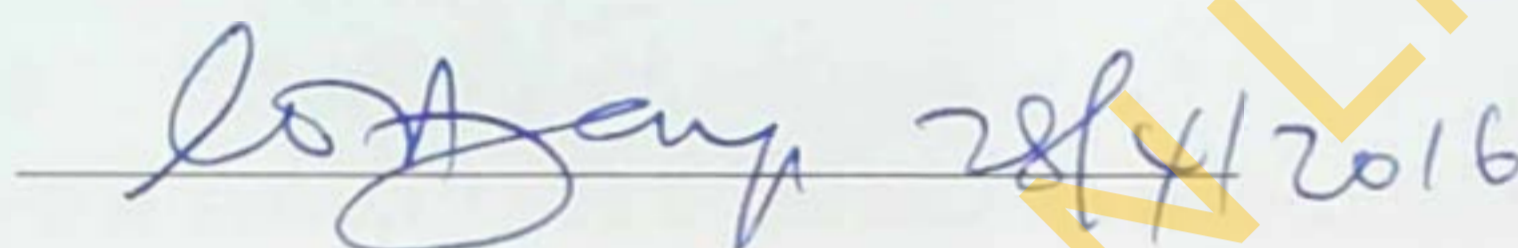
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CERTIFICATION

This is to certify that this project titled Prevalence and factors associated with obesity among newly admitted undergraduate students at the University of Ibadan, Nigeria was carried out by Olufayo Olumide, an MSc student in the department of Epidemiology and Medical Statistics, under my supervision.

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Table of Contents

Title page	i
Certification	ii
Dedication	iii
Attestation	iv
Acknowledgement	v
Table of content	vi
Abstract	ix
List of acronyms	x
List of tables	xi
List of figures	xii
CHAPTER ONE	
INTRODUCTION	1
1.1 Background of the study	1
1.2 Problem statement	2
1.3 Justification for the study	3
1.4 Research questions	4
1.5 Study objectives	4
CHAPTER TWO	5
LITERATURE REVIEW	5
2.1 Definition of obesity	5
2.2 Global burden of obesity	5
2.3 Geographical disparity in obesity rates	6
2.3.1 Burden of obesity in Africa	7
2.3.2 Burden of obesity in Nigeria	8
2.4 Major risks factors for obesity in adolescents/young adults	9
2.4.1 Dietary factors	9
2.4.2 Skipping meals	10
2.4.3 Physical Activity	10

2.4.4 Genetic influence on obesity	11
2.4.5 Smoking practices	11
2.4.6. Alcohol consumption	12
2.4.7. Sleeping Pattern	12
2.5. Health consequences of overweight/obesity	12
CHAPTER THREE	14
3.0 METHODOLOGY	14
3.1 Study Area	14
3.2 Study design	15
3.3 Study population	15
3.3.1 Inclusion Criteria	15
3.3.2 Exclusion Criteria	15
3.4 Study sample calculation	15
3.5 Sampling Technique	16
3.6 Instrument for Data collection	17
3.7 Data Management and Analysis	18
3.7.1 Study Variables	18
3.7.2 Data analysis	19
3.8 Ethical considerations	20
CHAPTER FOUR	21
4.0 RESULTS	21
4.1 Socio-demographics characteristics	21
4.2 Lifestyle and eating habits	25
4.3 Information on Meal skipping by Respondents	27
4.4 Information on smoking and sleeping pattern	29
4.5: Food Frequency Pattern of the Respondents	31
4.6 Sedentary behaviour	33
4.7. Family history of respondents on non- communicable diseases and body weight	35
4.8. Anthropometric Profile of respondents	37
4.8.1: Anthropometric Profile of respondents	39

4.9. Association between nutritional status and risk factors of overweight and obesity among respondents.	41
4.9.2 Meal commonly skipped by Gender	43
4.9.3: Alcohol intake by Gender	45
4.9.4: Association between obesity among respondents and dietary intake	47
4.9.5a: Association between obesity in respondents and dietary intake.	49
4.9.6 Physical activity level by gender	52
4.9.7: Association between Body Mass Index (BMI) and Physical activity level	54
4.9.8 Association between obesity in respondents and level of physical activities	56
4.9.9: Obesity and family history of overweight and being obese.	58
4.10: Predictors of obesity among respondents.	59
CHAPTER FIVE	62
DISCUSSION	62
5.2 Implications of findings of the study.	65
5.3 Limitations of the study	66
5.4 Conclusion	66
5.5. Recommendation	67
REFERENCE	68
Appendix I	77
Appendix II	80
Appendix III	87

ABSTRACT

Obesity is an unhealthy excess of body fat which increases the risk of medical illness and premature mortality. Overweight and obesity are the fifth leading risk for global death. They impact on co-morbidity and constitute major risk factors for a number of chronic diseases such as hypertension, cardiovascular disease and type 2 diabetes mellitus. Adolescents and young adults are susceptible to obesity in the transition stages of childhood/adolescence to adulthood. The university which is known for its level of independence exposes students to take up unguided lifestyles that could be detrimental to their health. Therefore, the findings from this research work stand to help advocate and emphasize the need for early identification and referral of overweight and obese students for control. The purpose of this study is to determine the prevalence and factors associated with overweight and obesity among newly admitted undergraduate students at the University of Ibadan.

The study was conducted in the University of Ibadan. A cross-sectional study design was used. A 3-stage sampling technique was used to randomly select 546 100Level undergraduates' students across the departments. Using a semi-structured questionnaire, information on the socio-economic status of both students and their parents were obtained, anthropometric measurements to determine Body Mass Index and Waist Circumference were carried out.

Participants included 44.9% males and 54.9% females. Overall, the prevalence of overweight and obesity was 15% and 5.5%, respectively. Females were more overweight and obese (18% and 8%, respectively) compared to the males (11.4% and 2.4%, respectively). After adjusting for other factors, gender, and family history of overweight/obesity were predictors of obesity among the students at multivariate analysis. Females were four times more likely than males to be obese (OR: 3.45; 95% CI: 1.39 – 8.57), those who had family history of overweight and obesity were three times more likely to be obese (OR: 3.04; 95% CI: 1.16 - 7.95)

The study revealed that gender, family history of overweight are potent predictors of obesity. Effective utilization of a curriculum on nutrition education will help to improve students' knowledge about nutrition, promote healthy body and weight management among students and reduce the prevalence of overweight and obesity.

Keywords: Overweight, Obesity, Body Mass Index, Risk factors, Undergraduates

Word count: 370.

ACRONYMS

BMI	Body Mass Index
CDC	Centers for Disease Control and Prevention
DALYs	Disability-Adjusted Life Years
FF	Food Frequency
IPAQ-SF	International Physical Activity Questionnaire Short- Form
LMICs	Low and Medium Income Countries
NCDs	Non Communicable Diseases
PA	Physical Activity
WC	Waist Circumference
WHO	World Health Organization

LIST OF TABLES

Table 4.1 a: Frequency distribution of the Socio-demographic Characteristics of the respondents	22
Table 4.1b: Frequency distribution of the Socio-demographic Characteristics of the respondents Parents and Guardian	23
Table 4.2: Eating habit of respondents	26
Table 4.3: Information on Meal skipping by Respondents	28
Table 4.4: Information on smoking and sleeping pattern	30
Table 4.5: Food Frequency Pattern of the Respondents	32
Table 4.6: Distribution of participants' sedentary behaviour	34
Table 4.7: Family history of respondents on non- communicable diseases and body weight	35
Table 4.8: Anthropometric Profile of respondents	38
Table 4.8.1 Anthropometric Profile of respondents	40
Table 4.9.1: Association between obesity and socio demographic factors characteristics of the respondents	42
Table 4.9.2 Meal commonly skipped by Gender	44
Table 4.9.3: Alcohol intake by Gender	46
Table 4.9.4: Association between obesity among respondents and dietary intake	48
Table 4.9.5a: Association between obesity in respondents and dietary intake	50
Table 4.9.5b: Association between obesity in respondents and dietary intake	51
Table 4.9.6 Physical activity level by gender	53
Table 4.9.7 Association between BMI and Physical activity Level	55
Table 4.9.8: Association between obesity in respondents and level of physical activities.	57
Table 4.9.9: Obesity and family history of overweight and being obese	59

Table 4.10: Binary logistic regression between risk factors and obesity among respondents

61

LIST OF FIGURE

Figure 4. 1: Categories of Physical Activity among the Respondents

24

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CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Obesity can be defined as abnormal or excessive fat accumulation that may impair health (WHO, 2015). It is also known as an unhealthy excess of body fat which increases the risk of medical illness and premature mortality (Adriana, 2014). Obesity occurs when there is imbalance between food intake and energy burn-off (NIH, 2013). The contributing factors that lead to obesity are physical inactivity, poor dietary intake, smoking, excessive alcohol consumption and genetic composition of an individual. Obesity has been associated with several non-communicable diseases such as hypertension, diabetes and lipid disorders as well as with increased morbidity and mortality among adults. (WHO, 2002).

According to Pan American Health Organization, restrictions in access to food determine two simultaneous phenomena that are two sides of the same coin i.e. poor people are malnourished because they do not have enough to feed themselves, and they are obese because they eat poorly, with an important energy imbalance. The complications of obesity include cardiovascular disease (CVD), high blood pressure, osteoarthritis, gout, gall bladder disease, respiratory problems, liver malfunction and complications in pregnancy and surgery (Whitmer, Gunderson, Barrett-Connor, Quesenberry, & Yaffe, 2005). Once considered a high-income country problem, overweight and obesity are now on the rise in low- and middle-income countries, particularly in urban settings. Obesity affects people of all ages, ethnic background and socioeconomic status. Globally, there is a disturbing trend towards increasing adiposity and according to World Health Organization fact sheet, 39% of adults aged 18 years and over (38% of men and 40% of women) were overweight in 2014, and this figure is more than double those between 1980 and 2015. Currently 300 million people can be considered as obese and due to the rising trend in obesity prevalence, this figure could be doubled by year 2025 if no action is taken against this threat. In Nigeria, WHO report puts the prevalence of overweight and obesity at 26.8% and 6.5% respectively (Ejike & Ijeh, 2012).

The major indicators to assess obesity are the Body Mass Index and Waist Circumference. Body Mass Index (BMI) is a simple index of weight-for-height that is commonly used to classify overweight and obesity in adult. It is determined by dividing body weight (in kilograms) by the square of height (in meters). BMI in adults is classified thus: $<18.5\text{kg/m}^2$ is underweight, $18.5\text{-}24.9\text{kg/m}^2$ is normal while overweight is defined by a BMI of $25.0\text{-}29.9\text{kg/m}^2$, and obesity is classified by a BMI $\geq 30.0\text{kg/m}^2$, regardless of sex. Obesity has been sub-classified to Obesity Class I if BMI is $30\text{-}34.9\text{kg/m}^2$, Obesity class II if $35\text{-}39.9\text{kg/m}^2$ and class III if BMI is $\geq 40\text{kg/m}^2$ (National Health and Medical Research Council, 2014).

Waist circumference - is considered a good estimate of the body fat (internal fat deposits) and the likelihood of developing weight related disease. It is used to assess central fat distribution and degree of abdominal obesity. For male: Waist circumference is normal at a value that is ($<94\text{cm}$), High ($94\text{-}102\text{cm}$), Very high ($\geq 102\text{cm}$). For Female: Waist Circumference is normal at ($<80\text{cm}$), High ($80\text{-}88$), very high (≥ 88). (IDF 2011). The risk of cardiovascular disease (CVD) and non-insulin dependent diabetes is high in men and women with abdominal adiposity (Ken, Andre, Kelly, Lynne, Steven, & Alan, 2008).

