



# The Prevalence of Obesity in a Rural Setting in Port Harcourt, Rivers State

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## ABSTRACT

**Background:** Obesity is a state of excess storage of body fat. It is currently quantitated by means of the body mass index (BMI), calculated from BMI= height in meters/weight in kilograms squared. However the BMI scale generally correlates with the degree of obesity and with risk. The prevalence of Obesity has been on the increase in our environment. The objective of this study is to assess the prevalence of Obesity but little information is available from developing countries where new cases of Obesity are increasingly diagnosed. **Method:** We examined BMI amongst apparently healthy adult population. A cross-sectional study was conducted amongst 107 adults- 80 females and 27 males between the ages of 18 years and 80years for a period of 3 months using convenience sampling. They were first administered a structured questionnaire to obtain their socio-demographic data and lifestyle characteristics after which anthropometric assessment was performed. **Results:** This shows that 74.8% were females and 25.2% were males. About 46.7% of the respondents were self-employed followed by 17.8% unemployed and 6.5% were students. Overall, 85.2% males have normal BMI while 14.8% males have a high BMI. 66.2% females have a normal BMI while 33.8% have a high BMI. **Conclusion:** The prevalence of Obesity is more in females than males in this study. 44.9% had abdominal obesity, 29.0% had central obesity, this calls for more education of the populace and positive attitude and appropriate intervention towards addressing the relevant risk factors of Obesity thereby preventing future cardiovascular complications including metabolic syndrome in the general population.

## INTRODUCTION

Obesity is a state of excess adipose tissue mass. Although often viewed as equivalent to increased body weight, this need not be the case-lean but muscular individuals may be overweight by numerical standards without having adiposity. Body weights are distributed continuously in populations so that choice of a medically meaningful distinction between lean and obese is somewhat arbitrary. Obesity is therefore more effectively defined by assessing its linkage to morbidity or mortality. Overweight and obesity are the fifth leading risk of global death with at least 2.8 million adults deaths each year from complications of overweight and obesity.<sup>[2]</sup> The World Health Organization stated that 1.9 billion of the world population are overweight while 650 million are obese as at 2016.<sup>[2]</sup> In addition, 44% of diabetes mellitus burden, 23% of ischemic heart diseases, and 7%–41% of certain cancer burden are attributable to overweight and obesity.

Worldwide prevalence of 2 billion if overweight included, 700 million obese Nigeria adult prevalence is less than 10%. In USA a third obese, a third overweight. In USA African American are most obese ethnic group with 45% obese, followed by Mexican Americans. Most obese population are the Pacific Islanders. Not very common nationally 8% in adults (Akinkugbe O 1992). Rare, 1 – 3% in rural regions (Okesina AB 1999). Higher in urban regions, up to 40% obese or overweight in Ife (Ojofeitimi EO et al 2007). Commoner in females F:M of 3.0. Fairly common in S. E Nigeria due to cultural practices.

Health risks associated with obesity include coronary heart disease and other atherosclerotic cardiovascular diseases, stroke, type 2 diabetes mellitus, high blood pressure, kidney disease, sleep apnea, osteoarthritis, gallstones, fatty liver disease, stress incontinence, and other gynecological abnormalities (amenorrhea and menorrhagia) and various cancers.<sup>[3]</sup> Sabir *et al.* reported obesity and increasing age are the major risk factors fueling increased prevalence of type 2 diabetes mellitus among Nigerians.<sup>[4]</sup> Dankyau *et al.* reported high prevalence of overweight and obesity among tertiary hospital workers in Northern Nigeria.<sup>[5]</sup> High prevalence of hypertension was reported by Owolabi *et al.* among health-care workers in Nigeria despite their awareness of the disease.<sup>[6]</sup> It has also been reported that increased body mass index (BMI) predisposes to certain cancers.<sup>[7]</sup> Analysis of data from the 1980 National Heights and Weights Survey estimates that the prevalence of obesity in England stood at **6% of men and 9% of women aged 16 and over with 0.1% of men and 0.4% of women living with severe obesity.** Overweight and obesity were previously considered as the problem of the high-income countries as two-third of

