BODY MASS INDEX OF STUDENTS IN THE UNIVERSITY OF BENIN.

BY

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DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE,
COLLEGE OF MEDICAL SCIENCES
UNIVERSITY OF BENIN, BENIN CITY, EDO STATE, NIGERIA.

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A ONE YEAR PROJECT PRESENTED TO

THE DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE

IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF

A BACHELOR OF MEDICINE AND BACHELOR OF SURGERY (MBBS) DEGREE

SEPTEMBER, 2025

CERTIFICATION

This is to certify that this research study titled **'BODY MASS INDEX AMONG UNDERGRADUATES IN THE UNIVERSITY OF BENIN'** will be carried out by OZOEMENA OGOCHUKWU VIVIAN with Matriculation number MED1706284 under supervision of Prof. Omokhoa Adeleye in the department of Public health and community medicine, School of medicine, college of medical sciences, University of Benin, Benin city, as part of the requirements for the award of Bachelor of medicine, Bachelor of Surgery(MBBS) degree.

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DECLARATION

I hereby declare that this project work titled **BODY MASS INDEX AMONG UNDERGRADUATES IN THE UNIVERSITY OF BENIN'** will be conducted under supervision and has not been submitted in part or in full for any purpose.

_____ _____

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DEDICATION

I dedicate this work to God Almighty for sufficient grace, knowledge and strength to conduct this research and bringing it to an end.

Furthermore, we also dedicate this study to My parents, Rev. FR. Nwachukwu Gregory and family members for unwavering support without which it would be impossible to achieve.

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I wish to begin by expressing my profound gratitude to the Lord Almighty for granting me the strength, grace, and wisdom necessary to successfully complete this project.

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Finally, I acknowledge my own dedication and commitment to this project, having wholeheartedly invested my time and energy to ensure its successful completion.

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LIST OF ABBREVIATIONS

BMI Body Mass Index

NCDs Non- Communicable Diseases

SPSS Statistical Package for Scientific Solutions

WHO World Health Organization

LMIC: Low Medium and Income Countries

DEXA: Dual-Energy X-ray Absorptiometry

DEFINITION OF TERMS

Obesity: abnormal or excessive accumulation of body fat with a body mass index greater than or equal to 30

Overweight: abnormal or excessive accumulation of body fat with a body mass index greater than or equal to 25.

Underweight: abnormally low body weight that may impair health or a body mass index below 18.5.

ABSTRACT

BACKGROUND: Body Mass Index (BMI) is a widely used measure of nutritional status and health risk, categorized as underweight, normal weight, overweight, and obesity. Abnormal BMI values have significant health implications, including increased risk for non-communicable diseases such as diabetes, hypertension, cardiovascular diseases, and bone-related disorders. Among university undergraduates, lifestyle changes, dietary patterns, and perceptions of weight-for-height influence BMI status, making it important to assess knowledge, prevalence, perceptions, and determinants.

OBJECTIVES: This study assessed the knowledge of health implications of abnormal BMI, prevalence of BMI categories, perception of personal weight-for-height, and determinants of BMI status among undergraduates in the University of Benin.

METHODOLOGY: A descriptive cross-sectional study was carried out among 350 undergraduate students of the University of Benin between September 2024 and August 2025. Respondents were selected using a multistage sampling technique. Data was collected using a structured self-administered questionnaire adapted from related studies. Knowledge was scored and categorized into good or poor, while perception of BMI was assessed by comparing self-reported weight-for-height classification with actual BMI. Anthropometric data were self-reported and BMI was calculated. Data was analyzed using IBM SPSS version 25.0 with descriptive, bivariate, and multivariate analyses. Statistical significance was set at $p < 0.05$. Ethical approval was obtained from the University of Benin Teaching Hospital Ethics and Research Committee.

RESULTS: The mean age ± SD of respondents was 21.0 ± 2.85 years. The majority of respondents 272 (77.7%) demonstrated good knowledge of abnormal BMI, while 78 (22.3%) had

poor knowledge. A significant proportion 263 (75.1%) had normal BMI, while 87 (24.9%) had abnormal BMI, comprising 36 (10.3%) underweight, 35 (10.0%) overweight, and 16 (4.6%) obese. Most respondents 255 (72.9%) had correct perception of their weight-for-height, while 95 (27.1%) misperceived their weight status. Age ($p < 0.001$), degree programme ($p < 0.001$), academic level ($p < 0.001$), marital status ($p = 0.028$), residence ($p = 0.001$), source of income ($p < 0.001$), and monthly income ($p < 0.001$) were significantly associated with knowledge of abnormal BMI. Gender ($p < 0.001$), age group ($p < 0.001$), programme of study ($p = 0.003$), academic level ($p < 0.001$), marital status ($p = 0.012$), residence ($p = 0.007$), source of income ($p = 0.003$), and monthly income ($p < 0.001$) were significantly associated with perception of BMI. Logistic regression revealed that age, sex, academic level, and income significantly influenced BMI status and perception.

CONCLUSION: The study revealed that most undergraduates had good knowledge of abnormal BMI and a majority had normal BMI, though a considerable proportion were underweight, overweight, or obese. While perception of weight-for-height was correct among most respondents, misperception remained notable. Socio-demographic factors including age, sex, programme of study, academic level, and income were significant determinants of knowledge, BMI, and perception. Strengthening targeted health education, encouraging healthy dietary practices, and promoting physical activity among undergraduates are critical in preventing abnormal BMI and its long-term health consequences.

Keywords: Body Mass Index, knowledge, perception, undergraduates, overweight, obesity

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Body Mass Index (BMI) is a widely used measure that helps estimate body fat by taking a person's weight in kilograms and dividing it by the square of their height in meters. BMI values are categorized into different weight statuses: underweight, with BMI below 18.5 kg/m^2 normal weight, with BMI range of 18.5–24.9 kg/m^2, overweight, with a BMI range of 25.0–29.9 kg/m^2, and obesity, with a BMI of 30 kg/m^2 or greater. [1] The concept behind BMI dates back to 1823 when Adolphe Quetelet, a Belgian scientist, developed the Quetelet Index. He aimed to describe the "average man" but based his research primarily on Western European men, which limited its applicability. Later, Francis Galton used this index to support the idea of eugenics.[1]

In the 1970s, American physiologist and nutritionist Ancel Keys simplified the Quetelet Index, leading to what we now know as BMI, which quickly became popular. Today, BMI is used globally in public health, despite the existence of other body fat measures like waist-to-hip ratios, body fat percentage, and Dual-Energy X-ray Absorptiometry (DEXA) scans. High BMI, indicating excess body fat, is linked to serious health problems like cardiovascular disease and diabetes. With rising global obesity rates, BMI is a key tool for monitoring this trend and evaluating interventions focused on diet and physical activity. Organizations like the World Health Organization and various funding bodies widely endorse BMI for public health assessments and in clinical settings.[1]

Despite increased research attention on the relationship between body image and obesity, a fundamental challenge persists because many individuals do not understand the clinical definitions of overweight and obesity based on body mass index. This gap in understanding

frequently results in adults misjudging their own weight status. Investigating how individuals perceive their weight in contrast to their actual weight can illuminate unrealistic body image views, which are defined as an individual's internal perceptions, thoughts, and feelings about their physical self.

Research consistently demonstrates that recognizing oneself as overweight or obese is an important factor for initiating weight-related behavioral change, and achieving proper self-weight perception and body satisfaction is necessary for effective health and weight management.[2] Body size is commonly misjudged, either overestimated or underestimated, a phenomenon attributed to various factors shaping body image, including psychological elements, socio-cultural influences, and the impact of friends, family, age, and gender.[2] Existing evidence, though limited, indicates that inaccurate weight perceptions among overweight and obese individuals are linked to detrimental weight-related attitudes such as eating and weight concerns and behaviors with fewer weight loss attempts, unhealthy dietary habits, and lower physical activity – all of which impede successful weight loss and maintenance.[2]

Overweight and obesity have become a global health challenge, and Nigeria is no exception. The prevalence of these conditions has been steadily increasing in recent years, particularly among young adults.[3] This trend is concerning, as overweight and obesity are associated with numerous chronic diseases, including type 2 diabetes, cardiovascular disease, and certain types of cancer.[3]

Underweight, overweight, and obesity are the extremes of malnutrition; none is a desirable health status, and they largely represent an imbalance between caloric intake and expenditure.[4]

Although not all underweight young individuals experience side effects or show symptoms, those who do may exhibit a range of health issues including osteoporosis (bone thinning, leading to increased fracture risk), frequent illness, problems with skin, hair, or teeth, anemia, persistent

fatigue, irregular menstrual periods, premature birth (in young women), and slow or impaired growth [5]

Over the past two decades, developing countries have undergone dramatic transformation, marked by rapid urbanization, a shift towards a more sedentary lifestyle, and an increased consumption of high-calorie processed foods. These factors have had a profound impact on public health, with the prevalence of obesity escalating dramatically. In many of these nations, the rate of obesity has more than tripled, signifying an important public health challenge that demands urgent attention.[6]

A concerning prevalence of overweight and obesity has been found among youth, including undergraduate students, residing in underdeveloped nations. This alarming trend is closely linked to several factors, encompassing both sociodemographic and lifestyle determinants.[6]

Sociodemographic factors, such as male gender, older age, and higher socioeconomic status, have been consistently identified as significant contributors. Social factors, including limited access to economic resources (lack of capital), a lack of religious affiliation (which can sometimes influence dietary choices), and a range of unhealthy lifestyle behaviors play a role in determining obesity and underweight status. These behaviors encompass excessive consumption of red meat, frequent meal consumption, high fiber intake, and the habit of skipping breakfast.[6] Furthermore, frequent alcohol consumption, a sedentary lifestyle characterized by physical inactivity, and the presence of poor mental health, including experiences of childhood abuse, have been shown to significantly increase the risk of overweight and obesity within this vulnerable population.[6]

The undergraduate experience itself presents a unique set of challenges that can exacerbate these risks. This critical period in a young adult's life is often characterized by a decline in physical activity levels, a surge in academic and social stressors, and the adoption of unhealthy dietary patterns. [4] These patterns frequently include excessive consumption of sugary beverages, sweets,

and highly processed foods, often coupled with irregular meal schedules, including frequent meal skipping. These lifestyle shifts create an environment that is highly conducive to weight gain and the accumulation of excess body fat.[4]