1.2 Problem statement

A study in one of the Nigerian tertiary institution shows that the prevalence of obesity among undergraduate students is 8% (Olusanya & Omotayo, 2011). Overweight and obesity are the fifth leading risk for global deaths. They impact on co-morbidity and constitute major risk factors for a number of chronic disease such as hypertension, cardiovascular disease and type 2 diabetes mellitus. (Poirier, Giles, Bray, Hong, Sterns, Pi-Sunyer & Eckel, 2006). At least 2.8 million adults die each year as a result of being overweight or obese. In addition, 44% of the diabetes burden, 23% of the ischemic heart disease burden and between 7% and 41% of certain cancer burdens are attributable to overweight and obesity (WHO, 2013). Obesity can exacerbate the age-related decline in physical function and lead to frailty.

Adolescents and young adults are susceptible to obesity in the transition stages of childhood/adolescence to adulthood. The length of time a young adult is obese is associated with the development of silent or subclinical, heart disease in the middle age.

It should be noted that each year that a young adult is obese, there is a tendency for such person to be at risk of developing coronary artery calcification, a subclinical predictor of heart disease. (NIH,2013). Therefore, the rising prevalence of obesity, especially among young adults, warrants the need to assess adiposity and prevent occurrences as early in life as possible.

1.3 Justification for the study

Change in foods habits, declining physical activity in schools and home, increase in sedentary habit among young adults are significant factors which contribute to imbalance between energy intake (600kcal/day) and energy expenditure as a threat of developing obesity. (CDC, 2015).The behavioral patterns (dietary, physical inactivity, smoking and alcohol consumption) of some adolescents and young adults makes them prone to issues like overweight and obesity. The university which is known for its level of independence exposes students to taken up unguided lifestyles that could be detrimental to their health. According to a study done on “Physical Inactivity in Nigeria Adults: Prevalence and Socio Demographic Correlates” shows that the prevalence of physical inactivity among Nigeria young adult is 41% (Adegokc & Oycyemi, 2011).

This is more so for new students who could be overwhelmed with the change in environment and the demanding school activities. In order to catch up, students may skip meals, eat late or eat unhealthy food such as high calorie junk food with sugar sweetened beverages which are more readily available. All these unhealthy behaviors can lead to overweight or obesity which may later impact on physical and mental health, health related quality of life, and generates considerable direct and indirect costs among these young adults. (CDC, 2015). The impact of the overbearing environment of the university on health of young new intakes in the University could be more among those who already have the risk factors. Studies have shown that such adolescents and young adults are at greater risk for developing bone and joint problems, sleep apnea, social and psychological problems such as stigmatization and poor self-esteem which could be worsened during their stay in the University. In addition, obese adolescents are more likely to have prediabetes, a condition in which blood glucose levels indicate a high risk for development of diabetes. (Lobstein, Baur & Uauy, 2004).

It should be noted that most of the young adults are not cautious about their health before coming to the university and the opportunity missed as a result of prior poor access to adolescent healthcare could be addressed in the University (Katz & Ali, 2009). The findings from this research work stand to help advocate and emphasize the need for early identification and referral of overweight/obese students for control.

1.4 Research questions

1. What are the prevalence of overweight and obesity among newly admitted undergraduate students?
2. What are the predominant risk factors of obesity among undergraduate students?
3. What is the relationship between obesity and age, gender, physical activity and dietary behavioral pattern among new intakes at University of Ibadan?

1.5 Study objectives

Broad Objective: To determine the prevalence and factors associated with obesity among newly admitted undergraduate students at the University of Ibadan.

Specific Objective:

1. To determine prevalence of obesity among newly admitted undergraduate students at University of Ibadan.
2. To determine the prevalence of factors associated with obesity among undergraduate students at University of Ibadan.
3. To assess the relationship between obesity and age, gender, physical activity, dietary behavioral, family history of obesity, perception of individual about obesity pattern among new intakes at University of Ibadan.

CHAPTER TWO

LITERATURE REVIEW

2.1 Definition of obesity

Obesity has been defined simply as a condition of abnormal or excess body fat accumulation in adipose tissue to an extent that impairs physical as well as psychosocial health and well-being (Hoelscher, Lee, Frankowski, Kelder, Ward & Scheurer, 2003). The degree of excess fat, its distribution and the associated health consequences vary considerably between obese individuals. It has been shown that the critical periods for the development of obesity are infancy, early childhood, adolescence, young adult (Lobstein, Baur, & Uauy, 2004). Obesity results from the interaction of genetic susceptibility factors and modifiable environmental factors, with genetic variations influencing a person's susceptibility to environmental factors (Popkin, 2006).

2.2 Global burden of obesity

It should be noted that almost 2 billion adults worldwide are overweight and obese which make it an important clinical and public health burdens worldwide. The prevalence of overweight were highest in the WHO Regions of the Americas (61% for overweight in both sexes, and 27% for obesity) and lowest in the WHO Region for South East Asia (22% overweight in both sexes and 5% for obesity). Women had roughly double prevalence of obesity than men in all WHO regions. Therefore, the rise in obesity has led to widespread calls for regular monitoring of changes in the prevalence of overweight and obesity among the populace. (Marie, Tom, Margaret, Blake, Nicholas & Christopher, 2014). Obesity has been linked to a multitude of health conditions including diabetes, hypertension, ischemic stroke, heart disease, and different types of cancers and reproductive conditions, considering all these health conditions, obesity is now among the leading factors for global morbidity and mortality and causes more global deaths than underweight. (Kelly, Yang, Chen & Reynolds, 2008). Overweight and obesity are linked to more deaths worldwide than underweight. For example, 65% of the world's population live in countries where overweight and obesity kill more people than underweight (this includes all high-income and most middle-income countries). Once considered a high-income country problem, overweight and obesity are now on the rise in low- and middle-

income countries, particularly in urban settings. In 2008, more than 1.4 billion adults, 20 years and older, were overweight. Of these, over 200 million men and nearly 300 million women were obese. About 35% of adults aged 20 years and over were overweight in 2008, and 11% were obese. Overweight and obesity are the fifth leading risk for global deaths. At least 2.8 million adults die each year as a result of being overweight or obese. In addition, 44% of the diabetes burden, 23% of the ischemic heart disease burden and between 7 and 41% of certain cancer burdens are attributable to overweight and obesity (WHO, 2013).

The most commonly used method today for classifying an adult as overweight or obese is based on body mass index (BMI), a value that is determined by dividing body weight (in kilograms) by the square of height (in meters). In adults, overweight is defined by a BMI of 25.0 kg/m², and obesity is defined by a BMI of 30.0 kg/m², regardless of sex. (Racette, Susan & Robert, 2003).

Therefore, WHO recognized obesity as a global epidemic which led to a new word describing the global nature of the epidemic has been coined- "globesity". (WHO, 2010). The WHO estimated that adult BMI of 22-23kg/m² were prevalent in most countries of Africa and Asia, while BMI of 25-27kg/m² were prevalent in North America, Europe and parts of Latin America, North Africa and some Pacific Island countries. It estimated that obesity rates vary from below 5% in China, Japan and certain African countries to over 75% in urban Samoa. However, in China, rates were as high as 20% in some cities, similar to cities in the developed world. The rates of the epidemic in the UK are some of the highest in Europe (Lokuruka, 2013).

2.3. Geographical disparity in obesity rates

The US has the highest rates of obesity among developed countries (32%), in the adult population. The rates vary with gender and ethnicity. It is higher in women than men (35 versus 33%), similar to other regions of the world. In the US, the scourge is higher among African-Americans than other races. In Canada, the aboriginals tend to be more obese than the Caucasian groups. Due to the dramatic rise in Class III obesity, more than 30% of annual deaths in the US

A recent study in South Africa discovered that the 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%). The overall prevalence of obesity and overweight in South Africa is high, with 29% of men and 56% of women being classified as overweight or obese. This is higher than reported in other African countries, particularly among women, since 30% of South African women aged between 30 and 59 were reported obese. The other African region where obesity rates are as high as in South Africa is North Africa.

In Asia, India, China, Indonesia, Japan and Bangladesh are listed among the WHO's 10 countries with the greatest prevalence of obesity. In India, morbid obesity in the 21st century has reached 5% of the country's population, while in Chinese cities, 12% of adults and 8% of children were reported obese (WHO, 2005).

2.3.1. Burden of obesity in Africa

Obesity is a threat to the health of populations, particularly in sub-Saharan Africa. The World Health Organization (WHO) has recognized obesity as a disease which is prevalent in both developed and developing countries, affecting young adults. With an estimated 1.5 billion people overweight worldwide, millions of people are at risk of developing obesity-associated co-morbid diseases (WHO, 2008). Most developing countries particularly sub-Saharan Africa is now disproportionately burdened with both communicable and non-communicable diseases. However, with recent warnings issued by the World Health Organization (WHO) about the escalating pandemic of overweight and obesity, which leads to wake up to the realities of the heavy burden posed by these diseases.

In West Africa, the rate of obesity is about 10%. It is 3x higher among women than men. In parts of West Africa, the rates have more than doubled in the last 15 years. In South Africa one in 3 men and one in 2 women are either overweight or obese. These South African statistics are close to the figures for the US. In Morocco, the rate of obesity is estimated to be 40% in the general population, while it is estimated to be about 12% in Kenya (Luke, Dugas, Ebersole, Durazo-Arvisu, Chao, Scholler, Adeyemo, Brieger & Cooper, 2009). Thus the following Africa countries have rate of obesity are stated below

Sudan (13%), Libya (15%), Egypt (14%), Ghana (15%), Senegal (10%), Niger (9%), Kenya (13%), Uganda (12%), Tanzania (14%) (US Census Bureau, 2010).

The lack of space for sports grounds and facilities in African cities is contributing to the rise in rates of the epidemic in urban areas. The habit of families sitting for long hours watching TV, videos and children playing video games for long, is also likely to contribute to the rising rates of obesity and overweight among affluent and middle class urban dwellers.

2.3.2 Burden of obesity in Nigeria

In Nigeria, it is estimated that about 6-8% of the population is obese (Luke *et al.*, 2009). Several studies on prevalence of overweight and obesity among adolescents and young adults in Nigeria varies across the geo-political zones in the country such as a 2007 study in Shagamu (south western Nigeria) showing a prevalence of overweight of 8.1% in males and 8.1% in females. It further showed a low prevalence of obesity of 2.7% in males and 1.9% in females. Another study in Ajaokuta (southwestern Nigeria) reported a higher figure of overweight/obesity as 17.3% (Akinpelu, Oyewole & Oritogun, 2008). This could be due to socioeconomic differences in sub populations studied. A study in Jos, Northern Nigeria found among males 17.2% was overweight, with 4.2% obese. Among women 23.5% were overweight and 4.5% were obese (Puepet, Zoakah, & Chuhwak, 2002). A study in the Niger delta southern Nigeria found 22.04% overweight and 49.34 % were obese (Adienbo, Hart & Oyeyemi, 2012). In Abia Southeastern Nigeria the prevalence of overweight/obesity in the population was 28.4% , contrast to another the report form in Imo south eastern Nigeria were prevalence of obesity was 6.0%, while in a community based study in Benue the prevalence of overweight was 9.7% and obesity 1.8% (Musa, Toriola, Monyeki & Lawal , 2012) .It is opined that the increasing consumption of processed and high fat fast foods, frequent snacking while watching movies and lack of regular exercise are contributing to the rise of the scourge. Zizza and others reported that between 1978 and 1996, there was a significant proportion of young adults snacking, representing a case for concern worldwide (Zizza, 2011).

2.4. Major risks factors for obesity in adolescents/young adults

Obesity is a chronic condition that develop as a result of complex interaction a person's gene and the environment characterized by long-term energy imbalance due to excessive caloric consumption, insufficient energy output (sedentary life style), low resting metabolic rate (Khan, 2004). It should be noted that obesity usually results from a combination of causes and contributing factors. A risk factors is defined as an attribute, characteristic or exposure of an individual which increases the likelihood of developing a disease or injury. Risk factors are either non-modifiable such as genetic endowment, race, age and sex or are modifiable by behavioral or other interventions such as changing diet, use of exercise and reduction of tobacco and alcohol use. (WHO, 2009). These includes genetics, family lifestyle, inactivity, unhealthy diet and eating habits, pregnancy, lack of sleep, age, certain medication socio economic status, medical problem (CDC, 2013).