the USA population are obese; they are now on the increase in low- and middle-income countries, most especially in the urban settings.<sup>[8]</sup> In Nigeria,<sup>[9]</sup> the prevalence of obesity ranges from 8.1% to 22.2%. According to Hruby and Hu, nutritional transition, sedentary lifestyle, changing methods of transportation and increasing urbanization are fuelling non-communicable diseases.<sup>[10]</sup> Poor eating habits including increased consumption of energy-dense food, high level of sugar, and saturated fats combined with physical inactivity have led to increased prevalence of overweight and obesity in many parts of the world.<sup>[11]</sup> Moreover, there is a paucity of data on Obesity and other non-communicable diseases in this part of the country. As with other developing countries worldwide, Nigeria is experiencing an epidemiological transition in the health of its adult populace. This is mainly due to the adoption of western lifestyle as well as genetic and socio-economic factors and this has led to an increase in the prevalence of Obesity

This study aims to assess the prevalence of Obesity and its risk factors in a rural community in the Niger Delta region of Southern Nigeria.

## MATERIALS AND METHOD

This was a cross-sectional, descriptive, community-based study is to be carried out using a total of 107 adults; in Amadi-ama and Fimie communities in Port-Harcourt City Local Government Area of Rivers state, in Southern Nigeria. Approval for this study was obtained from the Ethics Committee of the Rivers State Ministry of Health, Port-Harcourt.

The participants were all apparently healthy adults aged between 20-80 years and were chosen via convenience sampling. The communities were initially sensitized about this study via town criers and church announcements and those that met the inclusion criteria were told to meet in church halls for screening. All the individuals who gave their consent were included in the study. Pregnant and lactating women as well as those who are obviously ill or wheel-chair bound were excluded from the study. Strict Covid-19 prevention protocols were adhered to.

A screening questionnaire, was given to participants and no monetary or any form of inducement was required of them.

The requirements for participation include being >18 years of age with no previous history of hypertension or diabetes.

Anthropometric evaluation- Well trained examiners measured the anthropometric indices and participants were required to wear light, thin clothing and no shoes.

## INVESTIGATIONS

| WC                     | Male (in cm) | Female(in cm) |
|------------------------|--------------|---------------|
| WHO                    | 102          | 88            |
| IDF                    | 94           | 80            |
| Asian                  | 90           | 80            |
| Japan & China          | 85           | 80            |
| Nigeria (Okafor et al) | 97           | 95            |

The indices are:

- BMI (Body mass index is body weight/square of height, and the unit is kg/metre square.
- Blood pressure
- Blood sugar
- Lipid profile

The body weight was measured using an analogue medical scale while the height was measured with a standard stadiometer. They were measured to the nearest 0.1kg and 0.1cm respectively.

The classes of BMI reported by WHO are ;

18.5-24.9kg/m<sup>2</sup>-normal  
 25.0-29.9kg/m<sup>2</sup>-overweight  
 >30kg/m<sup>2</sup>-obesity

Classes of obesity include: class I -30-34kg/m<sup>2</sup>

class II- 35-39.9kg/m<sup>2</sup>  
 class III- >40Kg/m<sup>2</sup>

Blood pressure was measured with a clinically validated electronic sphygmomanometer - OMRON digital fully automated blood pressure monitor. Values were obtained after resting for 5mins in a seated position, with 30 seconds interval between cuff inflation.

An average of 3 measurements were taken, and care was taken to select the cuff size according to the participant's arm circumference.

Assessments were performed in a dedicated room, with optimum temperature and lightning while respecting privacy.

Blood pressure values were categorised as follows:

- Normal: <120/80mm/hg
- Pre-hypertension: 120-139/80-89mm/hg
- Stage 1: 140-159/90-99mm/hg
- Stage 2: > 160/100mm/hg

Blood measurements- Blood sugar was assessed using a glucometer and strip, after the participant's thumb is pricked in order to get a drop of blood on the strip. While the lipid level was obtained using a 5ml syringe and needle to collect at least 5mls of venous blood into a heparin containing bottle and samples sent to the chemical pathology laboratory for analysis.

