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# Factors Associated with Overweight and Obesity Among Tertiary Education Students in Uyo, South-South Nigeria

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***Abstract***

***Background:*** *Overweight andobesity are complex conditions caused by a mixture of genetic, environmental and medical factors. They affect 39% and 13% of the world's population respectively and havedeleterious health implications such as type 2 diabetes, hypertension, cardiovascular diseases and cancers that affect individuals in all ages and socio-economic groups.*

***Objective:*** *The aim of this study was to investigate the sociodemographic and other factors associated with overweight and obesity among students in the University of Uyo, in south-south region of Nigeria.*

***Methods:*** *this study was a cross sectional study with 343 participants (187 males and 156 females) who were selected by multistage sampling technique. Data were collected using a structured questionnaire and anthropometric data was collected using standard procedures. SPSS (version 20) was used to analyze data. Chi square was used to test hypothesis, with statistical significance set at p <0.05.*

***Results:*** *The prevalence of overweight was 30.61%, obesity 11.07%, and abdominal obesity 7.3% (3.2% and 12.2% in males and females respectively). Married and divorcedstatuses, employed status and higher monthly income/allowance hadsignificant relationships with increased BMI respectively (p<0.05), while waist circumference had a statistically significant relationship with work status, monthly allowance and religion in males; age and marital status in females (p<0.05). High intake of unhealthy foods, low intake of healthy food, sedentariness, increased hours of sleep daily, presence of obesity in parents and preference of a fleshy body type was associated with higher prevalence of overweight, general obesity and abdominal obesity.*

***Conclusion:*** *Overweight and obesity was highly prevalent in the studied tertiary education students. There is therefore a need for more public education about adopting lifestyles that help prevent them and possibly forestall their attendant health consequences.*

***Key words:****Associatedfactors, overweight, obesity, university students, physical activity, healthy diet, unhealthy diet.*

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## I. Introduction

Overweight and Obesity which are excessive accumulation of fat in the body that impair health are currently very serious public health problems worldwide [1].The burden of disease being higher in developing countries characterised by weak health-care systems and high prevalence of communicable diseases co-existing with high and increasingNon-Communicable Diseases (NCDs)[1,2].Globally, more than 1.9 billion adults aged 18 years and older were overweight, and over 650 million adults obese as at 2016, making up 39% and 13% of the world's population respectively. The world prevalence of obesity was seen to triple between 1975 and 2016[3]. In Nigeria, a systematic review revealed a prevalence of 20.3-35.1% and 8.1-22.2% for overweight and obesity respectively[4]. A cross sectional study at a tertiary institution in Eastern Nigeria reported a 28.4% prevalence of overweight/obesity [5], while another study carried out in five tertiary institutions reported a prevalence of 13.4 and 6.5% respectively for overweight and obesity[6].

Overweight and obesity are fundamentally caused by a positive energy imbalance between calories consumed and calories expended. Energy dense diets and sedentary lifestyle are the two major environmental factors associated with this increasing prevalence [1,7,8,9]. Genetic factors have also been implicated in the development of overweight and obesity. At present, 97 genetic loci have been associated with BMI and 188 loci

have been identified to be associated with obesity related phenotypes [10]. Several studies have shown that monozygotic twins are alike in their acquisition of fat and response to negative and positive energy balance, suggesting that the adaptation to an altered energy balance is influenced by their phenotype[10,11,12]. Medical conditions such as Hypothyroidism, Cushing's syndrome, depression and polycystic ovarian syndrome among others have been found to pose increased risk of overweight and obesity. Certain medicationslike some antidepressants and steroids have also been implicated in causation of overweight and obesity [8,13].

Obesity is a significant risk factor for and a major contributor to morbidity and mortality of chronic diseases such as cardiovascular diseases, diabetes, cancers, osteoarthritis, and sleep apnea, [14] and is associated with reduced quality of life [15]. A study in the United States showed a 15% and 43% prevalence of diabetes among overweight and obese individuals respectively, compared to 8% prevalence in with normal BMI [16].Obesity, particularly abdominal obesity has been linked to cardiovascular diseases [17,18]. Current evidence implicates obesity related metabolic abnormalities such as increased insulin-like growth factors and continuous low grade systemic inflammation in the relationship between obesity and cancers [19]. Overweight and obesity have been associated with increased risk of infections [20].Several mechanisms through which obese individuals are predisposed to infections includeimmune system dysregulation, altered adipokine signalling and underlying comorbidities [21,22].Obesity has also been identified as a risk factor for severe COVID-19 infection and death from the disease [23]. Apart from their impact on health, overweight and obesity also have significant economic implications, due to the fact that it is associated with numerous comorbidities which have high medical expenditures, as well as increased absenteeism, early retirement and disabilities [24,25].