2.4.1. Dietary factors

The increase in the consumption of junk foods and sugar-sweetened beverages have been to link to obesity. Therefore, there is an increase in caloric intake due to the excessive consumption of sugar-sweetened beverage which have replace and reduce the intake of other beverages such as milk and fruit juice in the diet of young adults. The adverse metabolic and physiological effect of sugars includes the elevation of triglyceride levels, lowering of high-density lipoprotein cholesterol level ("good cholesterol") which could increase the risk of coronary heart disease.

Unbalanced nutrition is a key contributor to rising obesity rates and other diet-related illnesses, such as diabetes, heart disease, and hypertension due to failure to eat enough fruit, vegetables and fiber. A study among university student revealed that all the students involved in the study patronized fast foods although more male (42.9%) than females (32%) did so. (Dulloo, 2006).

Dietary pattern of adolescents and young adults has been studied widely and reported in the literature as being associated with obesity, frequent snacking and meal skipping particularly breakfast (Isa & Masuri, 2011) students may make poor food choices which may affect their nutritional health status at the beginning of their programme in higher

institution and continue throughout their tertiary life (Adu, Falade, Nwalutu, Elemo & Magbagbeola, 2009).

2.4.2 Skipping meals

Moy, Johari, Ismail, Mahad, Tie & Wan, 2009 reported that young adults are in the habit of skipping meals. The results from a study by (Onyiriuka, Umonu & Ibeawuchi, 2013) states that 30.4% of the respondents skipped the lunch meal. The prevalence of breakfast skipping was 29.2% in a Malaysian study (Moy, Johari, Ismail, Mahad, Tie, Wan, 2009). The results further reveal the reason why more females than males skip breakfast which was similar to a study done by Shaw, 1998 which was due to differences in reported dieting behavior, attitudes toward body shape and weight between males and females of the same age group. Some of the reasons for skipping meals reported from the study were lack of time, financial constraint, not in the habit of eating and for achieving weight loss (Afolabi, Towobola, Oguntona, & Olayiwola 2013).

2.4.3. Physical Activity

Sedentary lifestyle and increase risk for developing obesity among adolescents and young adult occurs as result of numbers of hours spend in the front of television or computer screen. Decrease physical activity plays an important role in obesity. A physical activity pattern such as sedentary lifestyle, is also associated with weight change as well as influences physiological regulation of body weight (Ogunbode, Ladipo, Ajayi, & Fatiregun, 2011). In 2011, the American College Health Association reported that college students as a population are physically inactive, with only 20% reporting participation in moderate physical activity and 30% in vigorous physical activity on a regular basis from 2008 to 2010 with slight variation over years. In Egypt, the only available study of physical activity among university students was done by (Abolfotouh, Bassiouni & Fayyad, 2007). A study carried out in Obafemi Awolowo University, Ile-Ife, Nigeria among undergraduate students also revealed that more half of the respondents, 89.4% had a moderately activity level (Taofeek, Rufus, Olufemi, Adegbesan, Joseph, Idowu, Chidozie, Esnat, Lukman, 2014).

Physical activity (PA) levels are decreasing among young people in countries around the world, especially in poor urban areas, and it is estimated that less than one-third are sufficiently active to have a strong impact on their present and future health and well-

being. The maintenance of body weight occurs due to balance in the calories consumed against calories used which is utilized by normal bodily function and exercise. Otherwise if large abnormal amount of food is stored within the body and food intake exceed physical activity it will result to obesity. (Maruf, Akosile & Umunnah, 2012).

2.4.4. Genetic influence on obesity

Genotype-environment interactions also have been implicated in the development of obesity. It is estimated that approximately 40% of the variance in daily energy expenditure (excluding vigorous physical activity) is attributable to genotype. Despite the influence of genetics in the regulation of body weight, the rapidity with which obesity has escalated in the United States and other industrialized countries suggests that genetic factors cannot play the predominant role in the current obesity epidemic (Racette *et al.*, 2003). Therefore, the current obesity epidemic appears to be the result of environmental and behavioral factors interacting with genetic susceptibility (Segal, Polansky & Sankar, 2007).

2.4.5. Smoking practices

The relation between smoking and obesity is incompletely understood. On the one hand, nicotine acutely increases energy expenditure (EE) and could reduce appetite, which likely explains why smokers tend to have lower body weight than do nonsmokers and why smoking cessation is frequently followed by weight gain. Moreover, a belief popular among both smokers and nonsmokers is that smoking is an efficient way to control body weight. On the other hand, studies indicate that heavy smokers (ie, those smoking a greater number of cigarettes) have greater body weight than do light smokers and that there is a clustering of smoking, obesity, and lower socioeconomic status, at least in developed countries. Finally, there is increasing evidence that smoking affects body fat distribution and that it is associated with central obesity and insulin resistance (Amaud, David, Fred & Jacques 2008)

The prevalence of smoking is 8.5% reported by Aina, 2009. A study among Pakistan students revealed a higher prevalence; it showed that 12.9% of medical students and 10.6% of non-medical students smoked cigarette (Rubina, 2009). A Malaysian study found that the prevalence of smoking among university students was 29% (Redhwan,

Yun & Nor, 2013), this is close to the 32.8% prevalence reported among adolescents in North east Nigeria (Adeyeye, 2013).

2.4.6. Alcohol consumption

The abuse or harmful use of alcohol is a well-known risk factor for disability and premature mortality. (WHO, 2009). According to the World Health Organization (WHO), hazardous or harmful use of alcohol was responsible for about 2.3 million global deaths in 2004, accounting for 3.8% of all global mortality. (WHO, 2008). This is because harmful use of alcohol is a risk factor for non-communicable diseases such as cardiovascular disease cancers, trauma/injuries and chronic liver disease, which have been on increase. It is also known that about 4.5% of the global burden of disease, measured by disability-adjusted life years (DALYs) is due to alcohol and 25% of these are due to the relationship of alcohol to liver cirrhosis, cardiovascular disease and cancers.(Ogah, Madukwe, Onyeonoro, Chukwuonye, Ukegbu, Akhimien & Okpechi, 2013). A study carried out in Nigeria revealed that 55.8% consumed alcohol. The method of assessing alcohol consumption using the Quantity-Frequency method of assessment with a timeframe of last one year (Chukwuonye, Chuku, Onyeonoro, Madukwe, Oviasu & Ogah, 2013).

2.4.7 Sleeping Pattern

Adults require eight hours of sleep per day, sleep patterns of adolescents and young adults differ from those of their adult counterparts. According to the International Classification of Sleep Disorders, conditions such as dyssomnias, parasomnias and medical/psychological disorders which are often neglected, may be responsible for altered patterns among students and as a result students may use drugs to overcome these problems (Ali, Muhammad, Karwal, Amanda & Mulazim, 2013). Sleep loss occurs not only as a result of habitual behavior, but also in presence of pathological conditions associated with disturbed sleep, like obstructive sleep apnea (OSA). The increase in both the prevalence and the severity of obesity has translated into an increase in the prevalence of obesity-related comorbidities including OSA. (Guglielmo & Silvana, 2011).

2.5. Health consequences of overweight/obesity

Obesity has many and varied consequences, ranging from an increased risk of premature death to several non-fatal but debilitating complaints that impact on immediate quality of

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2.5. Health consequences of overweight/obesity

Obesity has many and varied consequences, ranging from an increased risk of premature death to several non-fatal but debilitating complaints that impact on immediate quality of

life. Obesity in adolescents and young adults also leads to several obesity –associated morbidities and NCDs including elevated blood pressure, cancer, dyslipidemia, insulin resistance and type-2-diabetes.

(a) Obstructive sleep apnea: Obstructive sleep apnea is another complication of childhood/adolescents obesity which has been reported to cause hypoventilation and even sudden death in severe cases.

b) Orthopedic Complications: Studies have shown that obese young adult can suffer from orthopedic complications. The more serious of these include slipped capital femoral epiphysis and Blount's disease (a bone deformity resulting from overgrowth of the tibia) while the more minor abnormalities include knock knee (genu valgum) and increased susceptibility to ankle sprains. (Daniels, 2009).

(c) Hepatic and gastric complication: Hepatic complications, particularly hepatic steatosis which is characterized by raised serum transaminase level have been reported in obese adolescents/young adults. Abnormal liver enzymes may be associated with cholelithiasis but this condition is rare in young adults.

(d) Cardiovascular risk factors: Dyslipidemia, hypertension and insulin resistance are frequently present in obese young adults and appears to be related to increased abdominal fat distribution. Serum lipid and lipoprotein levels, blood pressure and plasma insulin all follow from childhood into young adulthood, with obesity at baseline being a significant predictor of adult values.

CHAPTER THREE

METHODOLOGY

3.1 Study Area

The study was conducted in the University of Ibadan, which is located in Ibadan North Local Government Area of Oyo State, Nigeria. University of Ibadan is the first University established in Nigeria. It was founded in 1948. The University comprises thirteen faculties: Arts, Sciences, Agriculture and Forestry, the social sciences, Education, Veterinary Medicine, Clinical Sciences, Basic Medical Sciences Technology, Law, Public Health, Dentistry, Pharmacy. In addition it has a number of Institutes. The university also has a College of Medicine. The University admits above 3000 (<3500) candidates yearly and for the 2014/2015 Academic session 3,474 students were admitted and these constituted the students included in this study.

The university has twelve (ten undergraduate and two postgraduate) halls of residence and other basic amenities including a primary healthcare facility. The health services of the University of Ibadan is a National Health Insurance Scheme accredited primary care. It is a user outfit situated at Jaja Avenue in the University, hence-it is often called Jaja clinic.

In addition to a compulsory medical screening of students, University Health Service offer the following services :general outpatient clinic, Emergency care, public health services, medical social works services, visual care, data management /health records services ,pharmaceutical services, environmental health services, physical therapy (both at primary and secondary levels of care to students including for sport injuries). In addition, there are some outreach programmes developed to help students with health challenges.

These include Mental Health Clinic, Surgical out-patient/orthopedic clinic, Dental Clinic and Diabetic Clinic.

The University of Ibadan maintains a well-rounded programme of sporting and athletic activities on campus under the over –all supervision of Director of Sports. Apart from maintaining a sound body which is an asset for advanced thinking and rigorous academic pursuit, students have the added advantage of exposure to modern facilities and techniques through active participation in the variety of sports.

3.2 Study design

Cross-sectional study design was used for this study. This was used to investigate the prevalence and factors associated with obesity among undergraduate students at the University of Ibadan, Nigeria.

3.3 Study population

The population studied were the male and female 2014/2015 new-intake undergraduate students (100 Level) of the University of Ibadan, Ibadan, Oyo state.

3.3.1 Inclusion Criteria

- 100 Level students of University of Ibadan in the age bracket (15 to 35 years) of adolescents and young adult (NIH, 2015).
- Male and female who have been duly informed of the study and ready to participate voluntarily was included.

3.3.2 Exclusion Criteria

- Those who meet inclusion criteria but found to have physical deformity such as limb shortening or others that may alter the true anthropometry measurement.
- Those who were pregnant was excluded.

3.4 Study sample calculation

The statistical formulae for calculating sample size for cross sectional study is stated below:

$$n = \frac{(p)(1-p)(Z_{\alpha/2})^2}{(d)^2} \quad (\text{Jaykaran \& Tamoghna, 2013}).$$

$P=8\%$ (A study in one of the Nigeria tertiary institution shows that the prevalence of obesity among undergraduate students is 8%) (Olusanya *et al.*,2011). Since the prevalence of the previous study is less than 10% "d" (degree of precision) = 0.3×0.08 (prevalence of the previous study) i.e. this increased the sample size and the precision was

improved by 30% (i.e. reducing the error of estimate by 30%) (Naing, Winn, & Rusli, 2006).