Some form of education on life style modification was also given to the participants accordingly.

Data were analysed using the IBM SPSS Version 23.0.

## RESULTS

### Socio-demographics

A total of 107 respondents between the ages of 23 and 80 years were screened for general and anthropometric characteristics of Obesity. Majority were females (74.8%; n=80), married (58.9%; n=63) and between 41 and 50 (37.4%; n=40). The mean age was 49.4±13.7 years. The results also revealed that 43 (40.2%) of the respondents had tertiary education, 50 (46.7%) were self-employed and 67 (62.6%) earned less than N100,000 as monthly income, which is considered low (table 1).

**Table 1: Socio-demographic Characteristics**

|                           | Frequency (n=107) | Percent |
|---------------------------|-------------------|---------|
| <b>Age</b>                |                   |         |
| 21-30 years               | 9                 | 8.4     |
| 31-40 years               | 19                | 17.8    |
| 41-50 years               | 40                | 37.4    |
| 51-60 years               | 15                | 14.0    |
| Over 60 years             | 24                | 22.4    |
| Mean Age (SD)             | 49.4 (13.7)       |         |
| <b>Sex</b>                |                   |         |
| Male                      | 27                | 25.2    |
| Female                    | 80                | 74.8    |
| <b>Marital Status</b>     |                   |         |
| Single                    | 20                | 18.7    |
| Married                   | 63                | 58.9    |
| Divorced                  | 1                 | 0.9     |
| Separated                 | 3                 | 2.8     |
| Widowed                   | 20                | 18.7    |
| <b>Level of Education</b> |                   |         |
| Primary                   | 27                | 25.2    |
| Secondary                 | 32                | 29.9    |
| Tertiary                  | 43                | 40.2    |
| Non-formal                | 5                 | 4.7     |
| <b>Occupation</b>         |                   |         |
| Self-employed             | 50                | 46.7    |
| Unemployed                | 19                | 17.8    |
| Student                   | 7                 | 6.5     |
| Others                    | 24                | 22.4    |
| Civil Servant             | 5                 | 4.7     |
| Retired                   | 2                 | 1.9     |
| <b>Monthly Income</b>     |                   |         |
| Low                       | 67                | 62.6    |
| Medium                    | 20                | 18.7    |
| High                      | 20                | 18.7    |

SD=Standard deviation

**Prevalence of Obesity**

The prevalence of the various components of metabolic syndrome was also accessed and it was found that 70 (65.4%) of the respondents had high blood pressure, 54

(50.5%) had raised blood sugar, 48(44.9%) had abdominal obesity, 31(29.0%) had central obesity, 18 (16.8%) had reduced high density lipoprotein cholesterol, 6 (5.6%) had raised triglyceride (table 2).

**Table 2: Prevalence of Obesity in the study population**

|  | Frequency (n=107) | Percent |
|--|-------------------|---------|
| High blood pressure                          | 70                | 65.4    |
| Raised blood sugar                           | 54                | 50.5    |
| Abdominal obesity                            | 48                | 44.9    |
| Central obesity                              | 31                | 29.0    |
| Reduced high density lipoprotein cholesterol | 18                | 16.8    |
| Raised triglyceride                          | 6                 | 5.6     |