Despite the fact that morbidity and mortality from obesity-related diseases is higher in developing countries[26], many people are still under the impression that overweight and obesity affect mainly wealthy countries and that lower resource countries are only burdened with underweight, malnutrition and communicable diseases.Published reports on prevalence and associated factors of overweight and obesity among young adults in the South-south region of Nigeria are scarce. This study thereforeaims to add to the pool of available knowledge. This will increase awareness on lifestyle problems among young people in the region and consequently help to prevent the epidemic of overweight and obesity and associated NCDs which are of public health importance in Nigeria.

## II. Materials and Methods

This cross-sectional study was carried out on students of the University of Uyo, Uyo from March 2018 to April 2018.

**Study Design:** Cross sectional observational study

**Study location:** The study was carried out in University of Uyo, a tertiary institution located in the capital of Akwa-Ibom state. Akwa Ibom is located in the South-South geopolitical zone of Nigeria. There are 13 faculties in the University of Uyo, with a population of 26,010 students, comprising of 25,676 undergraduate and 3,334 postgraduate students[27].

**Study duration:** March 2018 to April 2018

**Sample size:** 343 students

**Sample Size calculation**

The minimum sample size was calculated as follows:

$n = Z^2pq/ d^2$, where:

n = minimum sample size,

p = prevalence of factor under study (derived from a previous study of 28.4%=0.284[5]).

q = 1- p = 1 – 0.284 = 0.716,

Z = 1.96;

d= degree of precision = 0.05.

Therefore:

$n = 1.96^2 \times 0.284 \times 0.716 / 0.05^2 = 312$

This was increased to 343 to allow for attrition and invalid data.

**Subjects and selection method**

Multistage sampling technique was used.

The first stage involved the selection of a faculty in which the study would be carried out. This was done by simple random sampling method and the faculty of Arts was selected. The second stage involved selection of 4 departments from the faculty of Arts out of 9 departments, where simple random sampling was also used. The following departments were selected: Communication Arts, Linguistics and Nigerian Language, Music, and Philosophy. In the third stage the sample size was divided proportionately among the different departments and among each year of study. The expected number of respondents were randomly selected at each level, until the number of respondents for that level was attained.

**Inclusion criteria:**
**1.** Students aged 16 years and above

**Exclusion criteria:**
**1.** Students who were visibly pregnant
**2.** Students who were acutely ill

**Procedure methodology**

This study, with a sample of 343 consenting male and female subjects, took place between March 2018 and April 2018.

Weight was measured in kilograms to the nearest 0.5 kg using a bathroom scale. Each subject was asked to remove heavy outer garments and foot wears before weighing. The height of the subjects was measured to the nearest 0.1cm using astadiometer calibrated in centimeters, mounted on a vertical wall with the respondent standing erect against the wall on a horizontal floor without shoes. An inelasticmeasuring tape was used to measure the waist circumference. The measurement was made at approximate midpoint between the lower margin of the last palpable rib and the top of the iliac crest.

A structured interviewer-administered questionnaire which is an adaptation of previously published works was used. It consisted of 5 sections that obtained information on various areas including: **Section A** which obtained the sociodemographic characteristics of the respondents including their age, sex, marital status, work status, monthly allowance/income and religion. **Section B**: Physical Activity which obtained information on the physical activity pattern of enlisted respondents. Information obtained was used to group physical activity into adequate and inadequate, where adequate physical activity was defined as that in which the respondent spent 30 minutes or more each day for 3 times or more per week.**Section C**: Food frequency section, which was categorized into "healthy foods (fruits and vegetables, whole grains, seafoods)" and "unhealthy foods". The participants were asked to state the frequency of consumption of such foods in an ascending scale for a score between 1 and 15. The healthy food intake was then categorized into "low", "fair" and "adequate". Unhealthy foods included candies, sweetened drinks and pastries and its intake was categorized accordingly into "very high", "high" moderate and low**.Section D:** Risk factor assessment section which assessed other associated factors not already assessed like hours spent on sedentary time, sleep pattern and respondents' perception of obesity in their parents.**Section E:** This section collected information on the body image preferences of the respondents and the influences of these body image preferences.**Section F:** Anthropometric measurement: this section of the questionnaire recorded data obtained from anthropometric measurement. The height, weight and waist circumference were measured. The BMI was derived from the weight (in kilograms) divided by height (in meters) squared. The BMI was then be categorized using the WHO criteria as follows: underweight - <18.5kg/$m^2$, normal – 18.5-24.9kg/$m^2$, overweight – 25.0-29.9kg/$m^2$, and obesity - ≥30.0kg/$m^2$. Class 1 obesity – 30.0-34.9kg/$m^2$, class 2 obesity – 35.0-39.9kg/$m^2$, and class 3 obesity - ≥40kg/$m^2$.Waist circumference was also categorized using WHO criteria as follows: for makes; normal - <102cm, high risk (central obesity) - >102cm and for females; normal - <88cm and high risk (central obesity) - >88cm[28].