Z_{α} = standard normal deviate at 95% confidence level = 1.96

$$n = \frac{(0.08)(1 - 0.08)(1.96)^2}{(0.3 \times 0.08)^2} = 490.9 \approx 491$$

Assuming 10% non-response rate = $1 - \frac{10}{100} = 0.9$

$$\frac{491}{0.9} = 545.5 \approx 546.$$

The minimum sample size for this study was 546.

3.5 Sampling Technique

The list of registered 100 Level students for 2014/2015 Academic session across all the departments in University of Ibadan was obtained from the Management Information System (MIS) Unit University of Ibadan.

A 3-stage sampling technique was used to select subjects for this study.

Stage 1

The University of Ibadan has academic programmes in thirteen Faculties namely, Arts, Sciences, Agriculture and Forestry, the social sciences, Education, Veterinary Medicine, Clinical Sciences, Basic Medical Sciences Technology, Law, Public Health, Dentistry, Pharmacy. The faculties of the Basic Medical Sciences, Clinical Sciences, Public health and Dentistry are organized as a College of Medicine. Six faculties were randomly selected from the nine faculties while all the faculties in College of Medicine, University of Ibadan were selected for the study. The following were the randomly selected faculties: Arts, Science, Technology, Agriculture and Forestry, Social sciences and Education and faculties of the Basic Medical Sciences, Clinical Sciences, Public health and Dentistry are organized as a College of Medicine was selected for the study (See Appendix I for Table 1)

Stage 2

Also 50% of the departments in each randomly selected faculties was considered except in faculty of dentistry and public health where only one department was chosen while in Clinical Sciences 100% of the departments that offer admission for 2014/2015 academic session was used.

(See Appendix I for Table 1).

Stage 3

The total number of 100 Level students (study population) in the randomly selected departments was obtained and thereafter proportional allocation of the sample was carried out to determine the number of 100 Level students to be allocated from each department (See Appendix I for Table 2). Thereafter, systematic random sampling was used to select the research participants (Students) from each department with use of the sampling interval. Then, a number was assigned to every single person (student) in each department, every Kth person were taken from the total number of 100 Level students in each randomly selected departments and the starting point was chosen at random.

3.6 Instrument for Data collection

A semi- structured questionnaire was used (Appendix II). The questionnaire has been developed using some questions from literature on the subject and a related research work on lifestyle of undergraduates carried out at the University of Ibadan. (Ogundero, 2013). Anthropometric measurements to determine Body Mass Index and Waist Circumference was carried out. The questionnaire was face validated by experts and thereafter pre-tested among twenty first year students not selected for the study. The questionnaire was administered by six trained research assistants.

The questionnaire was divided into five sections (A to E).

Section A: Sought information on socio-demographic characteristics which include age, sex, ethnicity of respondent parents.

Section B: information about diet (A food frequency questionnaire that reveals the frequency of consumption of each food group among the respondents was adopted in this study).

Section C: questions to ascertain the level of physical activities using the validated international physical activity questionnaire short form (IPAQ-SF). (Pate, Pratt, Blair, Haskell, Macera, Bouchard, 1995).

Section D: lifestyle and medical history.

Section E: anthropometric measurements. Height was measured using measuring tape. It was taken in meters (m).

Respondents were asked to take off their foot wears or shoes to get their accurate height. They were also asked to stand by a wall with their heels touching the wall.

With a ruler placed over the head, touching the wall, a mark was made with a pencil on the wall. The respondents were asked to step aside and measurements was taken from the floor to the mark made with the pencil. The weight of each subject was taken using the mechanical personal scale also known as the bathroom scale. Foot wears of the subjects were taken off. The respondents stood on the scale with heads raised and kept at eyes level. BMI of each participant was evaluated by dividing the weight of each participant in kilogram (kg) by squared of the height in meters (m²) (Anyiam, Ogala & Onuora, 2008).

The waist circumference (WC) of each participant was measured using a non-elastic measuring tape. Waist circumference was measured midway between the lowest rib and the superior border of the iliac crest at the end of normal expiration to the nearest 0.1cm (Ejike & Ijeh, 2012).

3.7 Data Management and Analysis.

3.7.1 Study Variables

Independent Variables: The independent variables in this study were-socio demographic characteristics like age, sex, family background, anthropometric measures (BMI Waist Circumference), and behavioral risk factors such physical activity, smoking, alcohol consumption, dietary pattern.

Dependent variable: The dependent variables was obesity and overweight

3.7.2 Data analysis

The data was compiled, entered and analyzed using SPSS version 15. Descriptive statistics such as frequency distribution, mean, percentages, was used to summarize the data.

Categorical variables were summarized as proportions while continuous variables were summarized as means. Pearson's Chi-square test was used to find the association between categorical variables.

Student's t-test was used to compare means of continuous variables. Binary logistic regression was used to analyze the predictors of obesity. The level of significant was set at $p < 0.05$. The level of physical activities. (Using the validated international physical activity questionnaire short form IPAQ-SF) data was analyze using the following value.

Walking MET-minutes/week = $3.3 \times$ walking minutes \times walking days

Moderate MET-minutes/week = $4.0 \times$ moderate-intensity activity minutes \times moderate days

Vigorous MET-minutes/week = $8.0 \times$ vigorous-intensity activity minutes \times vigorous-intensity days.

Total physical activity MET-minutes/week = sum of Walking + Moderate + Vigorous MET-minutes/week scores.

Therefore any participant who had at least 3000 MET -minutes/week was categorize to have

"High" physical activity level, those with at least 600 to 2999 MET -minutes/week were categorize to have "Moderate" physical activity level while those with less than 600 MET -minutes/week were categorize to have "low" physical activity level.

3.8 Ethical considerations

Written Informed consent was also obtained from the individual participants (see Appendix II). Ethical approval for study implementation was obtained from UI/UCH Ethics committee (see Appendix III).

Confidentiality of data collected: Data collected was entered and saved on a password protected computer and a data back-up to an external hard-drive. Only authorized individuals was allowed to handle participants' information. Names of the participants was not used and questionnaire was identified by codes.

Translation of protocol to the local language: The study population were literate, therefore translation was not applicable.

Beneficence to participants: The findings from this research work would be used to advocate and emphasize the need for early identification of students that are at risk of being obese and referral for control would be beneficial to such students.

Non-maleficence to participants: The research work was non-invasive because only interview administer questionnaire was used and anthropometric measurement was carried out.

Voluntariness: There was no form of undue influence and coercion. Therefore the research participants were autonomous persons who can decide to voluntarily take part in the research.

CHAPTER FOUR

RESULTS

4.1 Socio-demographics characteristics

A total of 546 fresh undergraduate students (100 Level Students) participated in the survey. The majority of the respondents 443 (81.1%), were between the ages of 15-20 years, while the mean age of the respondents was 19 ± 2.2 years. Table 4.1 shows the socio demographic distribution of the study participants. More than half of the respondents were females 300 (54.9%) and majority were single 536 (98%), Christianity 458 (83.9%) was the predominant religion practiced. Most of the students lived in the University hostels 476 (87.2%). Majority of the participants had fathers who were business owners 190 (34.8%), others had fathers who were civil servants 128 (23.4%), professional 77 (14.1%) and teachers/lecturers 66(12.1%). The participants whose mothers were business owners were 210 (38.5). While others had mothers who were civil servants 142 (26%), lecturers/teachers 91 (16.7%), professionals 44(8.1%). For respondents staying with a guardian and not their parents, guardian's occupation included: lecturers/teachers 29 (5.3%), civil servant 24 (4.4%), business owners 15 (2.7%).

About 187 (34.2%)of the respondents got monthly allowance ranging from ₦5,000 to ₦10,000 while 96(17.6%) got monthly ranging from ₦ 10001 to ₦ 15,000. Also, 171(31.3%) of the respondents spent more than ₦ 5,000 on food monthly while 91(16.7%) spent between (₦4,001 and ₦5000)

4.1a: Frequency distribution of the Socio-demographic characteristics of the respondents (N=546)

Variables	Frequency	Percent (%)
Gender		
Male	245	44.9
female	300	54.9
No response	1	0.2
Age group(Years)		
15-20	443	81.1
21-25	87	15.9
26-30	11	1.6
No response.	5	0.9
Marital status		
Single	536	98.2
Married	6	1.1
No response	4	0.7
Religion		
Christianity	458	83.9
Islam	73	13.4
Others	2	0.4
No response	13	2.4
Residence		
University hostel	476	87.2
Off campus	38	7.0
B/Q within the university	17	3.1
No response	15	2.7
Monthly allowance (₦)		
5,000-10,000	187	34.4
10,001- 15,000	96	17.6
15,001 – 20,000	40	7.3
<5,000	39	7.1
25,000-30,000	25	4.6
20,001-25,000	18	3.3
>30,000	9	1.6
No response.	132	24.2
Amount spent on food monthly (₦)		
< 5,000	171	31.3
4,000- 5,000	91	16.7
2,001 - 3,000	62	11.4
3,001 - 4,000	37	6.8
1,001 - 2000	35	6.4
<1,000	2	0.4
No response	148	27.1

- B/Q=Boys quarters of staff houses on the campus

**Table 4.1b: Frequency distribution of the Socio-demographic Characteristics of the respondents
Parents and guardian**

Variables	Frequency (N=546)	Percent (%)
Father's occupation		
Business ¹	190	34.8
Civil servant	128	23.4
Professional ²	77	14.1
Lecturer/Teacher	66	12.1
Others	36	6.6
Farmers	16	2.9
Not applicable	14	2.6
No response	19	3.5
Mother's occupation		
Business ¹	210	38.5
Civil servant	142	26.0
Lecturer/Teacher	91	16.7
Professional ²	44	8.1
Others	23	4.2
Farmer	6	1.1
Not applicable	4	0.7
No response	26	4.8
Guardian's occupation		
Not applicable	449	82
Lecturer/Teacher	29	5.3
Civil servant	24	4.4
Businessman/woman ¹	15	2.7
Professional ²	15	2.7
Others	10	1.8
Farmers	4	0.7

¹ Business category includes all forms of business including trading, self-employment and large scale farming.²The professional occupation group was computed as all professional practitioners including doctors, bankers, Architect and others