**Table 3: Prevalence of Metabolic Syndrome( Obesity as a component) by Respondents' Socio-demographics**

|                    | Metabolic syndrome |               | X <sup>2</sup>      | p-value       |
|--------------------|--------------------|---------------|---------------------|---------------|
|                    | Present (n=44)     | Absent (n=63) |                     |               |
| Age group          |                    |               |                     |               |
| 21-30              | 1 (11.1%)          | 8 (88.9%)     | 8.783               | 0.067         |
| 31-40              | 4 (21.1%)          | 15 (78.9%)    |                     |               |
| 41-50              | 20 (50.0%)         | 20 (50.0%)    |                     |               |
| 51-60              | 7 (46.7%)          | 8 (53.3%)     |                     |               |
| Over 60            | 12 (50.0%)         | 12 (50.0%)    |                     |               |
| Gender             |                    |               |                     |               |
| Male               | 7 (25.9%)          | 20 (74.1%)    | 3.444               | 0.063         |
| Female             | 37 (46.3%)         | 43 (53.8%)    |                     |               |
| Marital status     |                    |               |                     |               |
| Single             | 2 (10.0%)          | 18 (90.0%)    | 12.885 <sup>#</sup> | <b>0.009*</b> |
| Married            | 28 (44.4%)         | 35 (55.6%)    |                     |               |
| Separated          | 2 (66.7%)          | 1(33.3%)      |                     |               |
| Widowed            | 11 (55.0%)         | 9 (45.0%)     |                     |               |
| Divorced           | 1 (100.0)          | 0 (0.0%)      |                     |               |
| Level of education |                    |               |                     |               |
| Non-formal         | 2(40.0%)           | 3 (60.0%)     | 1.967 <sup>#</sup>  | 0.617         |
| Primary            | 9 (33.3%)          | 18 (66.7%)    |                     |               |
| Secondary          | 12 (37.5%)         | 20 (62.5%)    |                     |               |
| Tertiary           | 21 (48.8%)         | 22 (51.2%)    |                     |               |
| Occupation         |                    |               |                     |               |
| Self-employed      | 23 (46.0%)         | 27 (54.0%)    | 9.422 <sup>#</sup>  | 0.084         |
| Unemployed         | 8 (42.1%)          | 11 (57.9%)    |                     |               |
| Student            | 0 (0.0%)           | 7 (100.0%)    |                     |               |
| Others             | 8 (33.3%)          | 16 (66.7%)    |                     |               |
| Civil servant      | 3 (60.0%)          | 2(40.0%)      |                     |               |
| Retired            | 2 (100.0%)         | 0 (0.0%)      |                     |               |
| Monthly income     |                    |               |                     |               |
| Low                | 27(40.3%)          | 40 (58.7%)    | 0.153               | 0.926         |
| Medium             | 9 (45.0%)          | 11 (55.0%)    |                     |               |
| High               | 8 (40.0%)          | 12 (60.0%)    |                     |               |

\* = Statistically significant; <sup>#</sup> = Fisher's Exact Test

The multinomial logistic regression was used to identify significant predictors of metabolic syndrome. None of the socio-demographic variables included in model was found to significantly predict metabolic syndrome with the crude odds ratio, however, when the odds ratio was adjusted for confounders, it was found that age significantly predicted metabolic syndrome. The

result showed that the odds of developing metabolic syndrome was about 7.5% less unlikely in persons between 21-30 years of age compared to those above 60 years of age (AOR=0.075, 95% CI for AOR=0.007-0.785,  $p=0.0$ ).