The development of overweight and obesity is a complex phenomenon influenced by both social, environmental as well as genetic, physiological, and metabolic factors which also play a significant role in determining an individual's susceptibility to weight gain.[6]

1.2 STATEMENT OF THE PROBLEM

The increasing prevalence of overweight and obesity among university students constitutes a significant public health concern with far-reaching implications for individual well-being and National health outcomes. Globally, the World Health Organization (WHO) identifies overweight and obesity as major contributors to the burden of non-communicable diseases (NCDs), responsible for an estimated 5 million deaths in 2019 alone, stemming from conditions such as cardiovascular diseases, diabetes, various cancers, neurological disorders, chronic respiratory diseases, and digestive disorders.[7] This burden is not limited to developed nations; low- and middle-income countries (LMICs) are experiencing a rapid rise in overweight and obesity rates, mirroring trends observed in transitional societies.[4]

Over the last two decades, sedentary lifestyles have become more prevalent, leading to a global increase in health-related deaths linked to overweight and obesity. Modern youth are less physically active than previous generations, largely due to their engagement with technological gadgets like video games, smartphones, computers, and television. Research on body weight, including underweight, overweight, and obesity, indicates a significant rise in the consumption of unhealthy "junk" and poorly nutritious foods in recent years.[8] The frequency of adult overweight has more than doubled over the past 35 years, and adults from other nations have

shown comparable outcomes to Nigeria, with an even higher increase.[6] Although overweight and obesity are more common among young people in Namibia, the prevalence of underweight is notably low, affecting only about 5% of the youth population.[5] Some studies have indicated that being overweight is very common and is becoming more so among college students.[9, 10]

There is a high prevalence of overweight and obesity among university students, with some studies reporting rates as high as 40%.[8] This population faces unique challenges during their transition to higher education, including increased autonomy over dietary choices, reduced parental oversight of meal preparation, and potentially decreased physical activity levels due to academic pressures and changes in living environments.[7] Tobacco use and lack of physical activity were associated with obesity in male students in a study, although there was no correlation among females.[3] These factors can contribute to the adoption of unhealthy lifestyle patterns, increasing the risk of weight gain and associated health complications, and it is important to investigate the factors, such as individual perception of their weight status which can determine the adoption of healthy lifestyle in among undergraduates' students.

1.3 JUSTIFICATION

The increasing prevalence of overweight and obesity among young people, including University undergraduates, has become a significant public health concern worldwide.[7] Obesity is of public health importance due to its rising obesity rates and its association with several chronic conditions such as diabetes and heart disease. Awareness of the dilemma of obesity among undergraduates can delay the onset of chronic conditions leading to improved quality of life. This study aims to assess the awareness of abnormal weight among undergraduates and provide information on the level of awareness of obesity among undergraduates thereby contributing to the body of knowledge on this topic.[5]

Although several researches focus on the health risks of being overweight, underweight in young people is often overlooked, and it can lead to several serious health issues. These include disruptions to hormones crucial for menstruation and fertility, a compromised immune system that makes individuals more susceptible to infections, and nutritional deficiencies that can cause problems like hair loss and anemia. Additionally, being underweight is linked to osteoporosis, also known as bone thinning.[5]

By understanding the problem, the knowledge gap would be bridged. The findings from this study will assist in creating policies that would address the issue in the community and the world at large. By identifying the prevalence of underweight, overweight and underweight among students, it can contribute to promoting healthier lifestyles, healthy eating, and increased physical activity. The existing literature among university students shows inconsistencies and knowledge gaps regarding the complex factors contributing to overweight and obesity. There is a need to identify the individual perception of their weight status and how this may influence their behaviour. An understanding of these factors is important for developing effective and tailored interventions to prevent and manage overweight and obesity within this undergraduate population, particularly through empowering them using knowledge. Thus, ultimately reducing the long-term burden of non-communicable diseases.

1.4 RESEARCH QUESTIONS

1. What is the knowledge of health implications of abnormal weight (below normal, and excessive weight) among undergraduates in University of Benin.
2. What is the prevalence of the different body mass index categories (underweight, normal weight, overweight and obesity) among undergraduate students in University of Benin.
3. What is the perception of personal weight for height among undergraduate students in University of Benin.
4. What factors are associated with correct perception of personal weight for height among undergraduate students in University of Benin.
5. What factors are associated with knowledge of health implications of abnormal weight among undergraduate students in University of Benin.

1.5 GENERAL OBJECTIVE

TO ASSESS UNIVERSITY OF BENIN STUDENTS' KNOWLEDGE OF THE HEALTH CONSEQUENCES OF ABNORMAL WEIGHT-FOR-HEIGHT, AS WELL AS THEIR PERSONAL PERCEPTION OF THEIR OWN WEIGHT.

1.5.1 SPECIFIC OBJECTIVES

1. To evaluate the knowledge of health implications of abnormal weight (below normal, and excessive weight) among undergraduates in University of Benin.
2. To identify the prevalence of the different body mass index categories (underweight, normal weight, overweight and obesity) among undergraduate students in University of Benin.
3. To assess the perception of personal weight for height among undergraduate students in University of Benin.
4. To identify the factors associated with correct perception of personal weight for height among undergraduate students in University of Benin.
5. To identify the factors associated with knowledge of health implications of abnormal weight among undergraduate students in University of Benin.

CHAPTER TWO

LITERATURE REVIEW

2.1 KNOWLEDGE OF HEALTH IMPLICATIONS OF ABNORMAL WIEGHT

A descriptive study was conducted among college students in the south-eastern United States in 2022. The study aimed to determine the knowledge and perceptions of obesity among college students. The sample size was 124 students and a convenience sampling technique was used to recruit participants. Data was collected using an online questionnaire distributed through QR codes on flyers and web links sent to students' email addresses. Results showed that 83.1% of the students were considered knowledgeable about obesity risk factors and long-term effects, based on a score of 80% or higher on the knowledge section of the questionnaire. This finding suggests that a majority of the students had a good understanding of the health implications of obesity and the factors contributing to it.[11]

A cross-sectional study was carried out in Saudi Arabia among undergraduate students in 2024. The study aimed to evaluate the knowledge, prevalence and associated factors related to obesity, among undergraduate healthcare students. Convenience sampling technique was used to recruit 497 undergraduate students. Data was collected using a self-administered questionnaire. Results showed a significant proportion of the students were either overweight or obese and their knowledge about obesity was suboptimal in certain areas. The study revealed gaps in understanding regarding complications of obesity, risk factors for obesity, and management of obesity.[12]

A descriptive cross-sectional study was carried out in 2024 among undergraduate students in a tertiary institution, in Benin City, Nigeria. The study aimed to investigate the prevalence and determinants of overweight and obesity among undergraduate students. The sample size was 420 students and a non-probability convenience sampling technique was used. Data was collected

using a structured questionnaire. Results showed only 30% of the respondents demonstrated a high level of knowledge regarding overweight and obesity and its associated factors. A substantial proportion of students lacked knowledge about BMI, its calculation, and the ranges considered obese and overweight. Significant knowledge gaps were also observed regarding risk factors, complications, and prevention methods for overweight and obesity.[13]

2.1. PERCEPTION OF PERSONAL WEIGHT FOR HEIGHT

A correlational study carried out in universities of Islamabad and Rawalpindi in Pakistan, amongst 437 students aimed to determine correlation between BMI, body perception and physical activity in university students revealed that students have misperceptions regarding their body weight. Non-probability convenience sampling technique was used and the tools such as International Physical Activity Questionnaire, Body Mass Index, and Figure Rating Scale were used.

A qualitative study was carried out in 2016 among women in Subukia, Kenya. The study aimed to understand the perceptions, beliefs, and knowledge of obesity among women in rural Kenya. A convenience sampling technique was used and data was collected through In-depth interviews. The study found that less than 50% of the participants had adequate knowledge about obesity. This suggests a significant knowledge gap regarding the condition, its risk factors, and potential health consequences. A prevalent perception among participants was the desirability of a "big, round body," associating it with health and beauty. This cultural preference potentially conflicts with health recommendations regarding weight and body size.[14]

A cross-sectional study at Obafemi Awolowo University, Ile-Ife, Nigeria, which surveyed 394 undergraduate students assessed knowledge, perception, and dietary behavior among undergraduate students in a Nigerian university. Multistage sampling was used to recruit

participants, and data was collected via a self-administered questionnaire, covering socio-demographics, obesity knowledge, perception, and dietary behavior, revealed that most students (64.0%) possessed poor knowledge of obesity, predominantly males (54.0%). Conversely, a majority (58.4%) held a positive perception of obesity, with females constituting the larger proportion (62.1%). Furthermore, 57.6% exhibited poor dietary habits, mainly males (58.8%), marked by low daily intake of fruits (8%) and vegetables (4.1%).[15]

2.2. PREVALENCE OF DIFFERENT CATEGORIES OF BODY MASS INDEX

A cross-sectional study was conducted in 2024 among 228 Medical students at Jazan University, Saudi Arabia. This study aimed to determine the prevalence of overweight, obesity, and the associated risk factors among medical students. A self-administered questionnaire collected data regarding sociodemographic characteristics, physical activity, dietary habits, comorbidities, medication use, family history, and lifestyle factors. Data was analyzed using Spss version 25.0. The result showed that the prevalence of overweight and obesity among the particpants was 13.3% and 15%, respectively. Hence, the combined prevalence of overweight and obesity was 28.3%. On the other hand, 17.3% of participants were underweight, and 54.4% had normal BMI. Most of the participants (61%) did not engage in regular exercise. A high proportion consumed fruits (82.9%) and vegetables (58.8%) in less than 3 days per week, and 84.2% consumed 3 or fewer meals per day. 42.1% of participants consumed fast food more than three days per week.[9]

In 2016, a cross-sectional survey was carried out in India among 800 undergraduates to assess the prevalence of overweight and obesity and its associated factors. The age of the students ranged from 17 -20 years with 541 being Males and 259 being females. Data was collected using a self-administered questionnaire. Results revealed that 37.5% were overweight and 10.7% were obese and 16.4% had central obesity.[16]

In 2022, a cross-sectional descriptive study was conducted among 622 undergraduate students from two public universities in Malaysia to assess the prevalence of overweight among the students. Data was collected using a pretested, structured self-administered questionnaire. Data was analyzed using the SPSS Statistical package. Results revealed a high prevalence of overweight, especially among Male students. The prevalence of overweight and obesity was 14.31 and 10.13%, respectively.[17]

This study was carried out to first year Physical Education University student in Zambezi region of Namibia. A total number of 208 students 46.6% (n = 97) female participants and 53.3% (n =111) male participants, between the ages range of 18 - 37 partook in this study. The data of the study were gathered with the "Student Body Mass Index calculation form" Bathroom scale with 0.1 sensitivity and a static vertical measuring tape. According to the results of current study; (n =26) 12, 5% of university students were found to be underweight, (n = 61) 29,3% were found to have normal bodyweight, (n = 106) 51% were found to be overweight and (n = 15) 7.2% were found to be obese. Although the frequency of being underweight, overweight and obese show higher scores in female participants compared to male.