Physical activity level of respondents

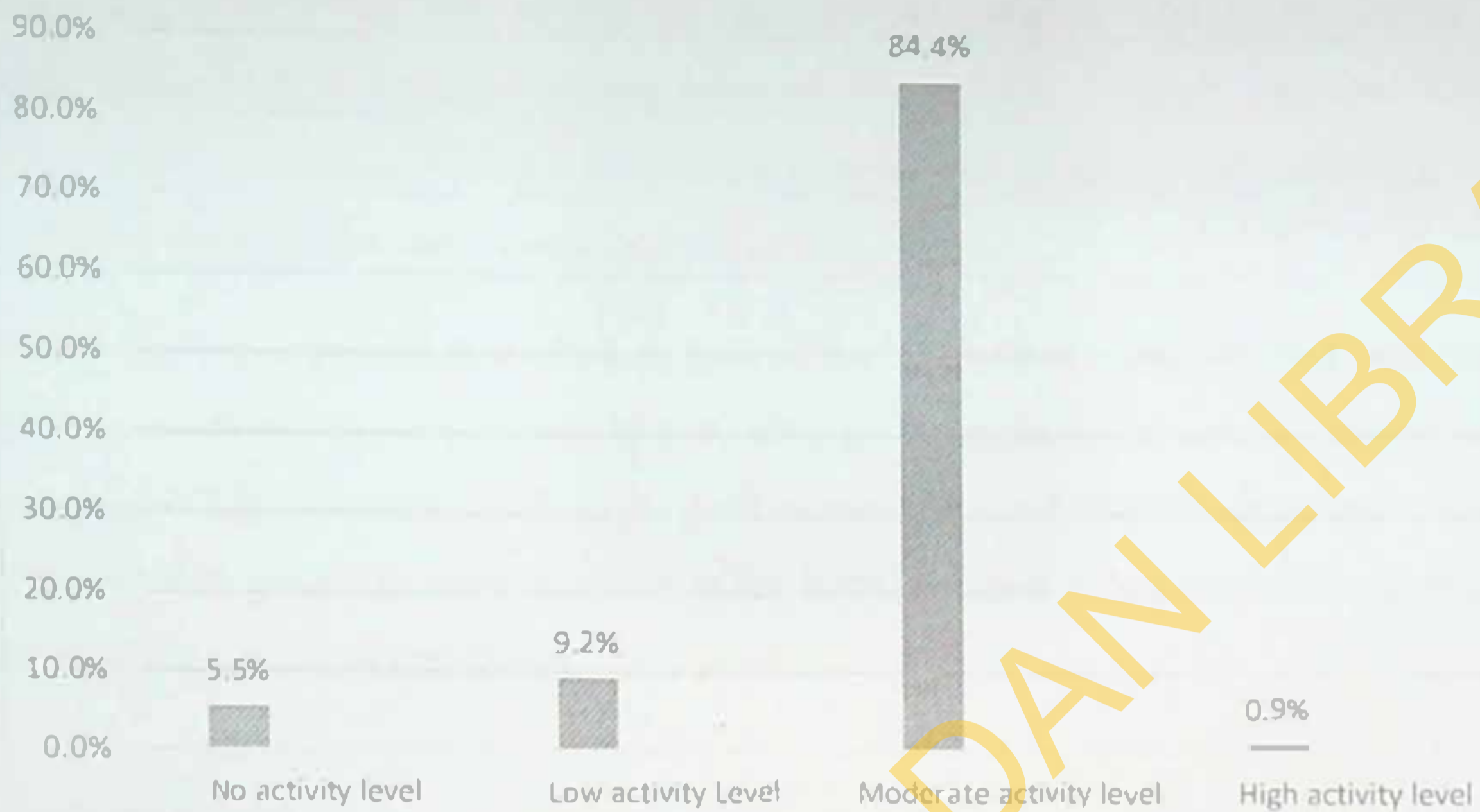


Figure 4. 1: Categories of Physical Activity among the Respondents

Figure 4.1 shows the physical activity level of the respondents using the short form of the International Physical Activity Questionnaire (IPAQ) for assessing the level of physical activity for individuals. More than half of the respondents had Moderate physical activity level 461(84.4%) while 5(0.9%) had high physical activity level and 50 (9.2 %) had low physical activity level.

4.2 Lifestyle and eating habits.

This section provides information on the lifestyle practices and eating habits of the respondents such as average sleeping hour per day, number of meals eaten per day, meal often skipped, reading of food labels before buying food products and preference of spicy and fried foods above other forms of food among others.

Table 4.2 below reveals that close to half of the respondents 246 (45.1%) said that they ate two meals per day while only 224 (41.0%) eat three meals per day, about 216 (39.6%) mentioned they always add salt to the food on the table, 267 (48.9%) preferred spicy food, 177 (32.4%) preferred fried foods to other forms of food while only 338 (61.9%) read food labels always before buying food products.

Table 4.2: Eating habit of respondents

Variables	Frequency	Percent (%)
Number of times meals were eaten per day		
Once	14	2.6
Twice	246	45.1
Thrice	224	41.0
More than thrice	47	8.6
No response	15	2.7
Add salt to food on the table		
Always	216	39.6
Occasional	106	19.4
Never	175	32.1
No response	49	9.0
Prefer eating spicy foods		
Yes	267	48.9
No	165	30.2
Don't Know	62	11.4
No response	52	9.5
Prefer eating fried foods to other food		
Yes	177	32.4
No	244	44.7
Don't know	78	14.3
No response	47	8.6
Reading food labels before buying food products.		
Yes	338	61.9
No	183	33.5
No response	25	4.6

4.3 Information on Meal skipping by Respondents

Table - 4.3 shows that more than half of the respondents skipped either lunch or breakfast, with 239 (43.8%) skipping lunch and 218 (39.9%) skipping breakfast. About 362 (65.5) of the respondents attributed their skipping meals due to lack of time, while 45 (8.1%) attributed it to effort at weight control.

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Table 4.3: Information on Meal skipping by Respondents

Variables	Frequency	Percentage (%)
Meal often skipped/day(N=546)		
Breakfast	218	39.9
Lunch	239	43.8
Dinner	14	2.6
None	43	7.9
No response	32	5.9
Reasons for skipping meals(N=553)		
No time	362	65.5
Financial constraint	85	15.4
Not in the habit	61	11
Weight control	45	8.1

4.4 Information on smoking and sleeping pattern

Table 4.4 reveals that majority of the respondents 490 (98.2%) never smoked cigarette while 399 (78.9%) of the respondents slept between four and seven hours per day.

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Table 4.4: Information on smoking and sleeping pattern

Variables	Frequency	Percent (%)
Smoking Habit(N=499)		
Non smokers	490	98.2
Regular smokers	3	0.6
Occasional	3	0.6
Smoke cigarettes last a year ago	3	0.6
Average sleeping hours per day(N=506)		
<4 hrs.	39	7.7
4-7 hrs.	399	78.9
8-10 hrs.	68	13.4

4.5: Food Frequency Pattern of the Respondents

Table 4.5 shows that only 10% of the respondents took fruit. 8.7 % took vegetables daily. 61% took food made of cereals and their products daily, 21% consumed snacks and soft drink four to six times per week and 83% never consumed alcohol.

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Table 4.5: Food Frequency Pattern of the Respondents

Food item	Frequency										Total N
	Daily		4-6xs/wk.		>3xs/wk.		Occasional		Never		
	n	%	n	%	n	%	n	%	n	%	
Cereals & their products	319	61.0	113	21.0	36	6.8	58	11.0	1	0.2	527
Root & Tuber products	66	12.5	109	20.6	161	30.4	187	35.3	6	1.1	529
Fruits	53	9.7	66	12.1	159	29.1	244	46.2	6	1.1	528
Milk & milk products	145	27.7	135	25.8	117	22.4	122	23.3	4	0.8	523
Meat, Poultry & their pdt.	214	40.9	145	27.7	93	17.8	69	13.2	2	0.4	523
Legumes, Nuts, Pulses	72	13.2	133	25.5	153	29.4	156	29.9	7	1.3	521
Snacks	131	25.0	110	21.0	113	21.5	168	32.0	3	0.6	525
Soft drinks	73	13.9	76	14.4	112	21.3	249	47.3	16	3.0	526
Alcoholic drinks	5	1.0	3	0.6	8	1.5	75	14.3	434	82.7	525
Vegetables	4.6	8.7	78	14.8	138	26.1	254	48.1	12	2.3	528

4.6 Sedentary behaviour

Table 4.6 shows the sedentary behaviour of the participants. About 239 (67.5%) of the respondents spent one to two hours in watching television, while 240 (74.1%) of the respondents spent one to two hours playing video games and 201 (55.2%) spent one to two hours on a computer (Personal Computer). Majority of the respondents 195 (52.6%) spent more than four hours sitting.

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Table 4.6: Distribution of participants' sedentary behaviour

Variables	Frequency	Percent (%)
Average duration of time spent per day watching television(Hours)(N=354)		
< 1	54	15.3
1-2	239	67.5
> 2	61	17.2
Average duration of time spent per day on video games(Hours)(N=324)		
< 1	49	15.1
1-2	240	74.1
>2	35	10.8
Average duration of time spent per day on using computer(Hours)(N=364)		
< 1	50	13.7
1-2	201	55.2
> 2	113	31.0
Average duration of time spent per day sitting(Hours)(N=371)		
< 1	11	3.0
1-4	165	44.5
> 4	195	52.6

4.7. Family history of respondents on non- communicable diseases and body weight.

Table 4.7 shows the facts of the respondents towards the risk factors for non-communicable disease. About 456 (90.1%) of the respondents had no family history of overweight/obesity. Seventy-eight (15%) had family history of diabetes mellitus, ninety-two (18%) had family history of hypertension and 50 (9.9%) had history of overweight/obesity. Only 13 (2.5%) mentioned they were born premature. 20.8% have a birth weight of 3.5kg at birth and 64 (12.5%) were told they were small compared with their other siblings at birth (Childhood) while 26% said their culture encourage individual to be fat and 99.8% had no health condition.

Table 4.7: Family history of respondents on non- communicable diseases and body weight.

Variables	Frequency	Percent (%)
Have you ever been told by health workers that you were obese(N=512)		
Yes	41	8.0
Is there any history of overweight/obesity in any member of your family(N=506)		
Yes	50	9.9
Is there any history of diabetes mellitus in any member of your family(N=505)		
Yes	78	15.4
Is there any history of hypertension in any member of your family(N=510)		
Yes	92	18.0
Were you born premature(N=515)		
Yes	13	2.5
Were you told you were small compared with your other siblings or other children when you were born (N=510)		
Yes	64	12.5
Do you have any of this health condition(N=418)		
Yes	1	0.2
Does your culture encourage individual to be fat (N=492)		
Yes	128	26

4.8. Anthropometric Profile of respondents

The nutritional status of the respondents based on anthropometric measurement is presented in Table 4.9. The mean value of weight and height of the respondents study was $62.1 \pm 10.1\text{kg}$ and $1.7 \pm 0.1\text{m}$, respectively.

Among the male participants, two hundred and twenty six (93.4%) had a waist circumference value $<94\text{cm}$, fourteen (5.8%) had waist circumference value between 94cm to 102cm , while among the female respondents about 67 (22.8%) had waist circumference value between 80cm and 88cm .

The prevalence of obesity and overweight was 5.6% and 15.2%, respectively.

Table 4.8: Anthropometric Profile of respondents.

Variables	Frequency	Percent (%)
Body Mass Index Profile (N=539)		
Underweight (<18.5kg/m ²)	57	10.6
Normal weight(18.5-24.9kg/m ²)	370	68.6
Overweight(25-29.9kg/m ²)	82	15.2
Obese (≥ 30kg/m ²)	30	5.6
Waist Circumference for male (N=242)		
Normal (<94cm)	226	93.4
High (94-102cm)	14	5.8
Very high (>102cm)	2	0.8
Waist circumference for female (N=294)		
Normal (<80cm)	200	68
High (80-88cm)	67	22.8
Very high (>88cm)	27	9.2

4.8.1: Anthropometric Profile of respondents

Table 4.8.1 shows the mean anthropometric measurements of the participants by sex. The mean value of weight were significantly higher in males 63.1kg compared to females 61.4kg while the mean value of Body Mass Index were significantly higher in females (23.1kg/m²) compared to males (21.8kg/m²). Although, the males were significantly taller than the females (1.71m versus 1.63m; $p < 0.05$). The mean value of the respondents weight, Height, BMI was 62.1kg, 1.7m and 22.5kg/m² ; $p < 0.001$.

Table 4.8.1 Anthropometric Profile of respondents.

	Male	Female	All respondents	p-value
Weight	63.07 ± 8.97kg	61.39 ± 10.83kg		0.053
Height	1.70 ± 0.09m	1.63 ± 0.08m		<0.001
Body Mass Index	21.84 ± 3.60 kg/m ²	23.05 ± 4.10 kg/m ²		<0.001
BMI of all respondents			22.5 ± 3.9	<0.001

Note: Results was based on independent sample t-test for comparing means.

4.9. Association between nutritional status and risk factors of overweight and obesity among respondents.

Bivariate analysis was carried out to ascertain association between the nutritional status and respondents' socio-demographic characteristics, dietary pattern, physical activities, sedentary behaviors and facts on body weight. Six (2.5%) of males compared to 24 (8.1%) of the females respondents were obese which was significant at p-value < 0.05 .