**Ethical Consideration**

An ethical clearance letter was obtained from the Health Research Ethical Committee of the University of Uyo Teaching Hospital, Uyo. Informed and voluntary consent was obtained before questionnaires were administered, and before measurements of the height, weight and waist circumference were obtained. To ensure confidentiality, the participants names and other means of identification were not used during the research. Instead the questionnaires were given coded means of identification.

**Statistical Analysis**

Data entry, categorization and analysis was done using SPSS statistical package version 20. The results were presented in frequencies and percentages. Inferential statistics was tested using chi square and fisher's exact. All relationships were tested at 0.05 level of significanceand descriptive statistics presented by use of tables.

## III. Result

**Sociodemographic characteristics of respondents**

A total of 343 individuals participated in the study. Out of these, 187 (54.5%) were males and 156 (45.5%) were females. Most of the participants were 18-24 years(62.1%), followed by those greater than 24 years (20.1%). Respondents less than 18years were 17.8%. Most of the respondents were single (83.1%), while 15.7% were married and 1.2% divorced. Only 97 (28.3%) of the students worked alongside their schooling. 180 (52.2%) of the participants had their income/allowance less than ₦18,000 naira, while 127 (37%) had their

income/allowance between ₦18,000 and ₦50,000 naira. Those with income more than ₦50,000 were 36 (10.5%). Most of the respondents were Christians (93.3%).

**Prevalenceof overweight and obesity**

This study showed that using BMI, 30.6% of the respondents were overweight and 11.1% were obese. Of these, 10.2% were mildly obese and 0.9% were moderately obese. No respondent was severely obese. Using waist circumference, it was seen that 25(7.3%) of the total population were obese, with a higher proportion of females (12.2%) having central obesity compared to their male counterparts (3.2%).

Table 1 showed that the BMI of respondents across age groups, marital status, employment status and income/allowance categories was significantly different (p=0.006, 0,001, 0.012 and 0.001 respectively).

**Table 1: Distribution of respondents BMI by their sociodemographic characteristics**

| Sociodemographic characteristics | BMI categories | | | |
|---|---|---|---|---|
| | Underweight/ Normal N=200 (58.3%) | Overweight N=105(30.6%) | Obese N=38(11.1%) | Statistical indices |
| **Age (years)** | | | | |
| <18 | 39 (63.9) | 18 (29.5) | 4 (6.5) | Fisher's exact= 21.628 |
| 18-24 | 132 (62) | 52 (24.4) | 29 (13.6) | p=0.006* |
| >24 | 29 (42) | 35 (50.7) | 5 (7.2) | |
| **Sex** | | | | |
| Male | 109 (58.3) | 52 (27.8) | 26 (13.9) | $\chi^2$= 5.594 |
| Female | 91 (58.4) | 53 (34.0) | 12 (7.7) | p=0.232 |
| **Marital status** | | | | |
| Single | 183 (64.2) | 73 (25.6) | 29 (10.2) | Fisher's exact =27.911 |
| Married | 16 (29.6) | 30 (55.6) | 8 (14.8) | p=0.001* |
| Divorced | 1 (25.0) | 2 (50.0) | 1 (25.0) | |
| **Students that are working** | | | | |
| Yes | | | | |
| No | 43 (44.3) | 41 (42.3) | 13 (13.3) | $\chi^2$= 12.886 |
| | 157 (63.8) | 64 (26.0) | 25 (10.2) | p=0.012* |
| **Income/allowance per month (naira)** | | | | |
| <18,000 | 121 (67.2) | 40 (22.2) | 19 (10.5) | $\chi^2$=26.330 |
| 18,000-50,000 | 70 (55.1) | 44 (34.6) | 13 (10.2) | p=0.001* |
| >50,000 | 9 (25.0) | 21 (58.3) | 6 (16.7) | |
| **Religion** | | | | |
| Christian | 189 (59.0) | 98 (30.6) | 33 (9.7) | Fisher's exact=9.809 |
| Muslim | 5 (50.0) | 3 (30.0) | 2 (20.0) | p=0.279 |
| Free thinkers | 6 (46.2) | 4 (30.8) | 3 (23.1) | |