In 2023, a cross-sectional study was carried out among 330 undergraduate students in two colleges and one university in Mongu, Zambia to Western Province, to assess the prevalence of obesity and overweight as well as the factors that are linked to these conditions. Trained study assistants used Kobo Collect software to administer a standardized questionnaire and electronically gather data. One-third (33%) of the pupils were obese or overweight. Students' overweight and obesity were substantially correlated with their sex, age, and alcohol consumption. To address obesity, learning institutions should implement early interventions due to the significant prevalence of overweight and obesity among young individuals.[10]

In 2017, a cross-sectional descriptive study conducted among undergraduate students from five tertiary institutions in Southwest Nigeria to note the prevalence of overweight among students revealed a high prevalence of overweight, especially among Female students. Data was collected using a pretested, structured self-administered questionnaire. The prevalence of overweight and obesity was 13.14 and 6.5%, respectively.[18]

In 2016, a cross-sectional survey carried out in India among 800 undergraduates to assess the prevalence of overweight and obesity and its associated factors revealed that 37.5% were overweight, 10.7% were obese and 16.4% had central obesity. The age of the students ranged from 17 -20 years with 541 being Males and 259 being females. Relevant findings revealed that lack of dietary knowledge, shorter sleep duration, living away from parents or guardians, tobacco use, lack of social support, and religiousness were linked as risk factors. A self-administered questionnaire was utilized and SPSS was used to analyze the data.[16]

In 2018, a cross-sectional study was carried out among 343 students (187 males, 156 females) in tertiary institutions in Uyo, South-South, Nigeria to assess socio-demographic factors associated with being Overweight among Undergraduates. Multi-staged sampling was used for sample determination. A structured questionnaire was used to gather relevant data. It was noted that there was a significant relationship between increased waist circumference and students who were married, had a higher monthly allowance, slept for longer hours, consumption of unhealthy food, and had parents who were obese.[19] This study intended to probe the factors related to Body Mass Index, Overweight and Obesity prevalence among university students. The findings of this study show that overweight and obesity's prevalence is on high rise in young people between the ages of 18 – 30 years. Sedentary lifestyle has become a preference over physical activities with the increase of use of technological gadgets and eating unhealthily.[5]

2.3 FACTORS ASSOCIATED WITH KNOWLEDGE OF HEALTH IMPLICATIONS OF ABNORMAL WEIGHT

This systematic review published in 2025 in Epidemiology and Society Health Review, aimed to synthesise evidence on determinants associated with the incidence of obesity among adults (≥18 years). The study drew on eight eligible articles published between 2018 and 2023 covering diverse populations (e.g. Ethiopia, Nepal). Sample sizes and sampling methods varied by study, and the review itself did not employ empirical sampling. Data collection involved extraction of reported outcomes from primary research studies, with quality assessment via the STROBE checklist. Relevant findings revealed consistent associations: high-calorie diets, physical inactivity, and smoking emerged as key risk factors contributing to obesity. The study utilised standardised frameworks (PRISMA/PICOS) which lends credence to its methodology. However the narrow scope limits generalisability of the findings.[20]

A systematic review aimed at evaluating the prevalence of obesity in Africa and its associated health impacts, including public knowledge of its implications. Conducted across multiple African countries, the review covered studies published up to the year 2012, focusing on diverse adult populations from both urban and rural settings. As a review, there was no single sample size, but rather a synthesis of multiple studies, with varying sampling techniques (mainly descriptive and literature-based inclusion). Data were collected by extracting and analysing published research findings on obesity, risk perception, and health outcomes. The review found that knowledge of the health implications of abnormal weight was generally low, influenced by education level, cultural norms favouring larger body sizes, and limited exposure to health promotion messages. While the study's strengths lie in its wide geographical coverage and attention to socio-cultural influences, it is limited by its lack of meta-analysis, outdated data, and inconsistent quality across included studies.[21]

A descriptive narrative review published in March 2018 aimed at exploring the causes of childhood obesity in Nigeria and suggesting control strategies . It covered child populations in Nigeria and data were collected via literature review of published studies. Relevant findings identified factors such as shifting lifestyles, cultural beliefs and taboos, dietary habits, medication use, and genetic predisposition as contributors to childhood obesity, which in turn predisposes children to renal, cardiovascular, musculoskeletal, respiratory, neurological, psychological, and emotional health problems. Proposed interventions included health education, lifestyle modification, changing food habits and cultural beliefs, and greater involvement by parents and media. The study's strengths include its recognition that childhood obesity is emerging as a major public health concern in Nigeria and its holistic look at socio-cultural, behavioural, and biological causes. However, it is limited by lack of quantitative data.[22]

2.4 FACTORS ASSOCIATED WITH CORRECT PERCEPTION OF PERSONAL WEIGHT FOR HEIGHT

A cross- sectional study, conducted in 2017 among undergraduate students at the Federal College of Education, Obudu, Cross- River State, Nigeria, aimed to assess factors associated with accurate perception of body weight for height (weight-for-height status) among young adults. A total of 1,030 students meeting inclusion criteria were randomly recruited and underwent measured anthropometry (height, weight, BMI classification) and responded to a self-report questionnaire regarding their perceived weight category and preferred weight. Measured BMI was compared to their self-perceived weight group to identify correct perception vs misperception. Approximately 33% misperceived their actual weight-for-height, and 24% expressed dissatisfaction with their body weight. Among normal- weight individuals, 67% thought they were overweight; among overweight individuals, nearly 90% perceived themselves as normal weight. Key factors associated with misperception included actual BMI category

(overweight/obese subjects were significantly more likely to misperceive), with misperception significantly more prevalent in overweight vs. normal BMI groups ($P < 0.001$). Sex differences were minimal. The large sample size and objective anthropometric measurement by trained staff supports the accuracy and generalisability of the study's findings. However, factors such as sex, age, and psychosocial or cultural determinants (like media influence, education level) were not directly assessed.[23]

A cross-sectional exploratory study was conducted in 2015 among apparently healthy adults aged ≥18 years in both urban (Warri) and rural (Jesse) communities of Delta State, Nigeria. A total of 183 participants (urban and rural residents) were recruited using a multi-stage cluster sampling technique. Researchers collected direct anthropometric measurements (height, weight, BMI, waist circumference) and gathered self-perceived body size via structured questionnaires in both verbal and visual formats, comparing perceived weight with measured BMI. Approximately one-third of respondents misperceived their weight status; 24.8% underestimated, and 8.8% overestimated their body size relative to BMI. Misperception was more prevalent among urban residents, males, and individuals who were overweight or obese. Strengths of the study include use of objective anthropometric measurements and inclusion of both urban and rural adults, enhancing relevance to weight-perception research. Limitations include modest sample size, lack of multivariate analysis to isolate independent predictors, limited demographic breadth, and absence of exploration into educational level, cultural norms, media influence or socioeconomic status as determinants of perception accuracy.[24]

A cross-sectional household survey carried out in 2019 in southeast Nigeria used a multistage cluster-randomised sampling technique, enrolling 6,628 adults from 2,843 households across urban and rural areas. The aim was to examine how perception of large body size influences actual obesity and how individuals perceive their own body size relative to measured BMI, in

relation to weight-management behaviours. Study population covered adult men and women residing in the region, with measured BMI used to establish actual weight-for-height categories. Data collection involved direct anthropometric measurements and structured interviews capturing individual perceptions and desirability of large body size, followed by logistic regression analyses to identify predictors. It found that 26% of participants were overweight or obese, and nearly half (44.1%) considered a large body size desirable, and this positive valuation significantly increased the odds of being obese. Among obese individuals, 42.0% misperceived their weight as normal. Perceiving one's weight as normal was linked to markedly reduced odds of engaging in weight-loss behaviour. The study's strengths include its very large, population-representative sample, rigorous anthropometric assessment, and culturally sensitive interrogation of perceived desirability. However, its cross-sectional design limits causal inference. Its regional focus may also limit generalisability beyond southeast Nigeria.[25]

CHAPTER THREE

METHODOLOGY

3.1 STUDY AREA

This study was conducted at the University of Benin, located in Benin City, the capital of Edo State, Nigeria. Edo State is situated in the South-South geopolitical zone of Nigeria and was established in 1991. It covers an area of 19,743 square kilometers and shares borders with Ondo, Anambra, Kogi, and Delta States. Its geographical coordinates span latitude 60 06'N to 60 30'N and longitude 50 30'E to 50 45'E, relative to the Greenwich meridian. The state is home to various ethnic groups, including the Benin, Esan, Etsako, Owan, and other smaller tribes. Benin City, an ancient urban center, serves as the administrative hub of Edo State and is known for its historical significance. It is home to several higher education institutions, including the University of Benin.[28]

The University of Benin (UNIBEN) was the site of this study. Founded in 1970 as a technology institute, UNIBEN gained full university status in 1971. Accredited by the National University Commission (NUC), UNIBEN offers a wide range of academic programs at diploma, undergraduate, and postgraduate levels. The university contains 15 faculties; 14 of the faculties are located at the Ugbowo Campus while 1 faculty is at the Ekenwan Campus. The current vice chancellor is Prof. Edoba Omoregie. Currently, UNIBEN has an estimated student population of over 70,000, including both full-time and part-time students, and employs about 4,000 academic staff members. The campus has different faculties such as Agriculture, Arts, Education, Engineering, Law, Life Sciences, Management Sciences, Pharmacy, Physical Sciences, Social Sciences, Veterinary Medicine, and the College of Medical Sciences which is composed of the School of Basic Medical Sciences which has seven (7) departments under it, School of Medicine, Dentistry and Institute of Child Health.