**Table 5: Association of Socio-demographics and Metabolic Syndrome (Obesity as a component)**

|                           | COR   | 95%<br>Interval for COR | Confidence<br>Interval for COR | p-value | AOR   | 95% Confidence Interval<br>for AOR | p-value        |
|---------------------------|-------|-------------------------|--------------------------------|---------|-------|------------------------------------|----------------|
|                           |       | Lower<br>Bound          | Upper<br>Bound                 |         |       | Lower<br>Bound                     | Upper<br>Bound |
| <b>Age group</b>          |       |                         |                                |         |       |                                    |                |
| <b>21-30</b>              | 0.125 | 0.013                   | 1.160                          | 0.067   | 0.075 | 0.007                              | 0.785          |
| <b>31-40</b>              | 0.267 | 0.068                   | 1.042                          | 0.057   | 0.313 | 0.069                              | 1.423          |
| <b>41-50</b>              | 1.000 | 0.363                   | 2.751                          | 1.000   | 1.077 | 0.342                              | 3.398          |
| <b>51-60</b>              | 0.875 | 0.240                   | 3.185                          | 0.839   | 0.695 | 0.168                              | 2.872          |
| <b>Over 60</b>            | 1     |                         |                                |         | 1     |                                    |                |
| <b>Gender</b>             |       |                         |                                |         |       |                                    |                |
| <b>Male</b>               | 0.407 | 0.155                   | 1.069                          | 0.068   | 0.371 | 0.123                              | 1.119          |
| <b>Female</b>             | 1     |                         |                                |         | 1     |                                    |                |
| <b>Level of education</b> |       |                         |                                |         |       |                                    |                |
| <b>Non-formal</b>         | 0.698 | 0.106                   | 4.607                          | 0.709   | 0.617 | 0.075                              | 5.088          |
| <b>Primary</b>            | 0.524 | 0.193                   | 1.422                          | 0.205   | 0.358 | 0.118                              | 1.087          |
| <b>Secondary</b>          | 0.629 | 0.247                   | 1.597                          | 0.329   | 0.564 | 0.194                              | 1.646          |
| <b>Tertiary</b>           | 1     |                         |                                |         | 1     |                                    |                |
| <b>Monthly income</b>     |       |                         |                                |         |       |                                    |                |
| <b>Low</b>                | 1.012 | 0.365                   | 2.805                          | 0.981   | 0.845 | 0.242                              | 2.956          |
| <b>Medium</b>             | 1.227 | 0.350                   | 4.307                          | 0.749   | 1.276 | 0.296                              | 5.493          |
| <b>High</b>               | 1     |                         |                                |         | 1     |                                    |                |

COR=Crude Odds Ratio; AOR=Adjusted Odds Ratio

Table 6: Frequency distribution of gender, anthropometric parameters and lipid abnormalities of study population

| Population                           | Gender      |               | χ <sup>2</sup> | p-value |
|--------------------------------------|-------------|---------------|----------------|---------|
|                                      | Male (n=27) | Female (n=80) |                |         |
| Blood pressure                       |             |               |                |         |
| Normal                               | 14 (51.9%)  | 23 (28.8%)    | 4.762          | 0.029*  |
| High                                 | 13 (48.1%)  | 57 (71.2%)    |                |         |
| Fasting blood glucose                |             |               |                |         |
| Normal                               | 14 (51.9%)  | 39 (48.8%)    | 0.078          | 0.780   |
| High                                 | 13 (48.1%)  | 41 (51.2%)    |                |         |
| Waist circumference                  |             |               |                |         |
| Normal                               | 26 (96.3%)  | 33 (41.2%)    | 24.729         | <0.001* |
| High                                 | 1 (3.7%)    | 47 (58.8%)    |                |         |
| BMI                                  |             |               |                |         |
| Normal                               | 23 (85.2%)  | 53 (66.2%)    | 3.517          | 0.061   |
| High                                 | 4 (14.8%)   | 27 (33.8%)    |                |         |
| High density lipoprotein cholesterol |             |               |                |         |
| Normal                               | 16 (59.3%)  | 73 (91.2%)    | 14.765         | <0.001* |
| Reduced                              | 11 (40.7%)  | 7 (8.8%)      |                |         |
| Triglyceride                         |             |               |                |         |
| Normal                               | 25 (92.6%)  | 76 (95.0%)    | 0.221          | 0.641   |
| High                                 | 2 (7.4%)    | 4 (5.0%)      |                |         |

\* = Statistically significant

Table 7: Association between metabolic syndrome (BMI as a component) and Social behaviours /risk factors related to BMI of study population