***=**statistically significant (p<0.05)

Further analysis as seen in table 2 showed that in males, there was statistically significant difference in waist circumference when analysed by employment status, monthly income/allowance and religion (p=0.011, 0.046 and 0.020 respectively), however, among females, waist circumference was significantly different across age group and marital status (p=0.047 and 0.001 respectively).

**Table 2: Distribution of waist circumference of respondents by their gender and sociodemographic characteristics of respondents.**

| Sociodemographic characteristics | Males | | | Females | | |
|---|---|---|---|---|---|---|
| | High risk N=6 (3.2%) | Normal N=181 (96.8%) | Test statistic/p value | High risk N=19 (12.2%) | Normal N=137 (87.8%) | Test statistic/ p value |
| **Age (years)** | | | | | | |
| <18 | 1 (2.9) | 33 (97.1) | Fisher's | 3 (11.1) | 24 (88.9) | Fisher's exact= |
| 18-24 | 3 (2.7) | 108 (97.3) | exact=1.439 | 15(14.7) | 87 (85.3) | 9.647 |
| >24 | 2 (4.8) | 40 (95.2) | p=0.837 | 1 (3.7) | 26 (96.3) | p=0.047* |
| **Marital status** | | | | | | Fisher's exact= |
| Single | 4 (2.4) | 162 (97.6) | Fisher's exact= | 13 (10.9) | 106 (90.1) | 17.843 |
| Married | 2 (10.7) | 17 (89.3) | 5.031 | 4 (11.4) | 31 (88.6) | p=0.001* |
| Divorced | 0 (0.0) | 2(100) | p=0.284 | 2 (100.0) | 0 (0.0) | |
| **Are you employed?** | | | Fisher's exact= | | | Fisher's exact= |
| Yes | 5 (9.3) | 49 (90.7) | 8.971 | 3 (7.0) | 40 (93.0) | 5.305 |
| No | 1 (0.8) | 132(99.2) | p=0.011* | 16 (14.2) | 97 (85.8) | p=0.070 |
| **Monthly allowance/income** | | | Fisher's exact= | | | Fisher's exact= |
| <₦18,000 | 2 (1.9) | 101 (98.1)) | 9.690 | 11 (14.3) | 66 (85.7) | 4.341 |
| ₦18,000-50,000 | 1 (1.6) | 61 (98.4) | p=0.046* | 6 (9.2) | 59 (90.8) | p=0.362 |

| | | | | | | |
|---|---|---|---|---|---|---|
| >₦50,000 | 3 (13.6) | 19 (86.4) | | 2 (14.3) | 12 (85.7) | |
| **Religion** | | | | | | |
| Christian | 6 (3.5) | 167 (96.5) | Fisher's exact=11.644 p=0.020* | 18 (12.2) | 129 (87.8) | Fisher's exact = 4.646 p=0.326 |
| Muslim | 0 (0.0) | 4 (100) | | 0 (0.0) | 6 (100) | |
| Free thinkers | 0 (0.0) | 10 (100) | | 1 (33.3) | 2 (66.7) | |

*significant p value (<0.05)

**Lifestyle Characteristics of Respondents**

**a) Physical activity levels of respondents**

Majority of the respondents reported inadequate levels of physical activity (77.0%). Significantly higher proportion (28.2%) of respondents between 18-24 years had adequate levels of physical activity (p=0.020) compared to other age groups (table 3).