3.2 STUDY DESIGN

A descriptive cross-sectional study design was used for this study.

3.3 STUDY POPULATION

The study population comprised of undergraduate students of the University of Benin, Benin City, Edo State, Nigeria.

3.4 SELECTION CRITERIA

3.4.1 Inclusion criteria

All undergraduate students of the University of Benin who were present at the time of data collection.

3.4.2 Exclusion criteria

All 100 and 200 level students in the University of Benin as they had not spent enough time in the university to have developed solid opinions and perceptions ion of the health services as at the time of the study

3.5 STUDY DURATION

This study was carried out between September 2024 and August 2025.

3.6 SAMPLE SIZE DETERMINATION

The minimum sample size (n) was calculated using the Cochran's formula for a cross-sectional study.[29]

$$n = \frac{Z^2 pq}{d^2}$$

Where:

n = minimum sample size

Z = standard normal deviation set at 1.96 (at 95% confidence interval)

d = degree of precision set at 0.05

p = prevalence rate of a particular characteristics of the target population

A prevalence rate of 28.3% will be used, as it described the prevalence of overweight and obesity among Medical students in a 2024 study conducted at Jazan University, Saudi Arabia.[19]

p = 28.3% i.e. 28.3 / 100 = 0.283

q = 1 - p

= 1 - 0.283

= 0.717

Hence:

$$\frac{(1.96)^2 \times 0.283 \times 0.717}{(0.05)^2}$$

≈ 312

To account for non-response, 10% non-response rate was added to the minimum sample size, utilizing the formula

$nf = n / (1 - nr)$

where,

n = Minimum sample size = 312

nr = Non-response rate = 10% = 0.10

nf = Final Minimum sample size

nf = 312 / (1- 0.10)

nf = 312 / 0.9

nf = 346.66

A final sample size of 350 will be used.

3.7 SAMPLING TECHNIQUE

A simple random sampling technique will be used in this study.

Departments will be selected using simple random sampling of the departments in the five (5) faculties: Medicine, Nursing Pharmacy and Basic medical sciences.

Responses will be allocated to the various departments using proportions based on the student population in the following departments: Medicine, Nursing, Pharmacy, Physiotherapy, Medical laboratory sciences.

Respondents from the listed departments will be randomly selected to participate in the study.

STAGE 1: SELECTION OF DEPARTMENTS

The sampling frame consisted of the University of Benin from which, one-degree programme was selected from each faculty using simple random sampling by balloting.

STAGE 2: SELECTION OF RESPONDENTS

From the selected degree programmes, stratified sampling technique was used to select the respondents based on the population of undergraduate students in each of the selected degree programmes, and the population at each level will form the basis of each stratum.

3.8 DATA MANAGEMENT

3.8.1 Tools for data collection.

A structured questionnaire was used to collect data for the study, containing both open and closed-ended questions. The questionnaire was adapted from similar studies reviewed in our literature review.[8,10,16.]

The questionnaire will consist of five (5) sections:

Section A: Sociodemographic information of respondents

Section B: Knowledge of health implications of abnormal weight (below normal, and excessive weight)

Section B: Prevalence of the different body mass index categories (underweight, normal weight, overweight and obesity)

Section C: Perception of personal weight for height among undergraduate students in University of Benin.

Section D: Factors associated with correct perception of personal weight for height among undergraduate students in University of Benin.

Section E: Factors associated with knowledge of health implications of abnormal weight among undergraduate students in University of Benin.

3.8.2 Method of data collection

The questionnaires were self-administered. Informed consent was obtained from the respondents and the respondents before administering the questionnaire.

3.8.3 Data analysis

Data collected was collated, screened for completeness, numbered serially and entered into IBM Statistical Package for Social Sciences (SPSS) Statistics for Windows, Version 25.0 software.

3.8.4 Scoring

Knowledge will be assessed using 24 questions including multiple responses. Correct responses were given a score 1 and negative responses were given 0. Composite scores will be obtained for the respondents and converted into percentages. Respondents with scores equal to or greater than 50 will be reported as good knowledge while those with scores less than 50 will be reported as having poor knowledge.

3.9 ETHICAL CONSIDERATION

Ethical clearance and approval will be sought and obtained from the University of Benin Teaching Hospital Ethical Committee. Permission for the study will be sought from the departments chosen for the study. Consent will be obtained from the respondents after they have been educated on the purpose of the study and the confidentiality of the information assured.

3.10 LIMITATION OF STUDY

Data to be collected from the respondents will be self-reported and this may introduce response biases. To overcome this, a simple structured questionnaire which is easy to understand and fill will be used in the data collection to ensure that participants understand and are able to recall responses.

CHAPTER 4

RESULTS

A total fifty (350) respondents participated in this study with all questionnaires retrieved giving a response rate of 100%. The results are presented in the following sessions in line with the specific objectives.

SECTION A: Socio-demographic characteristics of the respondents.

SECTION B: Knowledge of health implications of abnormal weight for height.

SECTION C: Self-reported arthropometric data.

SECTION D: Perception for personal weight for height.

SECTION A: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

TABLE 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Variable	Frequency (n=350)	Percent
Age (Years)		
<21	95	27.1
21-25	242	69.1
>25	13	3.7
Mean(SD)= 21.0(2.852)		
Gender		
Male	167	47.7
Female	183	52.3
Degree programmes		
Medicine	108	30.9
Dentistry	20	5.7
Nursing	107	30.6
Medical biochemistry	115	32.9
Level		
200L	73	20.9
300L	61	17.4
400L	143	40.9
500L	57	16.3
600L	16	4.6
Marital status		
Never married	334	95.4
Married	16	4.6
Residence		
On campus	267	76.3
Off campus	83	23.7
Source of income		
Parents	302	86.3
Employed	26	7.4
Scholarship	22	6.3
Average monthly income		
<#30,000	105	30.0
#31,000-#50,000	101	28.9
#51,000-#100,000	122	34.9
>#100,000	22	6.3

On the socio-demographic characteristics of the 350 respondents, age distribution shows that the majority of participants 242 (69.1%) were within the 21–25 years age group. This was followed by those less than 21 years 95 (27.1%), while the least proportion was those greater than 25 years 13 (3.7%). The mean age of the respondents was 21.0 years with a standard deviation of 2.852.

With respect to gender, 167 (47.7%) of the respondents were male while 183 (52.3%) were female. Regarding degree programmes, the highest proportion of respondents were in Medical Biochemistry 115 (32.9%), followed closely by Medicine 108 (30.9%) and Nursing 107 (30.6%), while the least were in Dentistry 20 (5.7%).

In terms of level of study, the majority of respondents were in 400 level 143 (40.9%), followed by 200 level 73 (20.9%), 300 level 61 (17.4%), 500 level 57 (16.3%), and the least proportion in 600 level 16 (4.6%).

Concerning marital status, most respondents 334 (95.4%) were never married while 16 (4.6%) were married. For residence, the majority 267 (76.3%) lived on campus, while 83 (23.7%) resided off campus.

With respect to source of income, most respondents 302 (86.3%) reported parents as their main source, while employed 26 (7.4%) and scholarship 22 (6.3%) accounted for smaller proportions.

Regarding average monthly income, 122 (34.9%) earned between ₦51,000–₦100,000, 105 (30.0%) earned less than ₦30,000, 101 (28.9%) earned between ₦31,000–₦50,000, while the least proportion 22 (6.3%) earned greater than ₦100,000.

SECTION B: KNOWLEDGE OF HEALTH IMPLICATIONS OF ABNORMAL WEIGHT FOR HEIGHT

TABLE 2: KNOWLEDGE OF HEALTH IMPLICATIONS OF ABNORMAL WEIGHT FOR HEIGHT AMONG RESPONDENTS

Variable	Frequency (n=350)	Percent
Heard of abnormal weight		
Yes	327	93.4
No	23	6.6
Abnormal weight		
Overweight	121	34.6
Obesity	203	58.0
Underweight	26	7.4
Excessive weight is a health condition		
Yes	282	80.6
No	68	19.4
Source of information that excessive weight is a health condition	**n = 282**	
School	127	45.0
Television	65	23.0
Internet/Social media	57	20.2
Health workers	17	5.7
Family/friends	16	6.0
Normal BMI* range		
18.5-24.9	296	84.6
25.0-29.9	54	15.4
BMI range that indicates overweight		
18.5-24.9	10	2.9
25.0-29.9	197	56.3
30.0	143	40.9
Conditions associated with overweight		
Hypertension	94	26.9
Diabetes	199	56.9
Stroke	20	5.7
Joint problems	37	10.6
Conditions associated with underweight		
Osteoporosis	38	10.9
Anaemia	142	40.6
Weakened immune system	159	45.4
Irregular/absent periods	11	3.1

*BMI- Body Mass Index

Majority of respondents 327 (93.4%) reported that they had heard of abnormal weight, while 23 (6.6%) had not. Regarding knowledge of abnormal weight, 203 (58.0%) identified obesity, 121 (34.6%) identified overweight, while 26 (7.4%) identified underweight.

Concerning whether excessive weight is a health condition, 282 (80.6%) of the respondents reported yes, while 68 (20.4%) reported no. Among the 282 respondents who identified excessive weight as a health condition, the sources of information reported were school 127 (45.0%), television 65 (23.0%), internet/social media 57 (20.2%), health workers 17 (5.7%), and family/friends 16 (6.0%).

With regard to knowledge of normal BMI range, the majority of respondents 296 (84.6%) identified 18.5–24.9, while 54 (15.4%) identified 25.0–29.9. On BMI range that indicates overweight, 197 (56.3%) correctly identified 25.0–29.9, while 143 (40.9%) reported 30.0, and 10 (2.9%) reported 18.5–24.9.

Regarding knowledge of conditions associated with overweight, 199 (56.9%) identified diabetes, 94 (26.9%) hypertension, 37 (10.6%) joint problems, and 20 (5.7%) stroke. On conditions associated with underweight, 159 (45.4%) identified weakened immune system, 142 (40.6%) anaemia, 38 (10.9%) osteoporosis, and 11 (3.1%) irregular/absent periods.