|                                 | Prevalence<br>syndrome | of            | metabolic |                                  |         |
|---------------------------------|------------------------|---------------|-----------|----------------------------------|---------|
|                                 | Present (n=44)         | Absent (n=63) | OR        | 95% CI<br>(Lower-Upper<br>Limit) | p-value |
| Tobacco use                     |                        |               |           |                                  |         |
| Never smoked                    | 41 (93.2%)             | 55 (87.3%)    | 2.235     | 0.533-9.370                      | 0.272   |
| Previous smoker                 | 3 (6.8%)               | 8 (12.7%)     |           |                                  |         |
| Alcohol consumption             |                        |               |           |                                  |         |
| Current drinker                 | 10 (22.7%)             | 18 (28.6%)    | 0.957     | 0.354-2.591                      | 0.931   |
| Previous drinker                | 15 (34.1%)             | 16 (25.4%)    | 1.464     | 0.574-3.737                      | 0.425   |
| Never drank                     | 19 (43.2%)             | 29 (46.0%)    |           |                                  |         |
| Fruit and vegetable consumption |                        |               |           |                                  |         |
| Adequate                        | 7 (15.9%)              | 16 (25.4%)    | 0.547     | 0.200-1.498                      | 0.241   |
| Inadequate                      | 37 (84.1%)             | 47 (74.6%)    |           |                                  |         |
| Salt consumption                |                        |               |           |                                  |         |
| Add extra salt to meal          | 6 (13.6%)              | 10 (15.9%)    | 0.791     | 0.257-2.436                      | 0.682   |
| Do not add extra salt to meal   | 38 (86.4%)             | 53 (84.1%)    |           |                                  |         |
| Engage in physical activity     |                        |               |           |                                  |         |
| Yes                             | 22 (50.0%)             | 34 (54.0%)    | 0.881     | 0.400-1.941                      | 0.753   |
| No                              | 22 (50.0%)             | 29 (46.0%)    |           |                                  |         |

OR=Odds Ratio; \* = Statistically significant



## DISCUSSION

Overweight and obesity are global public health problems that cut across all ages, sex, and races.<sup>[12]</sup> Overweight and obesity negatively affect most body systems (endocrine, gastrointestinal, nervous, and cardiovascular)<sup>[18]</sup> and predispose individuals to non-communicable diseases. Complications arising from overweight and obesity create more morbidities for the dwindling population of health-care workers to manage.<sup>[13]</sup> Health risks associated with obesity include coronary heart disease and other atherosclerotic cardiovascular diseases, stroke, type 2 diabetes mellitus, high blood pressure, kidney disease, sleep apnea, osteoarthritis, gallstones, fatty liver disease, stress incontinence, and other gynecological abnormalities (amenorrhea and menorrhagia) and various cancers.<sup>[3]</sup> Sabir *et al.* reported obesity and increasing age are the major risk factors fueling increased prevalence of type 2 diabetes mellitus among Nigerians.<sup>[4]</sup> Dankyau *et al.* reported high prevalence of overweight and obesity among tertiary hospital workers in Northern Nigeria.<sup>[5]</sup> High prevalence of hypertension was reported by Owolabi *et al.* among health-care workers in Nigeria despite their awareness of the disease.<sup>[6]</sup> It has also been reported that increased body mass index (BMI) predisposes to certain cancers.<sup>[7]</sup> Overall, 85.2% males have normal BMI while 14.8% males have a high BMI. 66.2% females have a normal BMI while 33.8% have a high BMI. The prevalence of Obesity is more in females than males in this study. 44.9% had abdominal obesity, 29.0% had central obesity. In Nigeria, the prevalence of overweight individuals ranged from 20.3%-35.1%, while the prevalence of obesity ranged from 8.1%-22.2%.

The prevalence of obesity ranges from 8.1% to 22.2%. The prevalence of obesity in this study population was found to be high and this is consistent with other studies done in Nigeria.

This high figure may be attributed to the epidemiological transition currently being experienced in this country as well as other developing countries in Africa and beyond. There is an increase in the adoption of Western lifestyle and urbanisation characterised by physical inactivity, inadequate consumption of the traditional African diet that is rich in fruits and vegetables and high consumption of Western styled energy-rich food. This leads to obesity, hyperglycemia, hypertension (the most common components identified in this study) and subsequent developments of other components of metabolic syndrome. Disrupted sleep pattern and chronic stress have been implicated in the causation of overweight and obesity among health-care workers as they bring about subnormal hypothalamus-pituitary-adrenal axis.<sup>[20]</sup> The biological clock is affected by disturbances in the circadian rhythms. The hypothalamus houses the suprachiasmatic nucleus which is known to generate the circadian rhythm that regulates most physiological processes such as sleep,

wakefulness, body temperature, and the production of some hormones such as melatonin (hormone involved in sleep), ghrelin (hunger hormone), leptin (fullness/satiety hormone), and cortisol (stress hormone). These hormones are known to maintain healthy weight. Misalignment in circadian rhythm has been reported among shift workers.<sup>[20],[21]</sup>