**Table 3: Distribution of physical activity levels of respondents by their sociodemographic characteristics**

| Socio-demographic characteristics | Adequate [a] N=79(23.0%) | Inadequate [b] N=264(77.0%) | Test statistic/ P value |
|---|---|---|---|
| **Age (years)** | | | |
| <18 | 7 (11.5) | 54(88.5) | $\chi^2$ = 14.992 |
| 18-24 | 60 (28.2) | 153(71.8) | P=0.020* |
| >24 | 12 (17.4) | 57(82.6) | |
| **Sex** | | | |
| Male | 47 (25.1) | 140(74.9) | $\chi^2$=3.884 |
| Female | 32 (20.5) | 124(79.5) | p=0.274 |
| **Marital status** | | | |
| Single | 68 (23.9) | 217(76.1) | Fisher's exact=9.949 |
| Married | 10 (18.5) | 44(81.5) | P=0.127 |
| Divorced | 1 (25.0) | 3(75.0) | |
| **Are you employed?** | | | |
| Yes | 22 (22.7) | 75(77.4) | $\chi^2$=2.620 |
| No | 57 (23.2) | 189(76.8) | P=0.454 |
| **Allowance per month (naira)** | | | |
| <18,000 | 37 (30.6) | 143(79.5) | |
| 18,000-50,000 | 31(24.4) | 96(75.6) | $\chi^2$=11.022 |
| >50,000 | 11 (30.5) | 25(69.5) | P=0.088 |
| **Religion** | | | |
| Christian | 71 (22.2) | 249(77.8) | Fisher's exact=3.652 |
| Muslim | 3 (30.0) | 5(70.0) | P=0.724 |
| Free thinkers | 5 (38.5) | 8(61.5) | |

[a] ≥30 minutes of physical activity a day for at least 3 times a week; [b]<30 minutes of physical activity a day for <3 times a week.

*: statistically significant

**b) Food intake pattern of respondents**

Only 13.7% of the respondents had adequate intake of healthy foods, while most of the respondents had fair intake of healthy foods (45.8%) and 40.5% had low intakes. No statistically significant difference was noticed in healthy food intake across the different sociodemographic characteristics as shown in table 4.

**Table 4: Distribution of healthy food intake of respondents by their sociodemographic characteristics**

| Sociodemographic characteristics | Healthy food intake[a] | | | Test statistic/ p value |
|---|---|---|---|---|
| | Low [b] N =139(40.5%) | Fair[c] N=157 (45.8%) | Adequate[d] N=47 (13.7%) | |
| **Age (years)** | | | | |
| <18 | 26 (42.6) | 29 (47.5) | 6 (9.8) | $\chi^2$=4.156 |
| 18-24 | 86 (40.0) | 92 (43.2) | 35 (16.4) | P=0.385 |
| >24 | 27 (39.1) | 36 (52.2) | 6 (8.7) | |
| **Sex** | | | | $\chi^2$=1.181 |
| Male | 74 (39.6) | 90 (48.1) | 23 (12.3) | p=0.554 |
| Female | 65 (41.7) | 67 (44.9) | 24 (15.4) | |
| **Marital status** | | | | |
| Single | 121 (42.5) | 124 (43.5) | 40 (14.0) | Fisher's exact=5.427 |
| Married | 18 (33.3) | 30 (55.6) | 6 (11.1) | p=0.246 |
| Divorced | 0 (0.0) | 3 (75.0) | 1 (25.0) | |

| | | | | |
|---|---|---|---|---|
| **Are you employed?** | | | | |
| Yes | 42 (43.3) | 44 (45.4) | 11 (11.3) | $\chi^2$=0.813 |
| No | 97 (39.4) | 113 (45.9) | 36 (14.6) | p=0.666 |
| **Allowance per month (naira)** | 77 (42.8) | 78 (43.3) | 25 (13.9) | |
| <18,000 | 55 (43.3) | 58 (45.7) | 14 (11.0) | $\chi^2$ = 8.468 |
| 18,000-50,000 | 7 (19.4) | 21 (58.3) | 8 (22.2) | p=0.076 |
| >50,000 | | | | |
| **Religion** | | | | |
| Christian | 130 (40.6) | 146 (45.6) | 44 (13.8) | Fisher's exact=4.503 |
| Muslim | 3 (30.0) | 7 (70.0) | 0 (0.0) | p=0.342 |
| Free thinkers | 6 (42.6) | 4 (30.8) | 3 (23.1) | |

[a]Healthy food included fruits and vegetables, whole grains and seafood. [b] Low intake classified as a healthy intake food score of <8; [c] Fair intake classified as healthy intake food score of 8-12; [d] Adequate intake classified as healthy intake food score of >12.