TABLE 3: CORRECTNESS OF KNOWLEDGE OF HEALTH IMPLICATIONS OF ABNORMAL WEIGHT FOR HEIGHT AMONG RESPONDENTS

Variables	Correct (%)	Incorrect (%)
Heard of abnormal weight	327 (93.4)	23 (6.6)
Excessive weight is a health condition	282 (80.6)	68 (19.4)
Normal BMI range	296 (84.6)	54 (15.4)
BMI that indicates overweight	197 (56.3)	153 (43.7)

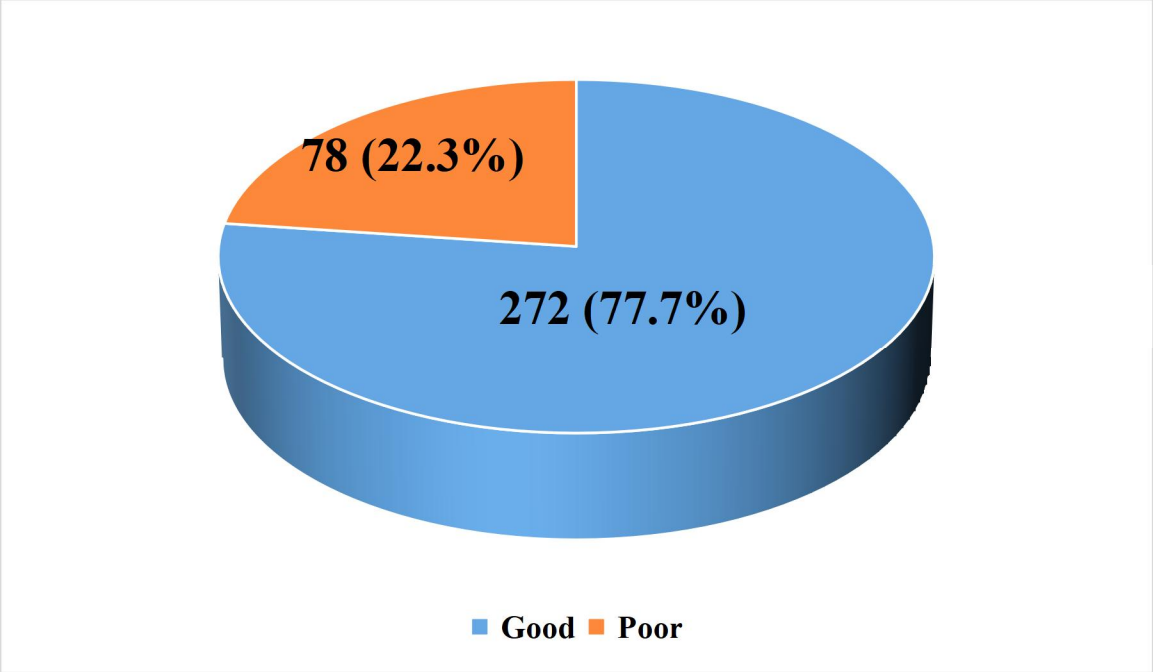

FIGURE 1: Knowledge of weight for height among respondents

Majority of respondents, 272 (77.7%) had good knowledge, while 78 (22.3%) had poor knowledge.

TABLE 4: SOCIO-DEMOGRAPHIC CHARACTERISTICS AND KNOWLEDGE OF WEIGHT FOR HEIGHT AMONG RESPONDENTS

Variables	Knowledge (n = 350)		Test Statistic	p-value
	Good (%) 272 (77.7)	Poor (%) 78 (22.3)		
Age (Years)				
<21	45 (47.4)	50 (52.6)	**Fisher's exact:** 63.708	**<0.001**
21-25	214 (88.4)	28 (11.6)		
>25	13 (100.0)	0 (0.0)		
Gender				
Male	131 (78.4)	36 (21.6)	χ^2= 0.098	0.754
Female	141 (77.0)	42 (23.0)		
Degree programmes				
Medicine	98 (90.7)	10 (9.3)	**Fisher's exact:** 67.317	**<0.001**
Dentistry	20 (100.0)	0 (0.0)		
Nursing	53 (49.5)	54 (50.5)		
Medical biochemistry	101 (87.8)	14 (12.2)		
Level				
200L	25 (34.2)	48 (65.8)	**Fisher's exact:**124.037	**<0.001**
300L	41 (67.2)	20 (32.8)		
400L	136 (95.1)	7 (4.9)		
500L	57 (100.0)	0 (0.0)		
600L	13 (81.2)	0 (18.8)		
Marital status				
Never married	256 (76.6)	78 (23.4)	χ^2= 4.808	**0.028**
Married	16 (100.0)	0 (0.0)		
Residence				
On campus	200 (80.0)	50 (20.0)	χ^2= 12.066	**0.001**
Off campus	70 (70.0)	30 (30.0)		
Source of income				
Parents	224 (74.2)	78 (25.8)	**Fisher's exact:**19.899	**<0.001**
Employed	26 (100.0)	0 (0.0)		
Scholarship	22 (100.0)	0 (0.0)		
Average monthly income				
<#30,000	67 (63.8)	38 (36.2)	**Fisher's exact:**21.334	**<0.001**
#31,000-#50,000	81 (80.2)	20 (19.8)		
#51,000-#100,000	102 (83.6)	20 (16.4)		
>#100,000	22 (100.0)	0 (0.0)		

Regarding age, 45 (47.4%) of respondents below 21 years, 214 (88.4%) of those between 21–25 years, and all 13 (100.0%) of those above 25 years had good knowledge. This association between age and knowledge was statistically significant (Fisher's exact = 63.708, $p < 0.001$).

For gender, 131 (78.4%) of males and 141 (77.0%) of females had good knowledge, and this association was not statistically significant ($\chi^2 = 0.098$, $p = 0.754$).

Across degree programmes, 98 (90.7%) in Medicine, all 20 (100.0%) in Dentistry, 101 (87.8%) in Medical Biochemistry, and 53 (49.5%) in Nursing had good knowledge. The association between programme of study and knowledge was statistically significant (Fisher's exact = 67.317, $p < 0.001$).

With respect to academic level, 25 (34.2%) in 200 level, 41 (67.2%) in 300 level, 136 (95.1%) in 400 level, 57 (100.0%) in 500 level, and 13 (81.2%) in 600 level had good knowledge. The association between academic level and knowledge was statistically significant (Fisher's exact = 124.037, $p < 0.001$).

Concerning marital status, 256 (76.6%) of the never married and all 16 (100.0%) of the married respondents had good knowledge. The association between marital status and knowledge was statistically significant ($\chi^2 = 4.808$, $p = 0.028$).

For residence, 200 (80.0%) of those staying on campus and 70 (70.0%) of those living off campus had good knowledge. This association was statistically significant ($\chi^2 = 12.066$, $p = 0.001$).

With regard to source of income, 224 (74.2%) of respondents supported by parents, all 26 (100.0%) of those employed, and all 22 (100.0%) on scholarship had good knowledge. This association between income source and knowledge was statistically significant (Fisher's exact = 19.899, $p < 0.001$).

Considering average monthly income, 67 (63.8%) of respondents earning below ₦30,000, 81 (80.2%) earning ₦31,000–₦50,000, 102 (83.6%) earning ₦51,000–₦100,000, and all 22 (100.0%) earning above ₦100,000 had good knowledge. This association was statistically significant (Fisher's exact = 21.334, $p < 0.001$).

SECTION C: SELF REPORTED ARTHROPOMETRIC DATA

TABLE 5: ANTHROPOMETRIC DATA AMONG RESPONDENTS

Variable	Frequency (n=350)	Percent
Current height (m)		
<1.8	330	94.3
≥1.8	20	5.7
Mean(SD)= 1.72(0.08)		
Current weight (kg)		
<50	11	3.1
50-59.9	133	38.0
60-69.9	93	26.6
70-79.9	73	20.9
>80	40	11.4
Mean(SD)= 64.40(9.78)		
BMI		
Underweight	36	10.3
Normal weight	263	75.1
Over weight	35	10.0
Obese	16	4.6
Been diagnosed as overweight or obese		
Yes	24	6.9
No	326	93.1

On anthropometric data of the respondents, the majority 330 (94.3%) had a current height of less than 1.8m, while 20 (5.7%) were 1.8m or taller. The mean height of respondents was 1.72m with a standard deviation of 0.08.

With respect to current weight, 133 (38.0%) of the respondents weighed between 50–59.9kg, 93 (26.6%) weighed between 60–69.9kg, 73 (20.9%) weighed between 70–79.9kg, 40 (11.4%) weighed more than 80kg, while 11 (3.1%) weighed less than 50kg. The mean weight of respondents was 64.40kg with a standard deviation of 9.78.

Regarding BMI, 263 (75.1%) had normal weight, 36 (10.3%) were underweight, 35 (10.0%) were overweight, and 16 (4.6%) were obese. Concerning previous diagnosis, only 24 (6.9%) reported being diagnosed as overweight or obese, while the majority 326 (93.1%) reported no previous diagnosis.

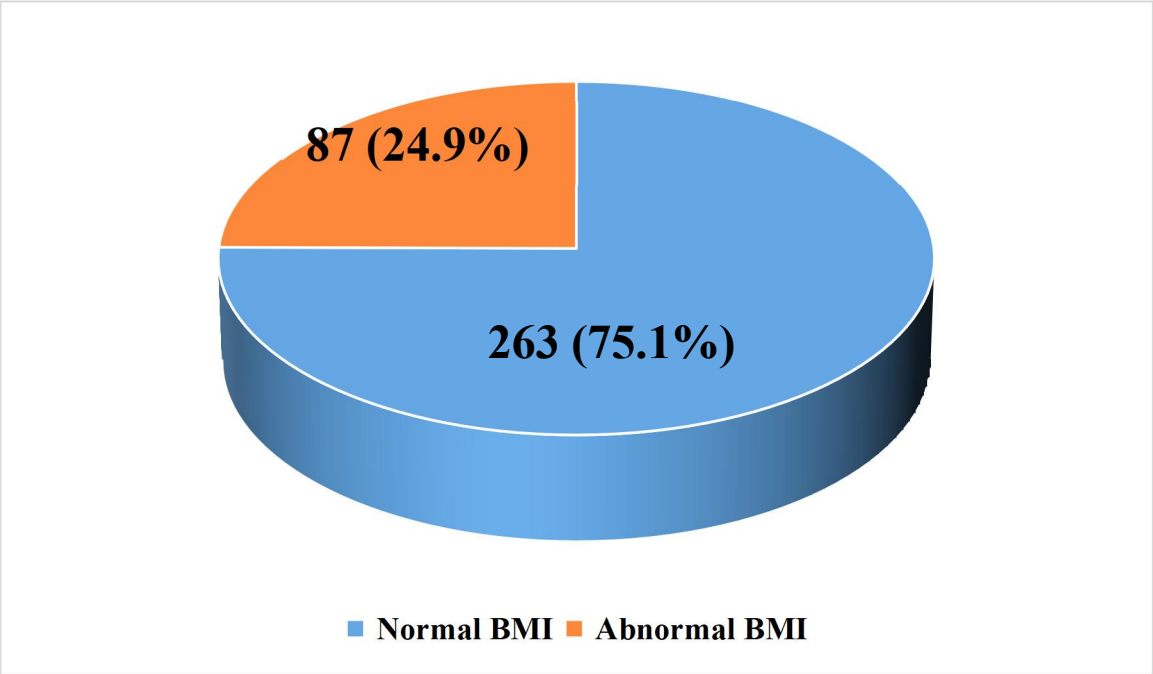

FIGURE 2: BMI of respondents

Majority of respondents, 263 (75.1%) had normal BMI, while 87 (24.9%) had abnormal BMI.

