

# Pattern and Prevalence of Underweight, Overweight and Obesity Among Young Adult Nigerians

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**Abstract:** Body mass index (BMI) is an important cardiometabolic parameter. This study determined the mean BMI, pattern and prevalence of underweight, overweight and obesity among young adult Nigerians. It also examined the effect of sex on pattern of distribution of BMI classes. This was cross-sectional study conducted among students of a tertiary institution. Seven hundred and two (702) students (412 males and 290 females) with age range between 18-40 years participated in the study. The participants had their weights and heights recorded by standardized techniques and BMI was calculated from the weight and height. BMI was classified according to WHO reference values. Data was analyzed using SPSS version 17 software. A p-value of less than 0.05 was considered as statistically significant. The mean BMI was  $21.89 \pm 3.07$  (kg/m<sup>2</sup>). Age was positively correlated with BMI ( $r = 0.298$ ,  $p < 0.001$ ). Significant sex differences in anthropometry were demonstrated in terms of height ( $t = 17.880$ ,  $p < 0.001$ ), weight ( $t = 7.595$ ,  $p < 0.001$ ), BMI ( $t = -2.483$ ,  $p = 0.013$ ) and BSA ( $t = 12.716$ ,  $p < 0.001$ ). There was a significant sex difference in BMI classes recorded in this study ( $\chi^2 = 12.255$ ,  $p = 0.007$ ). The prevalence of overweight and obesity among the total participants were 14.8% and 1.3% respectively. Among the males, the prevalence of underweight, overweight and obesity were 9.2%, 11.2% and 1.2% respectively while among the females, the prevalence of underweight, overweight and obesity were 11.0%, 20.0% and 1.4% respectively. More than a quarter of the apparently healthy young adults had abnormal BMI. The study also showed that abnormal BMI (underweight, overweight and obesity) were more frequent in female than male young adult Nigerians. Health education focusing on weight adjustment measures including exercise and dietary strategies will be beneficial among young adult population.

**Keywords:** Pattern, Prevalence, Underweight, Overweight, Obesity, Young Adult, Nigerians

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## 1. Introduction

The concept of the BMI dated back to Adolphe Quetelet, who, in 1832, observed that an individual's weight is approximately proportional to the square of his/her height [1]. According to World Health Organization (WHO), underweight, healthy weight, overweight and obesity were defined by BMI;  $< 18.5$ ,  $18.5-24.9$ ,  $25.0-29.9$  and  $\geq 30.0$  kg/m<sup>2</sup> respectively [2]. WHO also recommends BMI as the most useful population level measure of overweight and obesity, and is used as the same for both sexes and in all ages of adults [3]. Overweight and obesity result from an energy surplus over time that is stored in the body as fat. How genetic and environmental factors contribute to overweight and obesity is not well understood [4]. More than 1.1 billion people in the world are estimated to be overweight and 320 million was estimated to be obese [5]. BMI is the most popular of many

anthropometric indices. Indeed, it is an internationally accepted index for defining obesity [6]. Overweight and obesity are defined as abnormal or excessive fat accumulation in the body that may impair health [4]. So BMI of  $> 25$  kg/m<sup>2</sup> and  $\geq 30$  kg/m<sup>2</sup> are considered to be overweight and obese in adults irrespective of gender and age. This use of a single standard for obesity for all adults was recommended because it is thought to be independent of age and it can be used for making comparisons across studies [7]. BMI is a simple, safe, non-invasive and cheap way of estimating body fat percentage and assessing a person's health and nutritional status [8]. Globally, obesity has nearly doubled over the last three decades [3]. Worldwide, the proportion of adults with a body-mass index (BMI) of 25 kg/m<sup>2</sup> or greater increased between 1980 and 2013 from 28.8% to 36.9% in men, and from 29.8% to 38.0% in women. Prevalence has increased substantially in children and adolescents in developed countries; 23.8% of boys and 22.6% of girls were overweight

or obese in 2013[9]. This upward trend is predicted to continue over coming decades [10]. Global and local prevalence estimates are based on the BMI which provide a guide to obesity levels as recognized by BMI values greater than or equal to 30[11-12].