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Table 4.9.1: Association between obesity and socio demographic factors characteristics of the respondents

	Obese Yes	No	Total	X ²	p-value
Sex (N=540)					
Male	6(2.5%)	236(97.5%)	242	7.909	0.005
Female	24(8.1%)	274(91.9%)	298		
Age (N=525)					
15-20	24(5.5%)	415(94.5%)	439	0.976	0.807
21-25	6(7%)	80(93%)	86		
Marital Status (N=537)					
Single	30(5.6%)	501(94.4%)	531	0.479	0.924
Married	0(0%)	6(100%)	6		
Religion (N=529)					
Christianity	24(5.3%)	431(94.7%)	458	0.486	0.784
Islam	5(7%)	66(93%)	71		
Residence (N=524)					
University hostel	27(5.7%)	444(94.3%)	471	0.685	0.710
B/Q with the university	1(6.7%)	14(93.3%)	15		
Off campus	1(2.6%)	37(97.4%)	38		
Father's Occupation (N=492)					
Business	11(5.9%)	176(94.1%)	187	3.820	0.701
Civil servant	8(6.3%)	120(93.7%)	128		
Professional	2(2.6%)	74(97.4%)	76		
Lecturer/teacher	4(2.6%)	61(93.8%)	65		
others	3(8.3%)	33(91.7%)	36		
Mother's Occupation (N=505)					
Business	9(4.3%)	198(95.7%)	207	4.275	0.640
Civil servant	11(7.7%)	131(92.3%)	142		
Professional	1(2.3%)	43(97.7%)	44		
Lecturer/teacher	7(7.9%)	82(92.1%)	89		
others	1(4.3%)	22(95.7%)	23		
Monthly allowance (₦) (N=411)					
<5,000	2(5.1%)	37(94.9%)	39	8.482	0.205
5,000-10,000	14(7.5%)	172(92.5%)	186		
10,001-15,000	2(2.1%)	93(97.9%)	95		
15,001-20,000	2(5%)	38(95%)	40		
20,001-25,000	3(17.6%)	14(82.4%)	17		
25,001-30,000	1(4%)	24(96%)	25		
>30,000	0(0%)	9(100%)	9		
Estimated Amount spent on food monthly(₦) (N=375)					
< 1000	0(0%)	2(100%)	2	3.482	0.626
1,001-2000	4(11.4%)	31(88.6%)	35		
2,001-3000	2(3.2%)	60(96.8%)	62		
3,001-4,000	2(5.4%)	35(94.6%)	37		
4,001-5000	6(6.7%)	84(93.3%)	70		
>5,000	8(4.7%)	161(95.3%)	169		

4.9.2 Meal commonly skipped by Gender

Table 4.10.2 shows that more females (44.1%) than males (37%) skip breakfast while more males (47.3%) than females (44.1%) skip lunch. The p-value which was greater than 5% shows that there is no significant relationship between meal commonly skipped and gender of respondents.

Table 4.9.2 Meal commonly skipped by Gender.

	Meal skipped				Total	X ²	p-value
	Breakfast	Lunch	Dinner	None			
Gender							
Male	90(37%)	115(47.3%)	5(2.1%)	33(13.6%)	243(45%)	6.078	0.108
Female	131(44.1%)	131(44.1%)	10(3.4%)	25(8.4%)	297(55%)		
Total	221(40.9)	246(45.6%)	15(2.8)	58(10.7)	540(100%)		

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4.9.3: Alcohol intake by Gender

Table 4-9-3 revealed that more males consumed alcohol regularly than females. However, the difference was not significantly different.

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Table 4.9.3: Alcohol intake by Gender

Gender	Alcohol Intake			Total	X ²	p-value
	Regularly	Occasional	Not at all			
Male	11(5%)	36(16.2%)	175(78.8%)	222(44.8%)	3.197	0.202
Female	9(3.3%)	32(11.7%)	232(85%)	273(55.2%)		
Total	20(4%)	68(13.7%)	407(82.2%)	495 (100%)		

4.9.4: Association between obesity among respondents and dietary intake

Those who ate twice are more obese compared to the respondents that ate once, thrice and more than thrice. Although, the difference was not significantly different.

Respondents that said the reason why they skipped meal was for weight control are more obese than those that said it was due to financial constraint that was why they skipped meal. However, difference was statistically significant.

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Table 4.9.4: Association between obesity among respondents and dietary intake

	Obese		Total	X ²	p-value
	Yes	No			
How many times do you eat daily (N=526)					
Once	2(14.3%)	12(85.7%)	14	3.129	0.372
Twice	14(5.7%)	230(94.3%)	244		
Thrice	12(5.4%)	209(94.6%)	221		
More than= thrice	1(2.1%)	46(97.9%)	47		
Which meal do you skip (466)					
Breakfast	15(6.9%)	203(93.1%)	218	4.118	0.249
Lunch	13(5.6%)	221(94.4%)	234		
Dinner	0(0%)	14(100%)	14		
Reason for skipping meal					
No time to cook (N=459)					
Yes	19(5.3%)	340(94.7%)	359	1.036	0.309
No	8(8%)	92(92%)	100		
Not in the habit (N=458)					
Yes	6(10%)	54(90%)	60	2.097	0.148
No	21(53)	377(94.7%)	398		
Financial constraint (N=458)					
Yes	1(1.2%)	83(98.8%)	84	4.104	0.043
No	26(7%)	348(93%)	374		
Weight control (N=506)					
Yes	7(15.2%)	39(84.8%)	46	7.454	0.006
No	21(5.1%)	393(94.9%)	460		
How often do you add salt to your food (N=493)					
Always	9(4.2%)	206(95.8%)	215	1.781	0.410
Occasionally	8(7.6%)	97(92.4%)	105		
Never	11(6.4%)	162(93.6%)	173		
Do you prefer eating spicy food (N=428)					
Yes	13(4.9%)	253(95.1%)	266	1.940	0.379
No	12(7.4%)	150(92.6)	162		
Do prefer eating fried foods to other food (N=417)					
Yes	6(3.4%)	170(96.6%)	176	3.782	0.151
No	19(7.9%)	222(92.1%)	241		
Do you read labels and the implication before buying food products (N=517)					
Yes	23(6.8%)	314(93.2%)	337	3.752	0.053
No	5(2.8%)	175(97.2%)	180		

4.9.5a: Association between obesity in respondents and dietary intake.

Table 4-10.4b shows that 17(5.4%) respondents who ate cereals and their products daily were obese, ten (6.3%) who ate fruits less than three times per week were obese and thirteen (5.1%) ate vegetables occasionally were obese. However, the difference was not significantly different.

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Table 4.9.5a: Association between obesity in respondents and dietary intake.

	Obese		Total	X ²	p-value
	Yes	No			
How often do you eat Cereals and their products=(N=522)					
Daily	17(5.4%)	300 (94.6%)	317	2.665	0.615
4-6Xs/wk.	4 (3.6%)	108 (96.4%)	112		
<3Xs/wk.	3 (8.3%)	33 (91.7%)	36		
Occasional	5 (8.9%)	51 (91.1%)	56		
Never	0 (0%)	1 (100%)	1		
Root and tuber products. N=524					
Daily	2 (3.1%)	63 (96.9%)	65	4.025	0.403
4-6Xs/wk.	4 (3.7%)	104 (96.3%)	108		
<3Xs/wk.	8 (5%)	151 (95%)	159		
Occasional	15 (8%)	172 (92%)	187		
Never	0 (0%)	5 (100%)	5		
Fruits. N=523					
Daily	3 (5.9%)	48 (94.1%)	51	1.494	0.828
4-6Xs/wk.	5 (7.6%)	61 (92.4%)	66		
<3Xs/wk.	8 (5%)	151 (95%)	159		
Occasional	15(8%)	172 (92%)	187		
Never	0 (0%)	5 (100%)	5		
Vegetables. N=523					
Daily	3 (6.8%)	41 (93.2%)	44	6.514	0.164
4-6Xs/wk.	5 (6.4%)	73 (93.6%)	78		
<3Xs/wk.	8 (5.8%)	129 (94.2%)	137		
Occasional	13 (5.1%)	240 (94.9%)	253		
Never	0 (0%)	11 (100%)	11		

N=Total number of respondents in each group, n=number in respondents that chose the options in each group

Table 4.9.5b: Association between obesity in respondents and dietary intake.

	Obese		Total	X ²	p-value
	Yes	No			
Meats, poultry and its products (N=518)					
Daily	14 (6.6%)	197 (93.4%)	211	8.524	0.074
4-6xXs/wk.	7 (4.9%)	136 (95.1%)	143		
<3Xs/wk.	4 (4.3%)	89 (95.7%)	93		
Occasional	3 (4.3%)	66 (95.7%)	69		
Never	1 (50%)	1 (50%)	2		
Legumes, nuts and pulses (N=516)					
Daily	4 (5.6%)	68 (94.4%)	72	0.699	0.951
4-6xXs/wk.	7 (5.3%)	125 (94.7%)	132		
<3Xs/wk.	10 (6.6%)	142 (93.4%)	152		
Occasional	8 (5.2%)	146 (94.8%)	154		
Never	0(0%)	6 (100%)	6		
Snacks (N=520)					
Daily	5 (3.9%)	124 (96.1%)	129	2.680	0.613
4-6xXs/wk.	4 (3.6%)	106 (96.4%)	110		
<3Xs/wk.	7 (6.3%)	105 (93.7%)	112		
Occasional	12(7.2%)	154 (92.8%)	166		
Never	0 (0%)	3 (100%)	3		
Soft Drinks N=(521)					
Daily	2 (2.9%)	68 (97.1%)	70	18.112	0.003
4-6xXs/wk.	4 (5.3%)	72 (94.7%)	76		
<3Xs/wk.	6 (5.4%)	106 (94.6%)	112		
occasional	15 (6.1%)	231 (93.9%)	246		
Never	25 (5.8%)	15 (93.8%)	40		
Alcoholic drinks (N=520)					
Daily	0 (0%)	5 (100%)	5	1.606	0.808
4-6xXs/wk.	0 (0%)	3 (100%)	3		
<3Xs/wk.	1(12.5%)	7 (87.5%)	8		
Occasional	3(4%)	72 (96%)	75		
Never	25 (5.8%)	404 (94.2%)	429		

N=Total number of respondents in each group, n=number in respondents that chose the options in each group

4.9.6 Physical activity level by gender

Physical activity level

Gender	None	low	moderate	high	Total	χ^2	p- value
Male	16(6.5%)	20(8.2%)	206(84.1%)	3(1.2%)	245(45%)	2.190	0.534
Female	13(4.3%)	30(10%)	255(85%)	2(0.7%)	300(55%)		
Total	29(5.3%)	50(9.2%)	461(84.6%)	5(0.9%)	545(100%)		

4.9.7: Association between Body Mass Index (BMI) and Physical activity level

Table 4.10.6 revealed that the respondents with normal body mass index had more high physical activity than those respondents that are obese. Also, the difference was not significantly different.

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Table 4.9.7: Association between Body Mass Index (BMI) and Physical activity Level

BMI Category	Physical Activity Level				Total	χ^2	p-value
	No activity	Low	Moderate	High			
Underweight	1(2.8%)	3(8.3%)	31(86.1%)	1(2.8%)	36(7.0%)	6.460	0.693
Normal Weight	20(5.4%)	36(9.8%)	308(83.9%)	3(0.8%)	367(71.3%)		
Overweight	7(8.5%)	7(8.5%)	68(82.9%)	0(0%)	82(15.9%)		
Obese	1(3.3%)	1(3.3%)	28(93.3%)	0(0%)	30(5.8)		
Total	29(5.6%)	47(9.1%)	435(84.5%)	4(0.8%)	515(100%)		

4.9.8 Association between obesity in respondents and level of physical activities

Respondents who had moderate activity are more obese than those who had high physical activity. However the difference was not significantly different.