TABLE 6: SOCIO-DEMOGRAPHIC CHARACTERISTICS AND BMI AMONG RESPONDENTS

Variables	BMI (n = 350)		Test Statistic	p-value
	Normal (%) 263 (75.1)	Abnormal (%) 87 (24.9)		
Age (Years)				
<21	79 (83.2)	16 (16.8)	**Fisher's exact:**18.824	**<0.001**
21-25	181 (74.8)	61 (25.2)		
>25	3 (23.1)	10 (76.9)		
Gender				
Male	101 (60.5)	66 (39.5)	χ^2=36.770	**<0.001**
Female	162 (88.5)	21 (11.5)		
Degree programmes				
Medicine	70 (64.8)	38 (35.2)	**Fisher's exact:**16.975	**0.001**
Dentistry	20 (100.0)	0 (0.0)		
Nursing	79 (73.8)	28 (26.2)		
Medical biochemistry	94 (81.7)	21 (18.3)		
Level				
200L	71 (97.3)	2 (2.7)	**Fisher's exact:**32.657	**<0.001**
300L	40 (65.6)	21 (34.4)		
400L	99 (69.2)	44 (30.8)		
500L	40 (70.2)	17 (29.8)		
600L	13 (81.3)	3 (18.8)		
Marital status				
Never married	247 (74.0)	87 (26.0)	χ^2= 5.546	**0.019**
Married	16 (100.0)	0 (0.0)		
Residence				
On campus	185 (69.3)	82 (30.7)	χ^2= 20.660	**<0.001**
Off campus	78 (94.0)	5 (6.0)		
Source of income				
Parents	234 (77.5)	68 (22.5)	**Fisher's exact:**10.088	**0.003**
Employed	19 (73.1)	7 (26.9)		
Scholarship	10 (45.5)	12 (54.5)		
Average monthly income				
<#30,000	99 (94.3)	6 (5.7)	χ^2= 32.382	**<0.001**
#31,000-#50,000	72 (71.3)	29 (28.7)		
#51,000-#100,000	80 (65.6)	42 (34.4)		
>#100,000	12 (54.5)	10 (45.5)		
Knowledge				
Good	185 (68.0)	87 (32.0)	**Fisher's exact:**34.305	**<0.001**
Poor	78 (100.0)	0 (0.0)		

By age group, 79 (83.2%) of those less than 21 years, 181 (74.8%) of those aged 21–25 years, and only 3 (23.1%) of those above 25 years had normal BMI. This association was statistically significant (Fisher's exact = 18.824, $p < 0.001$).

For gender, 101 (60.5%) of males and 162 (88.5%) of females had normal BMI. This association between gender and BMI was statistically significant ($\chi^2 = 36.770$, $p < 0.001$).

Across degree programmes, 70 (64.8%) in Medicine, 20 (100.0%) in Dentistry, 79 (73.8%) in Nursing, and 94 (81.7%) in Medical Biochemistry had normal BMI. The association between programme of study and BMI was statistically significant (Fisher's exact = 16.975, $p = 0.001$).

With respect to academic level, 71 (97.3%) in 200 level, 40 (65.6%) in 300 level, 99 (69.2%) in 400 level, 40 (70.2%) in 500 level, and 13 (81.3%) in 600 level had normal BMI. The association between academic level and BMI was statistically significant (Fisher's exact = 32.657, $p < 0.001$).

Concerning marital status, 247 (74.0%) of those never married and all 16 (100.0%) of the married respondents had normal BMI. This association was statistically significant ($\chi^2 = 5.546$, $p = 0.019$).

For residence, 185 (69.3%) of respondents living on campus and 78 (94.0%) of those residing off campus had normal BMI. This association was statistically significant ($\chi^2 = 20.660$, $p < 0.001$).

With respect to source of income, 234 (77.5%) of those sponsored by parents, 19 (73.1%) of the employed, and 10 (45.5%) on scholarship had normal BMI. The association between source of income and BMI was statistically significant (Fisher's exact = 10.088, $p = 0.003$).

Considering average monthly income, 99 (94.3%) of those earning below ₦30,000, 72 (71.3%) of those earning ₦31,000–₦50,000, 80 (65.6%) of those earning ₦51,000–₦100,000, and 12

(54.5%) of those earning above ₦100,000 had normal BMI. The association between average monthly income and BMI was statistically significant ($\chi^2 = 32.382$, $p < 0.001$).

For knowledge, 185 (68.0%) of those with good knowledge and 78 (100.0%) of those with poor knowledge had normal BMI. The association between knowledge and BMI was statistically significant (Fisher's exact = 34.305, $p < 0.001$).

SECTION D: PERCEPTION FOR PERSONAL WEIGHT FOR HEIGHT

TABLE 7: PERCEPTION FOR PERSONAL WEIGHT FOR HEIGHT AMONG RESPONDENTS

Variables	Frequency (n = 350)	Percent (%)
Classify your weight in terms of height		
Underweight	22	6.3
Normal weight	314	89.7
Over weight	14	4.0
Describe your weight		
Very underweight	17	4.9
Slightly underweight	140	40.0
About the right weight	188	53.7
Very overweight	5	1.4
Action taken about weight		
Lose weight	103	29.4
Gain weight	112	32.0
Stay the same weight	91	26.0
Doing nothing about my weight	44	12.6
Feeling about current weight		
Satisfied	216	61.7
Wish to weigh less	17	4.9
Wish to weigh more	117	33.4
Feel pressure from others about weight		
Often	11	3.1
Occasionally	13	3.7
Rarely	326	93.1

On perception for personal weight for height, the majority of respondents 314 (89.7%) classified themselves as having normal weight, while 22 (6.3%) and 14 (4.0%) classified themselves as underweight and overweight, respectively.

When asked to describe their weight, 188 (53.7%) reported being about the right weight, 140 (40.0%) described themselves as slightly underweight, 17 (4.9%) as very underweight, and 5 (1.4%) as very overweight.

With respect to actions taken about their weight, 112 (32.0%) reported that they were trying to gain weight, 103 (29.4%) were trying to lose weight, 91 (26.0%) aimed to stay the same weight, while 44 (12.6%) reported doing nothing about their weight.

Concerning feelings about their current weight, 216 (61.7%) reported being satisfied, 117 (33.4%) wished to weigh more, while 17 (4.9%) wished to weigh less.

Regarding pressure from others about weight, the majority 326 (93.1%) reported rarely feeling pressure, while 13 (3.7%) reported occasionally and 11 (3.1%) often experiencing such pressure.

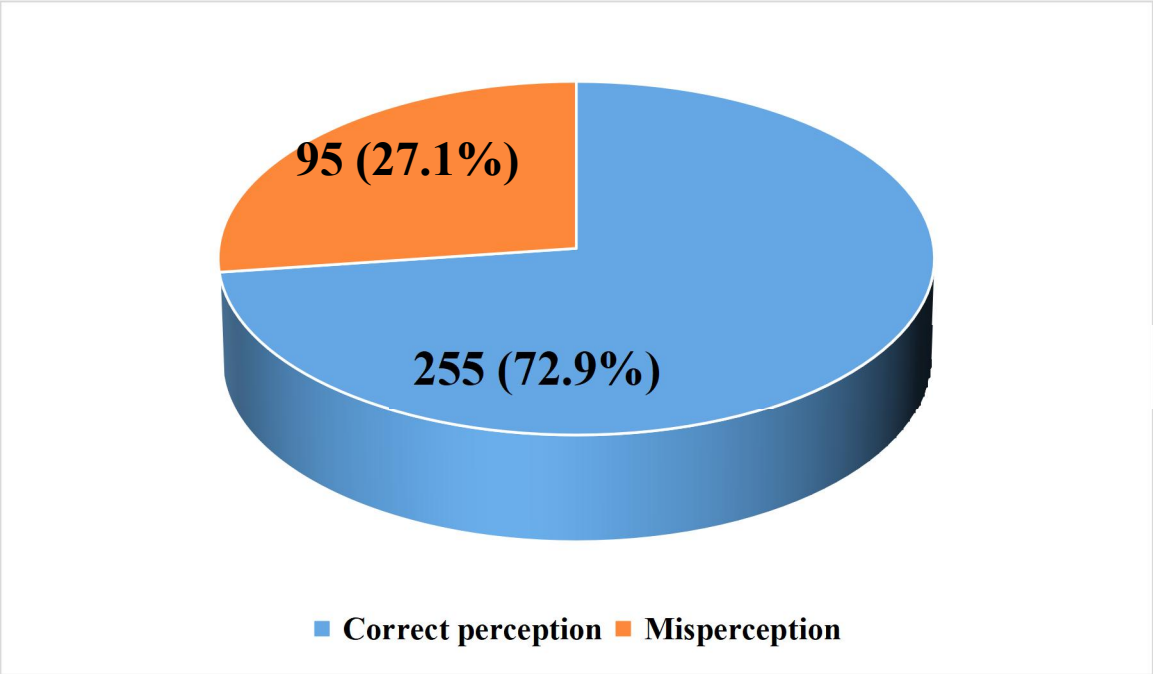

FIGURE 3: Perception of weight for height among respondents

Majority of respondents, 255 (72.9%) had correct perception, while 95 (27.1%) had misperception.