## 2. Subjects and Methods

### 2.1. Study Population

The participants were students of Obafemi Awolowo University, Ile-Ife, Nigeria. Seven hundred and two (702) students (412 males and 290 females) within the age range of 18 to 40 years participated in the study. None of the female participants was pregnant. They were all informed about the research and consents were obtained before participating. Ethical clearance was obtained from the Ethics and Research Committee of the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria.

### 2.2. Anthropometry

Measurements were taken using standardized equipment. Heights of all participants were measured using a stadiometer (OMRI Height Meter) in standing position without footwear to the nearest 0.5cm. Weight was measured with minimum clothes using a calibrated electronic scale with digital reading to the nearest 0.1 kg. BMI was determined based on the formula;  $BMI = \text{weight (in kg)} / \text{height (in metres)}^2$  and classified based on WHO cut-off values[12].

### 2.3. Statistical Analysis

Data was analysed using SPSS version 17 software. Continuous variables were presented as mean  $\pm$  standard deviation (SD). The student t-test was used to determine sex

differences in the means of anthropometry. The relationship between age and BMI was determined by Pearson correlation. Sex differences in BMI classes were determined with Chi square.

## 3. Results

A total of 702 students participated in the study. Four hundred and twelve (58.7%) were males and 290 (41.3%) were females. The mean  $\pm$  standard deviation (SD) for ages (years), weight (kg), height(m), BMI ( $\text{kg/m}^2$ ) and body surface area( $\text{m}^2$ ) for all participants were  $23.55 \pm 4.48$ ,  $61.42 \pm 9.73$ ,  $1.68 \pm 0.08$ ,  $21.89 \pm 3.07$  and  $1.69 \pm 0.15$  respectively (Table 1). Age was positively correlated with BMI ( $r = 0.298$ ,  $p < 0.001$ ). All indices of anthropometry except BMI were significantly higher in men than women (Table 2). The prevalence of overweight and obesity among the total participants were 14.8% and 1.3% respectively (Table 3). Among the males, the prevalence of underweight, overweight and obesity were 9.2%, 11.2% and 1.2% respectively while among the females, the prevalence of underweight, overweight and obesity were 11.0%, 20.0% and 1.4% respectively (Fig.1). There was a significant sex difference in BMI classes recorded in this study ( $\chi^2 = 12.255$ ,  $p = 0.007$ ).

Table 1. Demographic characteristics of all the participants.

Parameter	Mean $\pm$ SD	Minimum	Maximum
Age(years)	23.55 $\pm$ 4.48	18.00	40.00
Weight(kg)	61.42 $\pm$ 9.73	37.50	100.00
Height(m)	1.68 $\pm$ 0.08	1.45	1.93
BMI ( $\text{kg/m}^2$ )	21.89 $\pm$ 3.07	16.10	37.10
BSA ( $\text{m}^2$ )	1.69 $\pm$ 0.15	1.29	2.21

N= 702, BMI=Body mass index, BSA=Body surface area

Table 2. Sex differences in anthropometric parameters in young adults.

Anthropometry	Male (n=412)	Female(n=290)	t	p-value
Weight(kg)	63.67 $\pm$ 9.31	58.22 $\pm$ 9.43	7.595	<0.001
Height(m)	1.71 $\pm$ 0.07	1.62 $\pm$ 0.06	17.880	<0.001
BMI ( $\text{kg/m}^2$ )	21.65 $\pm$ 2.81	22.23 $\pm$ 3.37	-2.483	<0.001
BSA( $\text{m}^2$ )	1.75 $\pm$ 0.14	1.61 $\pm$ 0.13	12.716	<0.001

BMI=Body mass index, BSA=Body surface area

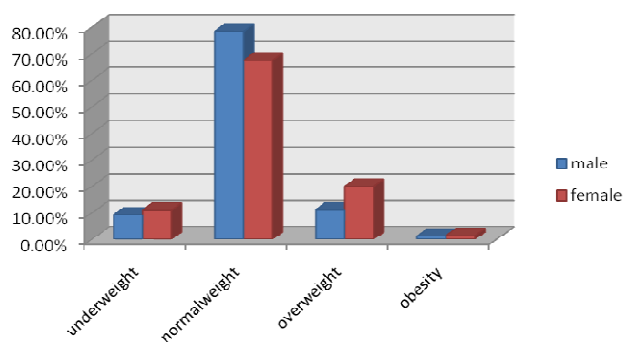
All indices of anthropometry assessed except body mass index were significantly greater in males than females.