In a study by Adaja T.M, *et al.*, 2018 using NIH criteria, observed that central obesity was seen in nearly two-thirds of the health-care workers. This was higher than the prevalence of central obesity (49.7%) reported by Iwuala *et al.*<sup>[22]</sup> We observed that female health-care workers have higher prevalence of obesity. This finding is also in tandem with our study and that of the work of Skaal and Pengpid, among South African health-care workers where female and older health-care workers were more obese than men and younger counterparts with 1 in 3 of the health-care workers suffering from obesity-related health problems.<sup>[23]</sup> In Ghana, Kasu *et al.* reported higher prevalence of overweight/obesity among female health-care workers as they are less involved in physical activities than their male counterparts.<sup>[24]</sup>

The prevalence of metabolic syndrome (Obesity as a component) in this study was found to be 41.1% which is quite high when compared to other studies done in Nigeria and other parts of Africa. The socio-demographic factors associated with metabolic syndrome include age (41-50 and over 60 years), female sex, marital status (divorced and separated), civil servants, retirees, those with tertiary education as well as medium income earners. However, the only statistically significant variable associated with metabolic syndrome in this study is marital status. Divorced and separated participants have a statistically significant occurrence of metabolic syndrome. This is comparable to another study done elsewhere where it was reported that being in a high quality marriage is associated with a lower risk of metabolic syndrome.<sup>[25]</sup> This may be due to the fact that married people are more likely to engage in positive health behaviours than widowed, separated or divorced people.<sup>[26,27]</sup> It was also noted in this study that metabolic syndrome has a low prevalence in unmarried participants. Similar studies done among African Americans and also in this part of the country revealed a similar finding.<sup>[28,29]</sup> This is most likely because single, unmarried persons tend to be young and metabolic syndrome prevalence increases with age.<sup>[30]</sup> However, it may also be due to the fact that unmarried persons tend to have low prevalence of obesity which is an important component and predictor of metabolic syndrome.<sup>[31]</sup>

When the odds ratio was adjusted for confounders, it was found that age significantly predicted metabolic syndrome i.e. the odds of developing metabolic syndrome was 7.5% unlikely in persons between ages 21-30 years when compared to those above 60 years of age. This finding is similar to other studies done previously.<sup>[28,32]</sup> This is likely due to the fact that there is a higher propensity towards hypertension, dyslipidemia and obesity in the elderly.<sup>[21,22,23]</sup> Also the function of the



islet cells tends to decline with age<sup>33</sup>. There is also a reduction in the level of physical activity with age<sup>34</sup>. These factors contribute to the increased prevalence of metabolic syndrome in the elderly. In this study, the prevalence of metabolic syndrome is higher in females (46.3%) compared to the males (25.9%). Although this difference is not statistically significant, this difference may be attributed to the greater percentage of women with high blood pressure and increased waist circumference seen in this study which is statistically significant. Abdominal obesity is a major component and predictor of future metabolic syndrome<sup>35,36</sup>. Women are said to have a higher HDL cholesterol in comparison to men partly due to the fact that they (women) respond to dietary ingestion of cholesterol and fats with a greater increase in HDL cholesterol than men<sup>37</sup>. The prevalence of overweight and obese individuals in Nigeria is of epidemic proportions. There is a need to pay closer attention to combating these health disorders.

## CONCLUSION

The prevalence of overweight and obesity in a rural setting in Port Harcourt is high. These apparently healthy adult population might be at risk of noncommunicable diseases. Hence, there is a need for advocacy on therapeutic lifestyle modification among the population. The commonest components of metabolic syndrome identified in this study are hypertension, hyperglycaemia and abdominal obesity. More so, obesity should be viewed as a disease rather than risk factor for other diseases.

## Limitation

The small sample size in this study is a major limitation factor. The findings, therefore should be confirmed with a much larger sample size.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

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