TABLE 8: SOCIO-DEMOGRAPHIC CHARACTERISTICS AND PERCEPTION OF BMI AMONG RESPONDENTS

Variables	Perception (n = 350)		Test Statistic	p-value
	Correct (%) 255 (72.9)	Incorrect (%) 95 (27.1)		
Age (Years)				
<21	81 (85.3)	14 (14.7)	**Fisher's**	**<0.001**
21-25	171 (70.7)	71 (29.3)	**exact:**22.446	
>25	3 (23.1)	10 (76.9)		
Gender				
Male	99 (59.3)	68 (40.7)	χ^2= 29.767	**<0.001**
Female	156 (85.2)	27 (14.8)		
Degree programmes				
Medicine	70 (64.8)	38 (35.2)	**Fisher's**	**0.003**
Dentistry	10 (50.0)	10 (50.0)	**exact:**13.841	
Nursing	81 (75.7)	26 (24.3)		
Medical biochemistry	94 (81.7)	21 (18.3)		
Level				
200L	70 (95.9)	3 (4.1)	**Fisher's**	**<0.001**
300L	42 (68.9)	19 (31.1)	**exact:**33.276	
400L	90 (62.9)	53 (37.1)		
500L	40 (70.2)	17 (29.8)		
600L	13 (81.3)	3 (18.8)		
Marital status				
Never married	239 (71.6)	95 (28.4)	χ^2= 6.246	**0.012**
Married	16 (100.0)	0 (0.0)		
Residence				
On campus	185 (69.3)	82 (30.7)	χ^2= 7.251	**0.007**
Off campus	70 (84.3)	13 (15.7)		
Source of income				
Parents	229 (75.8)	73 (24.2)	**Fisher's**	**0.003**
Employed	16 (61.5)	10 (38.5)	**exact:**10.637	
Scholarship	10 (45.5)	12 (54.5)		
Average monthly income				
<#30,000	97 (92.4)	8 (7.6)	**Fisher's**	**<0.001**
#31,000-#50,000	82 (81.2)	19 (18.8)	**exact:**76.234	
#51,000-#100,000	74 (60.7)	48 (39.3)		
>#100,000	2 (9.1)	20 (90.9)		

Regarding age group, 81 (85.3%) of those less than 21 years, 171 (70.7%) of those 21–25 years, and only 3 (23.1%) of those above 25 years had correct perception. This association was statistically significant (Fisher's exact = 22.446, $p < 0.001$).

For gender, 99 (59.3%) of males and 156 (85.2%) of females had correct perception. This association between gender and perception of BMI was statistically significant ($\chi^2 = 29.767$, $p < 0.001$).

Across degree programmes, 70 (64.8%) in Medicine, 10 (50.0%) in Dentistry, 81 (75.7%) in Nursing, and 94 (81.7%) in Medical Biochemistry had correct perception. The association between programme of study and perception was statistically significant (Fisher's exact = 13.841, $p = 0.003$).

With respect to academic level, 70 (95.9%) in 200 level, 42 (68.9%) in 300 level, 90 (62.9%) in 400 level, 40 (70.2%) in 500 level, and 13 (81.3%) in 600 level had correct perception. The association between academic level and perception was statistically significant (Fisher's exact = 33.276, $p < 0.001$).

Concerning marital status, 239 (71.6%) of those never married and all 16 (100.0%) of the married respondents had correct perception. This association was statistically significant ($\chi^2 = 6.246$, $p = 0.012$).

For residence, 185 (69.3%) of those staying on campus and 70 (84.3%) of those living off campus had correct perception. This association was statistically significant ($\chi^2 = 7.251$, $p = 0.007$).

Regarding source of income, 229 (75.8%) of respondents supported by parents, 16 (61.5%) of those employed, and 10 (45.5%) on scholarship had correct perception. The association between source of income and perception was statistically significant (Fisher's exact = 10.637, $p = 0.003$).

Considering average monthly income, 97 (92.4%) of respondents earning below ₦30,000, 82 (81.2%) earning ₦31,000–₦50,000, 74 (60.7%) earning ₦51,000–₦100,000, and only 2 (9.1%) of those earning above ₦100,000 had correct perception. The association between monthly income and perception was statistically significant (Fisher's exact = 76.234, $p < 0.001$).

TABLE 9: FACTORS ASSOCIATED WITH PERCEPTION OF BMI AMONG RESPONDENTS

Variables	Perception (n = 350)		Test Statistic	p-value
	Correct (%) 255 (72.9)	Incorrect (%) 95 (27.1)		
Knowledge				
Good	183 (67.3)	89 (32.7)	χ^2= 19.201	**<0.001**
Poor	72 (92.3)	6 (7.7)		
BMI				
Underweight	12 (33.3)	24 (66.7)	**Fisher's**	**<0.001**
Normal	243 (92.4)	20 (7.6)	**Exact:**	
Overweight	0 (0.0)	35 (100.)	214.290	
Obese	0 (0.0)	16 (10.0)		

Regarding knowledge, 183 (67.3%) respondents with good knowledge and 72 (92.3%) with poor knowledge had correct perception of BMI. A statistically significant association was found between knowledge and perception ($\chi2 = 19.201$, $p < 0.001$).

For BMI, 12 (33.3%) respondents who were underweight, 243 (92.4%) with normal BMI, and none (0.0%) who were overweight or obese had correct perception. A statistically significant association was found between BMI and perception (Fisher's exact = 216.102, $p < 0.001$).

TABLE 10: RELATIONSHIP BETWEEN BMI STATUS AND PERCEPTION OF WEIGHT AMONG RESPONDENTS

BMI	Objective	Correct perception (%)	Misperception (%)
Underweight	36	12 (33.3)	24 (66.7)
Normal weight	263	243 (92.4)	20 (7.6)
Overweight	35	0 (0.0)	35 (100)
Obesity	16	0 (0.0)	16 (100)

Out of the 36 respondents who were underweight, 12 (33.3%) had the correct perception of their weight status, while 24 (66.7%) misperceived it. Among the 263 respondents with normal weight, 243 (92.4%) had the correct perception, whereas 20 (7.6%) misperceived it. All 35 (100%) respondents who were overweight had misperceptions about their weight status, with none perceiving it correctly. Similarly, all 16 (100%) respondents who were obese misperceived their weight status.

CHAPTER FIVE

DISCUSSION

This study assessed the knowledge, anthropometric status, and perception of weight for height among undergraduates. The socio-demographic characteristics revealed that the majority of respondents were aged between 21–25 years, with a mean age of 21 years. This finding is expected as most undergraduates in Nigerian universities typically fall within this age range due to the average age of entry into tertiary institutions. Similar age distribution has been reported in studies among Nigerian university students, where most respondents were in their early twenties.[13] The public health significance of this age distribution is that interventions targeted at weight management and health education will be most effective if designed for young adults, who are in a formative stage of lifestyle development. It is recommended that structured health promotion programmes on nutrition and weight management be integrated into undergraduate curricula.

Gender distribution showed a higher proportion of females compared to males. This finding aligns with a 2019 study that reported female predominance in the study, possibly due to greater willingness of females to participate in surveys.[26] However, in some African and international contexts, males have been more represented, reflecting differences in student enrolment patterns. The higher female participation is significant, as females often show greater body image concerns and are at higher risk of misperceptions about weight. Therefore, gender-sensitive health promotion activities should be encouraged in universities.

In terms of degree programmes, respondents were fairly distributed across Medicine, Nursing, and Medical Biochemistry, while Dentistry had the lowest representation. This finding is a

reflection of the relative population sizes within these departments. The significance of this is that interventions may need to be department-specific, as workload and academic pressures vary, which may influence health practices. Universities are encouraged to ensure equitable dissemination of health education across all faculties. Across academic levels, the majority of respondents were in 400 level, while the least were in 600 level. This can be explained by the larger population sizes in middle academic levels compared to the final year. The implication is that interventions targeted at healthy weight and nutrition should start early in the academic journey and be reinforced in higher levels.

Marital status showed that most respondents were never married. This is expected since the study population were undergraduates, with few in marriageable age brackets. The public health significance is that most respondents were dependent on their families for financial support, and interventions must consider parental influence on lifestyle practices.

The majority of respondents resided on campus compared to off-campus. This pattern reflects the availability of campus accommodation and is consistent with other Nigerian university-based studies. Residence is significant in determining access to food outlets and lifestyle behaviours, as on-campus students may rely more on cafeteria meals. Universities should strengthen campus-based nutrition programmes. Regarding source of income, most respondents depended on parents, with a smaller proportion earning income through employment, scholarship, or others. Financial dependence limits autonomy in food choices and may influence dietary patterns. This underscores the importance of parental involvement in promoting healthy nutrition.

Knowledge of health implications of abnormal weight for height showed that majority of respondents had heard of abnormal weight, with obesity being the most commonly identified abnormality. Schools and media were the major sources of information. This aligns with other Nigerian studies where school and media were primary sources of health knowledge. Schools

remain a key platform for delivering health education, and curricula should be strengthened. This high level of awareness may be due to exposure to academic training and mass media. Findings were seen in a 2022 study in the US where majority of students were aware and knowledgeable of obesity and its risk factors.[11] The public health significance is that knowledge does not always translate into practice, highlighting the need for behaviour-focused interventions.

Knowledge of BMI ranges showed that the majority correctly identified normal BMI and overweight cut-offs, though a minority misclassified. Over two-thirds of respondents demonstrated good knowledge on weight for height. Contrasting findings were recorded in a 2024 study in Benin city among undergraduates where a substantial proportion of students lacked knowledge about BMI, its calculation and range.[13] This study involved a large amount of students in medical related courses as against the 2024 study and this could be responsible for the higher knowledge seen in this study. Public health significance is that poor knowledge may contribute to misperceptions and unhealthy practices. Thus, periodic training sessions on BMI interpretation are recommended.

Anthropometric data showed that majority had normal BMI, while about one-tenth were underweight, and less than a third of respondents were overweight or obese. This aligns with a descriptive cross-sectional study in Edo State where the prevalence of overweight and obesity was 19.37%.[13] In contrast, studies in high-income countries report higher prevalence of overweight and obesity, reflecting lifestyle differences. A 2025 Saudi Arabian study among undergraduate students showed that the prevalence of overweight and obesity was 43.5%.[27] While most respondents are within normal BMI, preventive strategies must be implemented early to avert transition to overweight.

