# **Original Article**



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# Body mass index and its perception among the Kalabari people in Rivers State, Nigeria

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# ABSTRACT

This study was carried out on the Kalabari people of Rivers State between the ages of 18 to 45 years to determine their mean Body Mass Index and to examine if there is sexual dimorphism or ethnic differences in the body mass index. This study also seeks to examine their perception of their body mass index and to determine if education has an influence on their body mass index. Five hundred (500) subjects were used for this study (250 males and 250 females). The materials used in the study were: weighing scale for measuring of weight and the meter rule, measuring tape for height and a questionnaire. The mean and standard deviation of weight, height and body mass index of the Kalabari Males and females were  $69.44\pm11$ kg,  $1.65\pm0.07$ m,  $25.55\pm3.88$ kg/m<sup>2</sup> and  $67.48\pm10.14$ kg,  $1.62\pm0.06$ m,  $25.58\pm3.62$ kg/m<sup>2</sup> respectively. It was observed that the Kalabari males had a significantly higher weight than the Kalabari females (p < 0.05). It was also observed that Kalabari males had a significantly higher height than the Kalabari females (p<0.05). There was no significant difference between the mean body mass index of Kalabari females and Kalabari males (p>0.05). The result of the mean and standard deviation of the body mass index of different age grades of the Kalabari people showed that there was an increase in the body mass index of the Kalabari people as age increases. The result for the males in the present study showed that, 1% of the subjects were underweight, 47% were Normal weight, 39% were overweight and 13% were obese. For the female category, 1% of the subjects were underweight, 45% were Normal weight, 41% were overweight and 13% were obese. The study also observed that there were more over weight male and female subjects who had secondary Education when compared to subjects with normal BMI. The study showed that, 96.8% of female subjects with obesity had a wrong perception of their weight. While 55% of the overweight females had a wrong perception of their weight. 81.8% of the male subjects with obesity had a wrong perception of their weight. While 55% of the overweight males had a wrong perception of their weight. When comparing the result in the present study and that of previous studies, it was observed that there were ethnic and racial differences in the BMI. Knowledge gained from this work will be useful to Anatomists, neuroscientist and clinician.

### **Keywords:**

Body Mass Index, Education, Kalabari, Perception.

# INTRODUCTION

Overconsumption of high-calorie foods coupled with sedentary lifestyles leads to weight gain, while a calorie deficit results in weight loss. Body mass index is calculated as weight in kilograms divided by the square of height in meters (Eknoyan *et al.*, 2007). It is used to determine, if an individual is underweight, normal weight, overweight, or obese (Eknoyan *et al.*, 2007). Body mass index (BMI) may have its limitations which may include its inability to differentiate between fat mass and muscle mass. This is the reason why some researchers argue about its accuracy in determining health risks (Eknoyan *et al.*, 2007; Ponti *et al.*, 2020).

For a researcher to assess the weight of a population or Ethnic group, BMI will be a simple and cost-effective tool to evaluate their weight status. BMI is used in medical research and Clinical settings. The Universal standard for classifying

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BMI is as follows: a BMI below 18.5 is considered as underweight, 18.5 to 24.9 is Considered as normal weight, 25.0 to 29.9 is taken as overweight, and 30.0 and above is classified as obesity (Eknoyan et al., 2007). The age, sex, diet, genetics, socioeconomic status, lifestyle, and environmental conditions are factors to be considered in respect to the BMI of a person (Anekwe et al., 2020). Studies have shown that, racial and ethnic differences plays a relevant role in BMI variations (Qasim et al., 2018). Due to genetic predisposition or cultural dietary habits, some populations shows higher obesity prevalence (Qasim et al., 2018). Some studies have shown that, obesity rates tend to rise steadily between 20 and 60 years before declining in older adults (Tam et al., 2020). Melby et al. (2019) stated that, dietary habits significantly impact BMI. They opined that, the balance between energy expenditure and energy intake

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determines weight loss or gain.

The environment that an individual lives plays an important role in determining his or her BMI. Fawehinmi & Oladipo (2004) stated that, individuals living in stable and resourceful environments tend to have a higher BMI when compared to those in stressful or war areas. Furthermore, early-life nutrition can influence BMI later in life, as fetal undernutrition has been linked to non-insulindependent diabetes and cardiovascular diseases (Fawehinmi & Oladipo, 2004; Zhou *et al.*, 2020). Hereditary predisposition plays a key role in evaluating BMI and obesity can be inherited.

The social and financial status of an individual can influence his BMI. People that have higher-income tend to have higher BMI especially, when they live a sedentary lifestyle and consume high calorie-dense foods. According to Guldan (2020), people with lower income may experience undernutrition. This may be as a result of lack of funds. Anekwe *et al.* (2020) reported that these disparities contribute to variations in BMI across different Ethnic and social groups.

There are some health risks associated with abnormal BMI values (Kobo *et al.*, 2019). Okolo and Mahmood (2020) reported that, high BMI is associated to increased risks of diabetes, cardiovascular diseases, hypertension, and premature death. Contrarywise, a low BMI is associated with malnutrition, osteoporosis, and weakened immune function. Health complications can be prevented if an individual manages his BMI by adjusting his foot intake and engage in sports or physical activities (American Diabetes Association, 2019).

Several research works have been done on BMI, but then, the public perception and knowledge about weight status often do not agree with actual BMI classifications. Many individuals misclassify themselves, with overweight or obese individuals believing they have a normal weight, which can hinder weight management efforts.

The Kalabari Kingdom, also called Elem Kalabari, is the independent traditional state of the Kalabari people, an Ijaw ethnic group, in the Niger Delta region. It is recognized as a traditional state in what is now Rivers State, Nigeria, West Africa (Jones, 2001). The people occupied a series of islands among the mangrove swamps of the delta, where they engaged in fishing and trading (Jasleen, 2004). They would take the produce of the delta region up the New Calabar and Imo rivers, and exchange them for food and goods of the hinterland. The Kalabari Kingdom is a Large Kingdom in Rivers State that is made up of Several communities including Buguma, Abonnema, Bakana, Tombia and others. The Kalabari's are predominantly found in Asari-Toru, Akuku-Toru and Degema Local Government Area in Rivers State, Nigeria. Given the increasing prevalence of obesity and weightrelated health issues globally, it is crucial to study BMI patterns within specific ethnic groups to understand their health risks and nutritional status. This study aimed to determine the BMI of the Kalabari people, assess the role of education in BMI awareness and explore perceptions of obesity. The findings will provide valuable insights into the health profile of the Kalabari people and contribute to broader discussions on BMI variations across different populations.

### MATERIALS AND METHODS

Five hundred (500) subjects were used for this study. They were two hundred and fifty (250) males and two hundred and fifty (250) females. This study was done in Abonema, Buguma, Bakana, Harris town and Abalama community in Kalabari Kingdom.

The morphological measurements and the calculated parameter were:

**Height (Stature):** The height was measured using a steel meter rule with the subject standing in an upright position with both hands by the side. The ruler was placed on top of the (persons head) vertex to indicate the upper margin. The distance between the vertex (v) and the floor is the height recorded in meter.

**Body Weight (kg):** The weight was measured using a weighing scale with respondents standing with bare feet (without shoes).

**Body mass index (BMI)**: The BMI was calculated from the formula below:

**Body mass index** (BMI) = weight  $(kg)/height ^{2} (m^{2})$ .

**Inclusion and Exclusion Criteria:** Male and female individuals who are within the age range of 18-45, and whose parents, grandparents and great grandparents are from Kalabari in Rivers State, Nigeria, were recruited for the study. Those who do not meet these criteria were excluded from the study.

**Ethical Consideration:** Informed **c**onsent was obtained from the subjects prior to their recruitment, and clarifications on the purpose of the study were provided, emphasizing that the data sort are strictly for research and the advancement of knowledge and human well-being

**Data Analysis:** The data obtained was analyzed using a z test and P<0.05 was taken as statistically significant. A well-constructed questionnaire was used for this study. The questionnaire comprises of their Biodata, Educational level and their perception of their body mass index.

#### PRECAUTIONS

During the course of the research, certain precautions were taken to ensure accurate results. They include;

- It was ensured that the subject's shoes were removed when measuring the height.
- It was ensured that the subjects stood erect when their heights were measured.
- It was ensured that the weight scale was placed on the ground before the subjects stepped on it, to be measured.
- It was also ensured that the weight scale pointer was at zero, before the subjects stepped on it.
- It was also ensured that the meter rule was marked and recorded at the actual height of the subject.

- It was ensured pregnant women were not used.
- It was also ensured that only Kalabari people of Rivers State were used for the research.
- It was also ensured that the consent of the subjects were asked, before their measurements were carried out.
- It was ensured that the subject that were used, their parents, grandparent and great grandparents were from the Kalabari Kingdom.

#### **RESULTS**

The result of the mean and standard deviation of weight, height and body mass index of the Kalabari ethnic group is shown in table1. The mean and standard deviation of weight, height and body mass index of the Kalabari Males and females were  $69.44\pm11$ kg,  $1.65\pm0.07$ m,  $25.55\pm3.88$ kg/m<sup>2</sup> and  $67.48\pm10.14$ kg,  $1.62\pm0.06$ m,  $25.58\pm3.62$ kg/m<sup>2</sup> respectively. It was observed that the Kalabari males had a significantly higher weight than the Kalabari females (P <0.05), It was also observed that the Kalabari males had a significantly higher height than the Kalabari females (P<0.05). There was no significant difference between the mean body mass index of Kalabari females and that of the Kalabari males (P>0.05).

The result of the mean and standard deviation of the body mass index of different age grades of the Kalabari people is shown in table 2. It was observed that there was an increase in the body mass index of the Kalabari people as age increases. Figure 1 and 2 shows a pie chat of the BMI category of the Male and female Kalabari's. For the males, it was observed that, 1% of the subjects were underweight, 47% were Normal weight, 39% were overweight and 13% were obese. For the female category, 1% of the subjects were underweight, 45% were Normal weight, 41% were overweight and 13% were obese. Table 3 Shows the Educational level and number of kalabari subjects in the BMI category. It was observed that there were more over weight male and female subjects who had secondary Education when compared to subjects with normal BMI. Table 4: Shows the Percentage of wrong perception of BMI of the Kalabari People. It was observed that, 96.8% of female subjects with obesity had a wrong perception of their weight. While 55% of the overweight females had a wrong perception of their weight. 81.8% of the male subjects with obesity had a wrong perception of their weight. While 55% of the overweight males had a wrong perception of their weight. Table 5: Compares the mean weight, height, and BMI of present study and previous studies. It was observed that there were ethnic and racial differences in the BMI.

Table 1: Weight, height and BMI of Kalabari Ethnic g	grou	p
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	Sample	Females	Males
Parameters	Size	Mean±SD	Mean±S.D
Weight (kg)	500	67.48±10.14	69.44±11
Height (m)	500	1.62±0.06	1.65±0.07
BMI (kg/m²)	500	25.58±3.62	25.55±3.88

#### TABLE 2: Mean BMI of different age grades of Kalabari people

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	Sample si	ze	Age	Males	Females	
Parameter	M (N)	F (N)	(Yrs)	Mean ±S.D	Mean ± S.D	
BMI (kg/m²)	23	29	18-22	21.62 ±1.55	23.34 ±2.84	
BMI (kg/m²)	48	56	23-28	23.42 ±2.91	23.35 ±3.09	
BMI (kg/m²)	76	67	29-33	25.20 ±2.94	25.95 ±3.27	
BMI (kg/m²)	65	66	34-39	28.10 ±4.51	27.00 ±3.39	
BMI (kg/m²)	38	32	40-45	26.97 ±2.71	27.80 ±3.32	
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Key: M- Males Subjects, F-Female Subjects, N-Sample Size



Figure 1: Pie chart showing the BMI category of Kalabari males.



Figure 2: Pie chart showing the BMI category of Kalabari females

Table 3: Educational	Level and Num	per of Kalabari	i Subjects in the
BMI category			

	Males			Females		
BMI Categories	1 <sup>0</sup>	2 <sup>0</sup>	3 <sup>0</sup>	1 <sup>0</sup>	2 <sup>0</sup>	3 <sup>0</sup>
Underweight	0	0	1	0	0	2
Normal weight	0	55	63	0	47	67
Overweight	0	56	42	0	49	54
Obese	0	27	6	0	18	13

Key: 1<sup>0</sup> Primary level, 2<sup>0</sup>-Secondary level, and 3<sup>0</sup>- Tertiary level.

#### TABLE 4: Percentage of wrong perception of BMI of Kalabari People

MALES			FEMALES			
			Percentage			Percentage (%)
		Frequency	(%)Frequency		Frequency	Frequency
		Of Wrong	of Wrong		Of Wrong	Of Wrong
BMI CATEGORY	Ν	Perception	Perception	Ν	Perception	Perception
UNDERWEIGHT	1	0	0	2	1	50
NORMAL WEIGHT	118	1	0.8	114	3	2.6
OVERWEIGHT	98	54	55	103	57	55
OBESE	33	27	81.8	31	30	96.8

N-Sample size

Table 5: Mean	ı Weight, Height,	And BMI of preser	nt study and previ	ous studies.
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Ethnic Group	Mean Weight ±S.D(Kg)	Mean Height ±S.D(M)	Mean BMI±S.D (Kg/M <sup>2</sup> )
Igbo males (Oladipo <i>et al.,</i> 2011)	70.22 ±12.6	1.63 ±0.06	26.6 ±4.8
Annang males (Okoseimiema et al.,	66.29±8.50	1.75±0.03	21.63 ±2.67
2016)			
Annang females (Okoseimiema et al.,	68.07 ±9.34	1.65±0.04	24.81 ±3.33
2016)			
Latino males (Maskarinec et al., 2009)	80.73±30		26.9 ±4.0
Latino females (Maskarinec et al., 2009)	70.76 ±32		21.4 ±5.5
Kalabari females (present study)	69.44 ±11	1.65 ±0.07	25.55 ±3.88
Kalabari males (present study)	67.48 ±10.14	1.62±0.06	25.58 ±3.62