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Table 4.9.8: Association between obesity in respondents and level of physical activities

	Obese		Total	χ^2	p-value
	Yes	No			
No activity	1(0.2 %)	29 (5.4 %)	30 (5.5%)	2.082	0.556
Low	1(0.2 %)	49 (9.1 %)	50 (9.2%)		
Moderate	28(5.2 %)	428 (79.1 %)	456 (84.3%)		
High	5(0.9)	0(0%)	5 (0.9%)		
Total	30 (5.5%)	511 (94.5%)	541 (100%)		

4.9.9: Obesity and family history of overweight and being obese.

There was an association between obesity and those who have being told by health workers that they are obese, respondents that had family history of obesity and those who were born premature. These were statistically significant with p-value < 0.05

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Table 4.9.9: Obesity and family history of overweight and being obese.

	Obese		Total	X ²	p-value
	Yes	No			
Have you ever been told by health workers that you were obese (N=506)					
Yes	9(24.3%)	28(75.7%)	35	27.119	<0.001
No	19(4%)	452(96%)	471		
Is there a history of overweight/obesity in any member of your family (N= 502)					
Yes	6(13.3%)	39(86.7%)	45	5.646	0.017
No	22(4.8%)	435(95.2%)	457		
Were you born premature (N=523)					
Yes	0(0%)	25(100%)	25	1.485	0.223
No	28(5.6%)	470(94.4%)	498		
Does your culture encourage individual to be fat (N=488)					
Yes	8(6.3%)	119(93.7%)	127	0.489	0.485
No	17(4.7%)	344(95.3%)	361		

4.10: Predictors of obesity among respondents.

Binary logistic regression was used to determine the predictors of obesity among the respondents and reference category is used for each of the variables put in the model.

Table 4.11 shows the result of binary regression of the factors associated with obesity among respondents. After adjusting for other risk factors, only gender, family history of overweight/obesity, perception of being fat were statistically associated with obesity among respondents.

Females were four times more likely than males to be obese (OR: 3.45; 95% CI: 1.39 – 8.57), those who had family history of overweight and obesity were three times more likely to be obese (OR: 3.04; 95% CI: 1.16 - 7.95).

Furthermore, results showed that those with moderate physical activity were - two times more likely to be obese compared to those who had high level of physical activity (OR:1.89; 95% CI :0.25 – 14.44), those who skipped breakfast meal in a day were four times more likely than those who didn't skip any meal to be obese-(OR:4.15, 95% CI: 0.54 – 32.09), while the odds of obesity was about twice higher among those who have family history of hypertension than those who never had (OR:1.56, 95% CI :0.64 - 3.80), factors were however not statistically significant.

Table 4.10: Binary logistic regression between risk factors and obesity among respondents.

	Adjusted OR	95% C.I for OR		p-value
		Lower	Upper	
Gender				
Male ¹				
Female	3.45	1.385	8.571	0.008
Physical Activity				
No activity ¹				
Low	0.59	0.036	9.826	0.714
Moderate	1.89	0.249	14.443	0.536
High				
How many times do you eat in a day				
Once ¹	0.365	0.074	1.793	0.215
Twice	0.344	0.069	1.717	0.193
Thrice	0.130	0.011	1.562	0.108
More than thrice				
Which meal do you skip in a day				
None ¹				
Breakfast	4.15	0.537	32.092	0.173
Lunch	3.25	0.416	25.361	0.261
Is there any history of overweight/obesity in any member of your family				
Yes	3.04	1.164	7.947	0.023
No ¹				
Does your culture encourage individual to be fat				
Yes	1.36	0.572	3.233	0.486
No ¹				
Is there a history of hypertension in any member of your family				
Yes	1.56	0.644	3.797	0.324
No ¹				

¹ =Reference group. OR=odds ratio * = significant at p<0.05

CHAPTER FIVE

DISCUSSION

This study provides the BMI status and related behavior of 100 Level undergraduate students who are mostly young adults at University of Ibadan, Ibadan Nigeria. The study revealed that the prevalence of overweight (15.2%) and obesity (5.6%) was higher than the 9% overweight and 3% obese prevalence previously reported by (Ogundero, 2013) for undergraduate (young adults) students at University of Ibadan. Result from this study shows that the prevalence of both overweight and obesity by gender was highest among females (18% and 8% respectively) compared to the males (11.4% and 2.4% respectively) and was far higher than the previous prevalence of overweight and obesity among female compared to male (10% and 5.1% vs. 4.6% and 1.3% respectively) reported by Olusanya and Omotayo, 2011 among undergraduate students of Tai Solarin University of Education Ijagun, Ijebu-Ode.

This study also showed significant difference in prevalence of obesity for gender, family history of overweight and obesity at multivariate analysis. The prevalence of both overweight and obesity was higher among females compared to males. A higher prevalence of both overweight and obesity in female undergraduate students compared to males have also been observed from studies conducted in Nigeria, (Olusanya *et al.*, 2011; Ejike & Ijeh 2012) as well as globally (Maric *et al.*, 2014; WHO, 2013). The difference in the prevalence of overweight and obesity between the genders may result from differences in energy expenditure between males and females (NIH, 2013) which was similar to this study which revealed that more females were engaged in low physical level activity compared to males.

The prevalence of overweight and obesity was highest among the age bracket of (15-20 years) compared to older young adults (≥ 21). The prevalence of obesity was highest at age 18, with about 23.3% of the students were obese while 35.4 were overweight. This finding is in contrast to the study conducted on undergraduate Students of Tai Solarin University

of Education, Ijagun, and Ijebu-Ode whereby the highest proportion with overweight (25%) and obesity (33.3%) were in the age group between 20-24 years old. This could be due to the age of the respondents in the two studies. In our study, the respondents were only the new intakes who were likely to be younger than those studied in TASUED.

Regarding fruits and vegetable consumption, only a small number of the respondents (9.7%) eat fruits and (8.7%) ate vegetables daily. This low consumption rate is similar to the findings of Adu *et al.*, 2009 on nutritional status of undergraduate in a Nigeria in South-west Nigeria. The results further show an association between monthly income of the respondents and fruits consumption. A study by Adenegan *et al.*, 2009 at University of Ibadan also reported that fruit consumption increased with family's material wealth and higher parental occupational status. Cereals and cereal products were the type of food mostly consumed daily (61%) while 39% consumed meat, fish, eggs and their products daily. Results from this study showed that 25% of the respondents takes snacks either daily, weekly or occasional while 13.5% consumed soft drinks daily, this low consumption of fast food is in contrast with the findings of Anulogun and Owolabi, 2011 on a research work done on fast food consumption among undergraduate students of the University of Ibadan, Nigeria showed that 80.5% of the respondents involved in their study consumed fast food. However, it is similar to the findings by Ganasegeran *et al.*, 2013 on Social and psychological factors affecting eating habits among university students in a Malaysian medical school: that showed low consumption of fast food among medical students. About 46% of the respondents eat less than three times a day, 37% and 41% of males and females respectively. Three hundred and sixty-two (65.5%) of the respondents gave the reason of no time for skipping meals, this is similar to previous study (Moy *et al.*, 2009) that reported that young adults are in the habit of skipping meals. In contrast to the results from a study by Onyiriuka, Umoru & Ibeawuchi, 2013 on weight status and eating habits of adolescent Nigerian urban secondary school girls states that 30.4% of the respondents skipped the lunch meal results from this study show that lunch was the most frequently skipped meal (45.1%). The prevalence of breakfast skipping was 40.5% which is higher than the 29.2% prevalence in a Malaysian study (Moy *et al.*, 2009). The results further reveal while more females than males skip breakfast which was similar

to a study done by Shaw, Mary E 1998. Some of the reasons for skipping meals reported from the study were lack of time, financial constraint, not in the habit of eating and for achieving weight loss which were similar to the reasons stated by Afolabi *et al.*, 2013 in their study on pattern of fast foods consumption and contribution to nutrient intake of Nigeria University students.

According to a recent data from WHO and released in 2011, Nigeria tops the list of African countries in alcohol consumption (alcohol consumption measured in equivalent litres of pure ethyl alcohol consumed per capita per year. It should be noted that harmful use of alcohol is a risk factor for non-communicable diseases such as cardiovascular disease cancers, trauma/injuries and chronic liver disease, which have been on the increase. It is also known that about 4.5% of the global burden of disease, measured by disability-adjusted life years (DALYs) is due to alcohol; 25% of these are due to the relationship of alcohol to liver cirrhosis, CVD and cancers (Ogah, Madukwe, Onyeonoro, Chukwuonye, Ukegbu, Akhimien, Okpechi, 2013). A study carried out in Nigeria revealed that 55.8% consumed alcohol. This was due to the method of assessing alcohol consumption using the Quantity-Frequency method of assessment with a timeframe of last one year (Chukwuonye *et al.*, 2013).

A small percentage of the respondents (8.6%) reported that they smoke. This low rate is similar to the smoking prevalence rate (8.5%) reported by Aina, 2009 in University of Lagos. A study among Pakistan students revealed a higher prevalence; it showed that 12.9% of medical students and 10.6% of non-medical students smoked cigarette (Rubina, 2009). A Malaysian study found that the prevalence of smoking among university students was 29% (Redhwan *et al.*, 2013), this is close to the 32.8% prevalence reported among adolescents in North east Nigeria (Adeyeye, 2013) which was in contrast with the finding in this study.

The findings of this study show that more than half of the respondents slept averagely for less than eight hours a day, they had irregular sleeping time at night and woke up time in the morning and majority said they tend to sleep for lesser hours per day during examination periods which is similar to a study done by Ali *et al.*, 2013 on effects of different sleeping patterns on academic performance in medical students.

In this study, results show that more than half of the respondents were physically active. Majority (>70%) of the respondents were moderately active, while few fell into the high active category. This is similar to a study carried out in Obafemi Awolowo University, Ile-Ife, Nigeria among undergraduate students also revealed that more half of the respondents, 89.4% had a moderately activity level (Taofeek *et al.*, 2014), these are in agreement with a previous study that showed that majority of the respondents were found to be involved in average activity (Bailey *et al.*, 2009) had a moderately activity level, while 38% fell into the low active category.

Only 5.5% of the respondents in the study had a low physical activity level. Maruf *et al.*, 2012 in a study among university undergraduates in Nigeria reported 17.6% of the respondents having low physical activity level while Odunaiya *et al.*, 2010 in a study carried out in Ibadan, Nigeria reported that 38% of the respondents had a low physical activity level.

The study further revealed that males tend to be more physically active than females, of the 5.5% that fell into the low active category, 2.4% were females, while more males were found in the high physical activity level. This is contrast to previous findings Abolfouh *et al.*, 2010, in Alexandria University hostels and Maruf *et al.*, 2012 in stated that more females than males tend to be physically inactive. Results also revealed that the age of the respondents influences their physical activity level; this is in agreement with findings of CDC, 1995 and Health Education Authority, 1997.

5.2 Implications of findings of the study.

It should be noted that most of the young adults are not cautious about their health before coming to the university and the opportunity missed as a result of poor adolescent health facility could be addressed in the university where health facility is through the approach of the Leavell's levels of prevention strategies (Katz & Ali 2009) such as:

- (i) Primordial Prevention through introduction of sport activities in the academic calendar which will enhance physical fitness.
- (ii) Primary Prevention: It will be essential for every restaurant in the university community to sell fruits for student consumption after meal. This will also encourage student to consume less food with high cholesterol.

(iii) Secondary Prevention: Screening and treatments i.e. dietary changes, exercise, behavioral change, Prescription weight-loss medication.

(iv) Tertiary Prevention: This stage is importance for the management and control of obesity among the obese/overweight students by going to the school sport facility specialized for exercise such as the gymnasium.