More females had normal BMI when compared to males and the association between gender and BMI was statistically significant. Women tend to be more likely to be health and diet conscious

compared to males and could be responsible for most of them having normal BMI than males.[28] Similar finding was recorded in a study among undergraduate students in 22 countries where men (24.7%) were significantly more overweight or obese than women (20.0%).[29] Contrasting have been recorded in Saudi Arabia where 53.6% females were classified as overweight or obese compared to 33.5% males.[27] Lifestyle and cultural differences may be responsible for contrasting findings. Public health significance is that interventions must be tailored to sociodemographic risk groups.

This study revealed that as age increased, the prevalence of abnormal BMI also increased. This finding suggests that older individuals in the study population are more predisposed to being obese/underweight compared to younger individuals. A possible reason for this finding is that with advancing age, metabolic rate decreases, and physical activity levels also tend to decline. Additionally, older individuals may accumulate more adipose tissue over time due to lifestyle factors such as sedentary behavior, dietary habits, or reduced engagement in vigorous activities. However, this finding contrasts with the result from another study which reported a significant negative correlation between age and prevalence of obesity.[13] In that study, younger individuals were found to be more likely obese compared to older individuals. A possible reason for this difference may be related to variations in study settings, sample characteristics, and lifestyle patterns. Despite the contrasting results, both findings stress the complex nature of obesity and its determinants, showing that the relationship between age and obesity may vary across populations. The finding in this study highlights the need for targeted interventions for older adults, focusing on promoting physical activity, dietary modification, and routine health checks to prevent obesity-related complications.

On perception, most respondents classified their weight correctly, described themselves as about the right weight, and were satisfied with their weight. Nearly one-third of respondents

misperceived their weight status. Also, some wished to gain or lose weight, and a minority reported pressure from others. Higher value was reported in a 2019 study among undergraduates in where more than a third (35.9%) of students misperceived their weight status.[26] This contrast may be due to socio-cultural differences. finding is consistent with Nigerian and African studies where most students have correct perception, but misperceptions remain in a minority. In contrast, studies from Western countries report higher dissatisfaction and social pressure, reflecting cultural differences. The significance is that correct perception among undergraduates is protective against risky weight-control behaviours, but continuous monitoring is needed.

Factors associated with perception showed significant associations with knowledge and BMI. Respondents with good knowledge and normal BMI had better perception, while those underweight, overweight, or obese often misperceived. This is consistent with findings from other Nigerian studies, which emphasize that knowledge improves perception, but actual body status heavily influences self-perception.[23,24] Public health significance is that improving knowledge alongside behavioural interventions may enhance accurate perception and healthy practices.

Males had higher misperception when compared to females and the association between gender and perception was statistically significant. A possible reason for this finding may be because females had better knowledge on weight for height when compared to males and as a result know their actual BMI. Similar finding was recorded in a 2015 study in Delta state where misperception was more prevalent among males.[24] Misperception may lead to underestimation of weight status, thereby reducing motivation to adopt healthy lifestyle practices such as balanced diet, regular physical activity, and weight control measures. This increases the risk of obesity and related non-communicable diseases such as hypertension, diabetes, and cardiovascular disorders.

Addressing this gap is crucial, as improving perception and awareness among males can foster early recognition of unhealthy weight and encourage preventive health-seeking behaviors.

CONCLUSION

Knowledge of abnormal weight and BMI showed that majority of respondents had good knowledge, though gaps existed in specific conditions associated with malnutrition.

Anthropometric assessment showed that most respondents had normal BMI, followed by underweight, overweight, and obesity.

Perception of weight for height was largely correct, with majority of respondents satisfied with their weight, though misperceptions persisted among some groups.

Factors such as age, degree programmes, level, marital status, residence, and monthly income significantly affected both knowledge and perception.

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RECOMMENDATIONS

To the Federal Government:

1. Integrate nutrition and weight management education into the national university curriculum.
2. Strengthen public health campaigns addressing both undernutrition and overweight/obesity.
3. Provide funding for university-based health and nutrition centres.

To Universities:

1. Incorporate regular health screening, including BMI assessment, into student health services.
2. Provide healthy and affordable food options within campus cafeterias.
3. Organize periodic seminars and workshops on healthy lifestyle and weight management.

To Undergraduates:

1. Engage in balanced diets and regular physical activity.
2. Avoid reliance on social pressures in determining body image.
3. Seek professional medical advice for weight concerns rather than self-directed practices.

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APPENDIX

APPENDIX I: QUESTIONNAIRE

QUESTIONNAIRE ON BODY MASS INDEX AWARENESS, PREVALENCE, AND DETERMINANTS AMONG UNIVERSITY OF BENIN STUDENTS

S/n: _____

I'm a 600level student of University of Benin. This questionnaire is aimed assessing the knowledge, prevalence and determinants of the different categories of Body mass index among undergraduates. The information you provide is confidential. Thank you.

Section A: Sociodemographic information of respondents

1. Age: _____
2. Gender: ☐ Male ☐ Female
3. Faculty_____ Department: _____
4. Level of Study: ☐ 100L ☐ 200L ☐ 300L ☐ 400L ☐ 500L ☐ 600L
5. Marital Status: ☐ Single ☐ Married ☐ Other
6. Residence: ☐ On-campus ☐ Off-campus
7. Source of income: ☐Parents ☐ Employed ☐ Scholarship ☐ Others ☐
8. Average monthly income: ☐ < 30,000 ☐ 31,000- 50,000 ☐ 51,000 -100,000 > 100,000 ☐

Section B: Knowledge of the health implications of abnormal (below normal and excessive) weight for height

9. Have you heard of abnormal weight? ☐ Yes ☐ No
10. Which of the following qualifies as abnormal weight? **(Tick all that apply)** ☐ Overweight ☐ Obesity ☐ Underweight
11. Is excessive weight (overweight, obesity, etc.) a health condition? ☐ Yes ☐ No
12. If yes, what is your source of information that excessive weight (overweight, obesity, etc.) is a health condition? **(Tick all that apply)** ☐ School ☐ Television ☐ Internet/Social Media ☐ Friends/Family ☐ Health workers ☐ Others: _____
13. Which *Body Mass Index* range is normal? ☐ 18.5–24.9 ☐ 25.0–29.9 ☐ ≥30.0
14. Which *Body Mass Index* range indicates overweight? ☐ 18.5–24.9 ☐ 25.0–29.9 ☐ ≥30.0

15. Which of the following health conditions are associated with overweight? **(Tick all that apply)** ☐ Hypertension ☐ Diabetes ☐ Stroke ☐ Joint problems ☐ Cancer ☐ None of the above
16. Which of the following health conditions are associated with underweight? **(Tick all that apply)** ☐Osteoporosis ☐Anaemia ☐Weakened immune system ☐Irregular/absent periods ☐ None of the above

Section C: Self-Reported Anthropometric Data

17. What is your current height? (indicate whether in ft or meters): _____
18. What is your current weight (in kilograms)? _____
19. Have you ever been diagnosed as overweight or obese by a healthcare provider? ☐ Yes ☐ No
20. Weight: ……
21. Height: …….

Section D: Perceptions of personal weight for height

24. How would you classify your weight in terms of your height? ( ) underweight ( ) normal weight ( )overweight
25. How do you describe your weight? Very underweight ( ) Slightly underweight ( ) About the right weight ( ) Slightly overweight ( ) Very overweight ( )
26. Which of the following are you trying to do about your weight? Lose weight ( ) Gain weight ( ) Stay the same weight ( ) I am not trying to do anything about my weight ( )
27. How do you feel about your current weight? I am satisfied with my weight ( ) I wish I weighed less ( ) I wish I weighed more ( )
28. Do you feel pressure from others (family, friends, media) about your weight? Often ( ) Occasionally ( ) Rarely ( )

APPENDIX II: INFORMED CONSENT FORM

INFORMED CONSENT FORM

TITLE OF STUDY: BODY MASS INDEX AMONGST STUDENTS IN THE UNIVERSITY OF BENIN

INVESTIGATOR: OZOEMENA OGOCHUKWU VIVIAN

SUPERVISOR: PROF. OMOKHOA ADELEYE

FINANCIAL SPONSORSHIP: This research project is self-sponsored.

PURPOSE OF THE RESEARCH: The purpose of this study is to assess University of Benin students' knowledge of the health consequences of abnormal weight-for-height, as well as their personal perception of their own weight.

PROCEDURES AND PROTOCOL INVOLVED IN THE STUDY

You are kindly requested to complete a questionnaire designed to assess to assess University of Benin students' knowledge of the health consequences of abnormal weight-for-height, as well as their personal perception of their own weight. This questionnaire is for research purposes only.

COMPENSATION

There will be no financial compensation for participating in this study.

VOLUNTARY PARTICIPATION

Your participation in this research is completely voluntary. There will be no discrimination against you if you choose not to participate. You are free to change your mind and withdraw from the study at any time, even if you initially agreed to take part.

SIDE EFFECTS

There is no anticipated adverse effect associated with participating in this study.

BENEFIT

The benefit of this study includes the provision of useful local data for understanding the trends in knowledge, prevalence, and perception of Body Mass Index (BMI) among undergraduate students, as well as identifying determinants of abnormal BMI. The findings will provide evidence-based recommendations for policy formulation and health promotion strategies aimed at encouraging healthy lifestyles, improving nutrition, and preventing overweight, obesity, and related health risks in the study population.

CONFIDENTIALITY

All information and data obtained during this study will be kept confidential. Participant names will not be recorded on the questionnaires, and all collected information will be securely stored in a password-protected file on my personal computer. Any physical copies will be stored in a locked personal document cabinet.

CONTACT INFORMATION

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Ethics and Research Committee

University of Benin Teaching Hospital

Benin City.

Phone Number: 07063331337

CERTIFICATE OF CONSENT

I have read the above information (or it has been read to me). I had the opportunity to ask questions about it and the questions were answered to my satisfaction.

(A) I consent voluntarily to take part as a participant in this study

(B) I do not consent to participate in this study.

Name of Participant: _____

Signature of participant: _____

Date:_____