Table 3. Prevalence of underweight, normal weight, overweight and obesity in young adults.

WHO classification of BMI(kg/m <sup>2</sup> )		Frequency (N=702)	Percentage(%)
Underweight	<18.5	70	10.0
Normal weight	18.5-24.9	519	73.9
Overweight	25-29.9	104	14.8
Obesity	≥30	9	1.3

BMI=Body mass index

More than a quarter of the apparently healthy young adults had abnormal BMI.



**Figure 1.** Effects of sex on body mass index in young adults.

Abnormal BMI (underweight, overweight and obesity) occurred more frequently in female than male young adult Nigerians. Normal or healthy weight occurred more frequently in male than female young adult Nigerians.

## 4. Discussion

The mean BMI in young adults from this study was  $21.89 \pm 3.07 \text{ kg/m}^2$ . Similar study carried out in Ota, Ogun State, Nigeria among young adults found the mean value for the BMI to be  $22.66 \pm 0.18 \text{ kg/m}^2$  [13]. The prevalence of overweight and obesity in this study were 14.8% and 1.3% respectively. These values were lower than the surveys among the general population from other parts of Nigeria with prevalence rates of overweight and obesity ranging from 21.4% to 32% [14-15]. There is an alarming rate of rise in the prevalence of overweight and obesity both in developed and developing countries [16-18]. Bakari *et al* reported prevalence of obesity and overweight to be present in about one third of the population studied in Zaria a suburban community [14]. Adedoyin *et al*, 2009 conducted a survey among 2097 adult residents of Ile-Ife, a semi urban town in South-West Nigeria where they reported crude prevalence rate of 20.3% for overweight 12.5% for obesity [19]. According to the health survey in England, a quarter of adults in 2013 were obese, (26 per cent of men and 24 per cent of women). Being overweight was more common than being obese and 41 per cent of men and 33 per cent of women were overweight, but not obese [20]. The prevalence of normal weight was higher in male participants (78.4%) compared to females (67.6%) while the prevalence of abnormal BMI were higher in females than in males. These findings were consistent with data from previous studies on abnormal BMI (21-22). Amira *et al*, 2012 in a study of the prevalence of obesity and its relationship with hypertension in an urban Nigerian community reported a prevalence of 29.5% and 15.7% in women and men respectively. However, the study evaluated adults  $\geq 18$  years in which the highest prevalence of obesity was found in the middle age group between 45-54 years [21]. This notable sex difference in body mass index distribution as demonstrated in Figure 1 was a pattern that had been reported in other anthropometric based studies in Nigeria population [15]. The health consequences of abnormal BMI are enormous. Underweight, overweight and obesity are linked to mortality and morbidity [23]. Underweight may be a pointer to starvation,

anorexia nervosa or presence of debilitating chronic illness such as acquired immunodeficiency syndrome and poverty related health conditions in developing countries. Overweight and obese individuals are at increased risk numerous multisystemic health challenges involving the endocrine, metabolic, cardiovascular, respiratory, musculoskeletal and neurological systems. Diseases such as hypertension, dyslipidaemia, ischaemic heart disease, stroke, sleep apnoea syndrome, gall bladder disease, osteoarthritis, cancers and type 2 diabetes mellitus with attendant complications and increased morbidity and mortality are more frequent with people with overweight and obesity [24-25]. The importance of evaluating young adult population for abnormal BMI cannot be over-emphasized. Health screening through anthropometric assessment of young population is cheap and if coupled with appropriate health education and lifestyle adjustment measures can serve as primary preventive strategy to curtail the growing trends of non-communicable diseases as the young advances in age to become the middle age population.

## 5. Conclusion

More than a quarter of the apparently healthy young adults had abnormal BMI. The study also showed that abnormal BMI (underweight, overweight and obesity) were more frequent in female than male young adult Nigerians. Health education focusing on weight adjustment measures including exercise and dietary strategies will be beneficial among young adult population.

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