5.3 Limitations of the study

It should be noted that cross-sectional study design is prone to bias due to likelihood of low response and misclassification due to recall bias. It is difficult to determine whether overweight and obesity followed the factors associated with obesity in time

5.4 Conclusion

The prevalence of overweight and obesity among 100 Level undergraduate students 2014/2015 academic session from this study were 15.2% and 5.6% respectively. The prevalence of overweight and obesity was more common of females students compared to male students (11.4% and 2.4% vs. 18% and 8% respectively).

The physical activity level of the respondents using the short form of the International Physical Activity Questionnaire (IPAQ) for assessing the level of physical activity for individuals revealed that more than half of the respondents had Moderate physical activity level 461(84.4%) while 5(0.9%) had high physical activity level and 50 (9.2 %) had low physical activity level. More than half of the respondents skipped either lunch or breakfast, with 239 (43.8%) skipping lunch and 218(39.9%) skipping breakfast. About 362 (65.5) of the respondents attributed their skipping meals due to lack of time, while 45(8.1%) attributed it to effort at weight control. Fifty-three (10%) of the respondents took fruit, 46 (8.7 %) took vegetables daily. Three hundred and ninety (61%) of the respondents took food made of cereals and their products daily, 110(21%) respondents consumed snacks and soft drink four to six times per week and 434 (83%) respondents never consumed alcohol. Respondents that said the reason why they skipped meal was for weight control are more obese than those that said it was due to financial constraint that was why they skipped meal. However, difference was statistically significant.

The study revealed that gender, family history of overweight and obesity, perception of being fat are potent predictors of obesity while level of physical activity, meal skipping did not significantly predict obesity.

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5.5. Recommendation

- (1) Public health strategies to prevent the risk factors of obesity should begin in the university and extend to the entire community.
- (2) Universities should review their policies and procedures to promote healthy eating habits and regular physical activity.
- (3) Weight loss programs should be introduced in the university and financial incentives should be introduced which will be effective in motivating some students to lose weight.

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Appendix I

TABLE 1: Selection of faculties, departments and number of students

Serial Number	Faculties.	Departments that offered admission (2014/2015 academic session)	Randomly Selected Departments	Total number of 100 Level Students
1	Agriculture and Forestry	4	Agriculture Forestry resource	188 33 Total=221
2	Arts	12	Communicatio&Language English European Studies History Linguistics Philosophy	49 48 34 64 37 52 Total=284
3	Education	6	Adult Education Guidance & Counselling Teacher Education	63 50 61 Total=174
4	Science	8	Chemistry Geology Mathematics Microbiology	121 52 62 46 Total=281
5	The Social sciences	5	Geography Psychology Sociology	76 71 74 Total=221
6	Technolog y	6	Civil Engineering Industrial Production Eng Electrical & Electronics Engineering	32 37 36 Total =105
7	Basic Medical Sciences.	4	Physiology Biochcmistry	59 59 Total=118
8	Clinical Sciences	2	Medicine Nursing	122 25 Total=147
9	Dentistry	1	Dental Surgery	34
10	Public Health	1	Human Nutrition	48
				Grand Total=1633

TABLE 2: Proportional Allocation of sample size for selection of respondents.

Departments	Number of 100 level students	Proportional Allocation	Sample size for each department
1. Agriculture	188	$\frac{188}{1633} \times 546 = 63$	63
2. Forestry resource.	33	$\frac{33}{1633} \times 546 = 11$	11
3. Communication and Language Arts.	49	$\frac{49}{1633} \times 546 = 16$	16
4. English	48	$\frac{48}{1633} \times 546 = 16$	16
5. European Studics	34	$\frac{34}{1633} \times 546 = 11$	11
6. History	64	$\frac{64}{1633} \times 546 = 21$	21
7. Linguistics	37	$\frac{37}{1633} \times 546 = 12$	12
8. Philosophy	52	$\frac{52}{1633} \times 546 = 17$	17
9. Adult Education	63	$\frac{63}{1633} \times 546 = 21$	21
10. Guidance and Counselling	50	$\frac{50}{1633} \times 546 = 17$	17
11. Teacher Education	61	$\frac{61}{1633} \times 546 = 20$	20
12. Chemistry	121	$\frac{121}{1633} \times 546 = 40$	40
13. Geology.	52	$\frac{52}{1633} \times 546 = 17$	17
14. Mathematics	62	$\frac{62}{1633} \times 546 = 21$	21
15. Microbiology	46	$\frac{46}{1633} \times 546 = 15$	15
16. Gcography	76	$\frac{76}{1633} \times 546 = 25$	25
17. Psychology	71	$\frac{71}{1633} \times 546 = 24$	24
18. Sociology	74	$\frac{74}{1633} \times 546 = 25$	25
19. Civil Engineering	32	$\frac{32}{1633} \times 546 = 11$	11
20. Industrial Production Engineering	37	$\frac{37}{1633} \times 546 = 12$	12

21. Electrical & Electronics Engineering	36	$\frac{36}{1633} \times 546 = 12$	12
22. Physiology	59	$\frac{59}{1633} \times 546 = 20$	20
23. Biochemistry	59	$\frac{59}{1633} \times 546 = 20$	20
24. Medicine	122	$\frac{122}{1633} \times 546 = 41$	41
25. Nursing	25	$\frac{25}{1633} \times 546 = 8$	8
26. Dental Surgery	34	$\frac{34}{1633} \times 546 = 11$	11
27. Human Nutrition.	48	$\frac{48}{1633} \times 546 = 16$	16

Appendix II

TITLE OF STUDY: PREVALENCE OF OBESITY AND THE RISK FACTORS AMONG NEWLY ADMITTED UNDERGRADUATE STUDENTS AT THE UNIVERSITY OF IBADAN, NIGERIA

QUESTIONNAIRE

Dear Respondents,

I am a postgraduate student of the above department .I am currently carrying out a research among university undergraduates. The research is for academic purposes and all information collected shall be treated with confidentiality. Finding of this study will provide information that will be useful for the university to provide intervention to control overweight and obesity among university students. Thanks for your cooperation.

By signing below, you agree to take part in this project.

.....

Signature of Participant

Serial No.....

Time Start:

Date.....

Course of Study:

INSTRUCTION: PLEASE WRITE THE APPROPRIATE ANSWERS (IN NUMBERS)
FOR EACH QUESTION IN THE CODE COLUMN

SECTION A: SOCIO-DEMOGRAPHIC DATA

S/N	QUESTIONS	CODE
1.	Gender: (1)Male (2)Female	
2.	Age in years:	
3.	Marital status :(1) single (2) married (3) cohabit (4) Divorced/separated/widowed.	
4.	Religion :(1) Christianity (2) Islam (3) Others please specify.....	
5.	State of origin:	
6.	Faculty/Department	
7.	Residence:(1)University hostel (2)B/Q within the university (3)Off campus	
8.	Father's Occupation: (1)Businessman (2)Civil servant (3)Professional (4)Lecturer/Teacher (5) Farmer (6)Not applicable (7) Others specify/.....	

9. Mother's Occupation: (1)Businesswoman (2)Civil servant
(3)Professional

(4) Lecturer/Teacher (5) Farmer (6) Not applicable (7) others
specify.....

10. Guardian's Occupation(if you live with a guardian): (1)Trader
(2)Civil servant (3)Professional (4)Lecturer/Teacher (5)Farmer
(6)Not applicable

(7)Others specify.....

11. Your monthly allowance

.....

(state actual or average estimate)

12. Estimated amount spent on food monthly:

.....(state amount)

SECTION B

DIETARY PATTERN

S/N QUESTIONS

CODE

13 How many times do you eat in a day?

(1) Once (2) twice (3) thrice (4) more than thrice.

14 Which meal(s) do you often skip in a day? (1)Breakfast

(2) Lunch (3) Dinner (4) None. [if you don't skip meals ,go to
Question7]

15 Why do you skip meals (1)no time to cook or eat (2) Not in the
habit (3)financial constraint(4)weight control (5)others
specify..... [multiple answers
allowed]

16 How often do you add salt to your food at the table (1)always

- (2)occasionally (3)Never
- 17 Do you prefer eating spicy foods (1)Yes (2)No (3)I don't know
- 18 Do you prefer eating fried foods to other foods (1)Yes (2)No (3)I don't know
- 19 Do you read food labels and the implication before buying food products (1)Yes (2)No
- (a)
- 20(b) If No, why (1) lack of knowledge (2) Lack of time (3) waste of time (4) all of the above (5) others, specify.....

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FOOD FREQUENCY QUESTIONNAIRE

Please tick how often you eat these different foods (Presently as an undergraduate students).

S/N	Food	Daily	4-6Xs/wk.	Less than 3Xs/wk.	Occasional	Never
21	Cereals and their products e.g. rice,maize,corn flakes,spaghettie					
22	Roots and Tubers & products e.g.yam,potatoes,Garri,Amala, fufu etc.					
23	Fruits					
24	Vegetables					
25	Milk and milk products.					
26	Meat, Fish egg and their products.					
27	Legumes,nuts and pulscs e.g. beans, groundnut, Akara, moimoi etc.					
28	Snacks.					
29	Soft drinks.					
30	Alcoholic drinks					

SECTION C: PHYSICAL ACTIVITY LEVEL

S/N QUESTIONS

31 During the last 7days, on how many days did you do vigorous physical activities such as heavy lifting, fast bicycling, swimming, aerobics, fetching water from well etc.?

.....days per week

32 How much time do you usually spend doing vigorous physical exercise on one these days?

.....hours per day

.....minutes per day

33 During the last 7days, on how many days did you do moderate activities activities such as playing tennis, bicycling at a regular pace, carrying light load?

..... days per week

34 How much time do you usually spend doing moderate physical activity on one of these days?

.....hours per day

.....minutes per day

35 During the last 7days on how many days did you walk for at least ten minutcs?

.....days per week

36 How much time do you usually spend walking on one of these days?

.....hours per day

.....minutes per day

37 During the last 7 days how much time did you spend sitting on a week day?

..... hours per day

.....minutes per day

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SECTION D: LIFESTYLE AND MEDICAL HISTORY

S/N QUESTIONS

Code

38 Average duration of time spent per day(in hours)

a) Watching television.....

b) Playing video.....

c) Using computer.....

d) Sitting

39 Average duration of sleep per night(in hours)

.....

40 Smoking habit

(1) Nonsmokers (2)Occasional smokers (3)smoke cigarette last
a year ago (4)Regular smoker

41

Average Number of cigarettes per day.

42

Alcohol intake

(1)Not at all (2)Took alcohol regularly

(3)Took alcohol regularly before ,but now takes it only

occasionally

(4)Take alcohol only occasionally

44 Have you ever been told by a health worker that you were Obese /Overweight

(1)Yes (2)No

45 Is there a history of overweight/obesity in any member of your family?

(1)Yes (2)No

46 If yes, please state person affected?

(1)Father (2)Mother (3)Grandparents (4)Sibling

(5)Others (please specify).....

47 Is there a history of Diabetes Mellitus in any member of your family?

(1)Yes (2)No

48 If yes, please state person affected?

(1)Father (2)Mother (3)Grandparents (4)Sibling

(5)Others (please specify).....

49 Is there a history of hypertension in any member of your family?

(1)Yes (2)No

50 If yes, please state person affected?

(1)Father (2)Mother (3)Grandparents (4)Sibling

(5)Others (please specify).....

51 Delivery history

Were you born premature? (1)Yes (2)No

52 What was your birth weight when you were born?

..... (kg)

Don't know

53 Were you told you were small compared with your other siblings or other children when you were born?

(1)Yes (2)No

54 Do you have any of this health conditions?

Hypertension

Diabetes

Others (Specify) _____

55 Does your culture encourage individuals to be fat?

(1)Yes (2)No

Section E: ANTHROPOMETRIC MEASUREMENT

Weight:.....(kg) Height:.....(m) BMI:.....(kg/m²)

Waist Circumference(cm)

Time end: