

## Study of the Body Mass Index and Waist to Hip Ratio of the Urhobo and Ikwerre Adults in Nigeria

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### Abstract

**Background:** The Body Mass Index (BMI) is an important anthropometric tool, used in the determination of how much of the body is composed of fat. The BMI reveals the caloric nutritional status of an individual by the consideration of the value of its ratio of weight in kilograms to the square of the height in metres. An assessment of the differences in nutritional status that exist between the Urhobos and Ikwerres using their body mass indices and Waist to Hip Ratio (WHR) is the purpose of this work; so as to know whether the study population is underweight, overweight, normal weight/or obese.

**Methods:** A total sample size of 500 subjects, participated in the study. From each tribe, 250 participants were studied. Subjects were randomly selected from different locations in the local government areas of Delta and River States where the people of these ethnic groups mostly reside.

**Results:** The mean BMI values of Urhobo males and females were 23.69kg/m<sup>2</sup> and 24.58kg/m<sup>2</sup> respectively. The mean BMI values of Ikwerre males and females were 24.16kg/m<sup>2</sup> and 25.31kg/m<sup>2</sup> respectively. The mean WHRs of Urhobo males and females were 0.8 and 0.83 respectively. The mean WHRs of the Ikwerre males and females were 0.84 and 0.83 respectively. Furthermore, the percentages of Urhobo males who were underweight, normal in weight, overweight and obese were 0.8%, 76.8%, 20% and 2.4% respectively while that of the females were 8.8%, 48.8%, 27.2% and 15.2% respectively. In Ikwerre subjects, the percentages of males who were underweight, normal in weight, overweight and obese were 0.8%, 68.8%, 26.4% and 4% respectively while that of the females were 3.2%, 51.2%, 32.8% and 12.8% respectively.

**Conclusion:** It is could be inferred that Urhobo and Ikwerre male subjects had normal BMI whereas their female counterparts were found to be overweight. In terms of WHR, both Ikwerre males and females had higher WHR starting from age 40 and 18 respectively, when compared with that of the Urhobos. This finding may be found useful in health related analysis of the study population for early commencement of interventional measures.

**KEYWORDS:** Urhobo, Ikwerre, BMI, WHR, Nigeria.

## INTRODUCTION

Obesity is one of the serious public health problems worldwide of the 21<sup>st</sup> century as viewed by the World Health Organization (WHO), with increasing prevalence in both adults and children. It is associated with high morbidity and mortality (Uwaifo *et al.*, 2006).

Obesity is stigmatized in modern world especially in the western world, though, it was widely perceived as a symbol of wealth and fertility at one time in history and still it is in some parts of the world. The recent upsurge in its prevalence in developing countries is believed to be linked to acculturation, resulting from westernization that those nations are undergoing with alterations in diet and activity patterns (WHO,1997; Popkin, 1994).

In the assessment of obesity, both body mass index (BMI) and waist to hip ratio (WHR) are the two anthropometric indices that cannot be overlooked. These are used majorly for this study.

While BMI is the individual's body weight in kilograms divided by the square of his or her height in metres, its formula is given below:

$$\text{BMI} = \frac{\text{mass (kg)}}{(\text{height(m)})^2} \quad (\text{WHO,1997})$$

BMI is identified by the World health organization as the most useful epidemiological measure of obesity (WHO, 2000) although, it has some limitations such as overestimation of adiposity in some individuals who are very lean and underestimation of height in aging adults. The BMI classification chart is shown in Table 1. WHR is the ratio of the circumference of the waist to that of the hip, WHR ratio is computed as abdominal girth in centimeters divided by hip girth in centimeters (McAldle *et al.*, 2000).

It is widely used as indicator Bookman Old Style of abdominal obesity in population studies (Oladipo *et al.*,2010). It is considered the traditional anthropometric technique for assessing central adiposity (Lemieux *et al.*,1996).

Mbada (2009), discovered that there is an inverse relationship between socioeconomic status and BMI in his study to determine whether variations in the BMI of adults in Nigeria are influenced by their socioeconomic status. Oladipo (2010), assessed the BMI and WHR between the Ogoni and Ikwerre tribes and documented that the mean BMI values of Ogoni and Ikwerre males were 23.81kg<sup>2</sup> and 21.51 kg/m<sup>2</sup> respectively whereas Ogoni females were found to be more obese than their Ikwerres' female counterparts.

The study assessed the BMIs and WHRs of the Urhobos in Delta state and that of Ikwerres in Rivers state in order to be informed of their nutritional status.

## MATERIALS AND METHODS

The study was carried out within Warri metropolis among the Urhobo ethnic group of Delta state and Ikwerre ethnic group of Rivers state in Obio and Akpor Local Government Areas of the states. Subjects were selected from different locations such as schools, churches and residential areas. A total sample size of 500 subjects were randomly selected, comprising 250 participants from each of study tribe. They are males and females, aged 18 years and above. This selection was carried out after the subjects had been duly informed on the procedure and informed consent was obtained.

Materials used include the tailor's tape (butter fly brand-made in China) graduated in centimetres (0 - 150cm), carpenter's tape (Gripp brand) graduated both in feet and metres (3.5 metres), electronic bathroom weighing scale (EKS brand), Scientific calculator and writing materials. Each subject was asked to stand on the weighing scale without a foot wear, in an upright position for few seconds after which the reading was taken. Weight was measured in kilograms, (Sanya *et al.*, 2009). The subject was later asked to stand on a plain surface floor, close to a wall and the subject's height was indicated on the wall with the aid of a marker. This was followed by the use of the height measuring tape (Oladipo *et al.*, 2010) in order to obtain the subject's marked height on the wall. The height was recorded in metres.

. The WHR was carried out using tailor's measuring tape while subject standing erect with his/her feet drawn close to each other. The tape was drawn round the waist i.e. narrowest part of the waist region or midway between the lowest rib and the iliac crest (WHO, 1997), in order to obtain the waist circumference (as shown in figure 1). Furthermore, the tape was placed around the widest part of the hip or at the level of the greater trochanter (McAldle *et al.*, 2000), to obtain the value of the hip circumference as shown in figure 2. The subjects' ages in years were also recorded.

## DATA ANALYSIS

Data collected were analyzed manually and expressed in Mean  $\pm$  standard error of mean

## RESULTS

Table 2 shows the mean BMI and WHR of the Urhobos and Ikwerres, the study population. The Ikwerre males had a mean BMI of 24.16 kg/m<sup>2</sup> which was slightly higher than that (23.69 kg/m<sup>2</sup>) of the Urhobo males, while Ikwerre females had mean BMI of 25.31 kg/m<sup>2</sup>. However, both Ikwerre and Urhobo females demonstrated high WHR of 0.80 and 0.83, respectively.

Table 3 shows the number and percentages of the study population who were underweight, normal in weight, overweight and obese. From the table, 0.8% of Urhobo males, was underweight, 20% was overweight, 76.8% had normal weight while a few (2.4%) were considered obese. Among the Urhobo females, 8.8% of them were underweight, 27.2% were overweight, 48.8% had normal weight and 15.2% were obese. The results from the male Ikwerre population indicated that 0.8% was underweight, 26.4% was overweight, 68.8% was normal in body weight and 4% was considered obese. Whereas the results from the Ikwerre females showed that 3.2% was underweight,

32.8% was overweight, roughly half (51.2%) of the females had normal weight while 12.8% was considered obese.

Table 4 shows the mean BMI and WHR of Ikwerre and Urhobo females in their various age groups. At age group 29 – 39, the Ikwerre females demonstrated a higher value (26.63 kg/m<sup>2</sup>) in BMI and a WHR (0.83) than that of their Urhobo counterparts who showed a lower BMI (24.30 kg/m<sup>2</sup>) and a healthier WHR (0.80). Table 5 shows the mean BMI and WHR of Ikwerre and Urhobo males in their age groups. The BMI and WHR of Ikwerre and Urhobo males in study age groups were observed to be almost similar. However, at age group 40-49, Ikwerre males were observed show a higher WHR (0.86) than their Urhobo male colleagues whose WHR was 0.80.

## DISCUSSION

The study assessed and compared the BMI and WHR between the Urhobo and the Ikwerre tribes. Their age groups in relation to their BMI and WHR values were also studied.

From the observed results, it can be inferred that Ikwerre women were overweight from age 26 whereas Urhobo women had theirs from age 40. However, on average, both Urhobo men and women were considered normal in their bodyweight. This finding is contrary to what has been previously reported by Oladipo, *et al* (2010) that both Ikwerre men and women had normal body weight.

Furthermore, Urhobo men and women demonstrated a healthier values in their WHR than the Ikwerres even though Ikwerre men still had their WHR within the normal range. The higher WHR seen in Ikwerre women implies increased central adiposity and increased risk of cardiovascular disease in these individuals. This finding is consistent with what has been previously documented by researchers that increased WHR and BMI are associated with increased risk of hypertension and cardiovascular disease (James *et al.*, 1993, Jacob *et al.*, 2001, and Sanya *et al.*, 2009). The increase in WHR may be due to their increased nutritional intake with less physical activity

## CONCLUSION

The study has shown the body mass indices and waist to hip ratios of the Urhobo ethnic group in Delta State and Ikwerre ethnic group in Rivers State of Nigeria. Health education on lifestyle modifications may still be needed in the study population in order to reduce the disease risk factors associated with increased body weight and adiposity.

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**Table1: BMI classification chart (WHO,2000)**

Category	BMI Range ( kg/m <sup>2</sup> )
Severely underweight	Less than 16.5
Underweight	16.5-18.4
Normal	18.5-24.9
Overweight	25-29.9
Obese class I	30-34.9
Obese class II	35-39.9
Obese class III	Over 40

**Table 2: Summary of the Mean Body Mass Index and Waist to Hip Ratio of the Study Population (Urhobos and Ikwerres)**

Parameter	Ikwerre Males	Ikwerre females	Urhobo males	Urhobo females
Mean body mass index(kg/m <sup>2</sup> )	24.16	25.31	23.69	24.58
Mean waist to hip ratio(cm)	0.84	0.83	0.83	0.80

**Table 3: The number and percentage of the study population who were underweight, normal in weight, overweight and obese.**

BMI categories	BMI range(kg/m <sup>2</sup> )	Ikwerre males (n = 125)	Ikwerre females (n = 125)	Urhobo males (n = 125)	Urhobo females (n = 125)
Underweight	<18.5	1 (0.8%)	4 (3.2%)	1 (0.8%)	11 (8.8%)
Normal	18.5-24.9	86 (68.8%)	64 (51.2%)	96 (76.8%)	61 (48.8%)
Overweight	25-29.9	33 (26.4%)	41 (32.8%)	25 (20.0%)	34 (27.2%)
Obese I	30-34.9	5 (4.0%)	8 (6.4%)	3 (2.4%)	11 (8.8%)
Obese II	35-39.9	-	8 (6.4%)	-	7 (5.6%)
Obese III	> 40	-	-	-	1 (0.8%)

**Table 4: Mean Body Mass Index and Waist to hip ratio Ikwerre and Urhobo females in their age groups.**

Age groups	Ikwerre Females (n = 125)		Urhobo Females (n = 125)	
	BMI	WHR	BMI	WHR
18-28	24.66±0.49	0.83±0.01	24.30±0.56	0.80±0.01
29-39	26.63±1.02	0.84±0.01	23.95±1.44	0.76±0.02
40-49	28.90±0.00	0.80±0.00	28.73±1.88	0.85±0.02
50-59	27.55±0.25	0.88±0.01	0.00	0.00±0.00

**Table 5: Mean Body Mass Index and Waist to hip ratio of Ikwerre and Urhobo males in their age groups.**

Age groups	Ikwerre males (n = 125)		Urhobo males (n = 125)	
	BMI	WHR	BMI	WHR
18-28	23.87±0.28	0.83±0.01	23.28±0.26	0.83±0.00
29-39	24.95±0.98	0.83±0.01	24.92±0.50	0.84±0.01
40-49	24.60±0.66	0.86±0.00	24.70±0.95	0.80±0.00
50-59	27.05±1.42	1.03±0.05	0.00±0.00	0.00±0.00



Figure 1: Picture showing measurement of waist



Figure 2: Picture showing measurement of hip measurement.