# DISCUSSION

The findings of this study indicate a significant difference in height between males and females, with males being taller on average. This result is consistent with general anthropometric trends where males tend to have greater height than females due to genetic and hormonal factors influencing growth patterns (Okoseimiema *et al.*, 2016). It has been reported that, men are more likely to be overweight while women tend to have higher obesity prevalence due to differences in fat distribution, metabolic rates, and hormonal influences (Frank *et al.*, 2019). In the present study, it was observed that, the males had a significantly higher mean weight than the females.

A high BMI suggests an increased risk for obesity-related conditions such as cardiovascular disease, hypertension, and diabetes, emphasizing the need for targeted health interventions. In the present study, it was observed that the mean value for the male and female Kalabari's were 25.55±3.88 kg/m<sup>2</sup> and 25.58±3.62kg/m<sup>2</sup>, which is in an overweight category. The mean value of BMI is lower than the result of the mean value for Igbo males (Oladipo et al., 2011). The BMI of the Kalabari people was higher than the mean BMI of the Annang Ethnic Group (Okoseimiema et al., 2016). In the present study, the mean of the body mass index of different age grades of the Kalabari people showed that there was an increase in the body mass index as age increases. The result for the males in the present study showed that, 1% of the subjects were underweight, 47% were Normal weight, 39% were overweight and 13% were obese. For the female category, 1% of the subjects were underweight, 45% were Normal weight, 41% were overweight and 13% were obese.

Research finding from previous research indicated that individuals with higher incomes are more prone to obesity due to increased access to high-calorie diets and reduced physical activity (De-Grubb *et al.*, 2019). In the present study, the occupation of the Kalabari people are predominantly fishing and trading. Some are Civil Servants. The ladies in Kalabari Communities are usually kept in a Fatting room and fed for several months, so as to prepare them for marriage, as tradition demands. This Ceremony is called Iria. By the time they are done with the ceremony, they usually increases in weight, due to the sedentary lifestyle during this period. This may have been one of the reasons for their mean BMI to be in the overweight category.

Education also plays a crucial role in BMI distribution, as individuals with higher education levels tended to have normal BMI values compared to those with lower education. Saghafi-Asl *et al.* (2020) stated that increased awareness and knowledge about nutrition, health risks, and lifestyle choices contributes to better weight management. Education enables individuals to make informed dietary and exercise choices, reducing the risk of obesity-related health complications. In the present study, it was observed that there were more over weight male and female subjects who had secondary Education when compared to subjects with normal BMI.

BMI classification in this study followed the standard ranges, with normal weight classified as BMI 18.5–24.9, overweight as 25.0– 29.9, obesity as 30.0 and above, and underweight as below 18.5 (Okoseimiema *et al.*, 2016). Despite the extensive research on BMI, public perception and knowledge about weight status often do not align with actual BMI classifications. Many individuals misclassify themselves, with overweight or obese individuals believing they have a normal weight, which can hinder weight management efforts. In the present study, it was observed that, 96.8% of female subjects with obesity had a wrong perception of their weight. While 55% of the overweight females had a wrong perception of their weight. 81.8% of the male subjects with obesity had a wrong perception of their weight. While 55% of the overweight males had a wrong perception of their weight.

The body mass index of the Annang Ethnic group in Akwa-Ibom State, Nigeria, has been studied (Okoseimiema *et al.*, 2016). They reported that, there was a strong positive correlation between their BMI and their body weight. This is in line with the result in the present study. It was observed that, there was a strong positive correlation between the BMI and the body weight of the Kalabari females. Body mass index has been studied by several authors in different ethnic and racial groups. The present study observed that there were ethnic and racial differences in the BMI when comparing the result in the present study and that of previous studies (Oladipo *et al.*, 2011; Maskarinec *et al*, 2009; Oladipo *et al*, 2010; Olayiwola and Olubode, 2006). Regular physical activity has been widely recognized as an effective strategy for maintaining a healthy BMI (Petridou *et al.*, 2019).

**Conclusion:** This study provides valuable anthropometric data on the BMI, height, and weight of the Kalabari people. The findings highlight significant sex-based differences in height and weight with males being taller than females. There was no significant difference between the BMI of the male subjects and that of the female subjects. When comparing the result in the present study and that of previous authors, it was observed that there were Ethnic and racial differences in the BMI. Knowledge gained from this work will be useful to the Anatomist and the Clinician.

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