As reported in table 5, majority of the respondents had high intake of unhealthy foods (42.5%), followed by very high intake (24.5%). Only 12.9%) had low intake and 20.1% had moderate intake. A significantly higher proportion of respondents who had their income/allowance more than 50,000 had low intakes of unhealthy food (5.6%) compared to other income categories, while a higher proportion of those who earned less than 18,000 had very high intake of unhealthy foods (25.6%) compared to other income categories (p=0.024).

**Table 5: Distribution of respondents' unhealthy food intake pattern by their sociodemographic characteristics**

| **Socio-demographic characteristics** | **Unhealthy foods intake pattern [a]** | | | | **Test statistic/ p value** |
|---|---|---|---|---|---|
| | **Very High [b] N=84(24.5%)** | **High[c] N=146 (42.5%)** | **Moderate[d] N=69 (20.1%)** | **Low[e] N=44 (12.9%)** | |
| **Age (years)** | | | | | |
| <18 | 12 (19.7) | 35 (57.3) | 10 (16.4) | 4 (6.6) | Fisher's exact=10.465 |
| 18-24 | 55 (25.8) | 87 (40.8) | 45 (21.1) | 26 (12.3) | P=0.106 |
| >24 | 17 (24.6) | 24 (34.8) | 14 (20.3) | 14 (20.3) | |
| **Sex** | | | | | $\chi^2$=1.992 |
| Male | 42 (22.5) | 85 (45.5) | 35 (18.7) | 25 (13.4) | p=0.574 |
| Female | 42 (26.9) | 61 (39.1) | 34 (21.8) | 19 (12.2) | |
| **Marital status** | | | | | |
| Single | 75(26.3) | 118 (41.4) | 60 (21.1) | 32(11.2) | Fisher's exact= 9.696 |
| Married | 9 (16.7) | 25 (46.3) | 8 (14.8) | 12 (22.2) | P= 0.138 |
| Divorce | 0 (0) | 3 (75.0) | 1 (25.0) | 0 (0) | |
| **Are you employed?** | | | | | |
| Yes | 22 (22.7) | 38 (39.2) | 18 (18.6) | 19 (19.6) | $\chi^2$=5.527 |
| No | 62 (25.2) | 108 (43.9) | 51 (20.7) | 25 (10.2) | P=0.137 |
| **Allowance per month (naira)** | 46 (25.6) | 77 (42.8) | 38 (21.1) | 19 (10.6) | |
| <18,000 | 29 (22.8) | 55 (43.3) | 29 (22.8) | 14 (11.0) | Fisher's exact=14.578 |
| 18,000-50,000 | 9 (25.0) | 14 (38.9) | 2 (5.6) | 11 (30.6) | P=0.024* |
| >50,000 | | | | | |
| **Religion** | | | | | |
| Christian | 78 (24.4) | 137 (42.8) | 64 (20.0) | 41(12.8) | Fisher's exact=3.216 |
| Muslim | 1 (10.0) | 5 (50.0) | 3 (20.0) | 1 (10.0) | p=0.781 |
| Free thinkers | 5 (38.5) | 4 (30.8) | 2 (15.4) | 2 (15.4) | |

* Significant p value (<0.05)

[a]Unhealthy food included pastries, candies, cake and sweetened drinks; [b] Very high intake: unhealthy food score of >10; [c]High intake: unhealthy food score of 7-10; [d] Moderate intake: unhealthy food score of 3-6;[e]Low intake: unhealthy food score < 3.

### c) Sedentariness of respondents

Sedentary time was explained to the respondents as time spent sitting or reclining on a typical day was assessed for. Majority spent 1-8 hours on sedentariness (56.0%). While 39.6% spent less than 1 hour, and 4.4% spent more than 8 hours on sedentariness.

### d) Body image preference of respondents

Majority of the respondents preferred a slim body type 194 (56.6%), while 149 (43.4%) preferred a fleshy body type. Of these, 57.2% of males preferred a slim body type, compared to 42.8% of female respondents.

**e) Sleep pattern of respondents**

Majority of the respondents 236 (68.8%) had less than 8 hours of sleep daily while 107 (31.2%) had an average of more than 8 hours of sleep daily.

**Perceived obesity of parents**

The respondents were asked to indicate if they considered any or both of their parents obese. Majority did not consider any of their parents obese (70.6%), while 24 (7.0%) reported that they considered their father obese, 44 (12.8%) considered their mother obese and 36 (10.5%) considered both their parents obese.

**Distribution of BMI and waist circumference according to respondent's life style characteristics and perceived obesity of parents**

Table 6 showed the distribution of BMI by several lifestyle characteristics of the respondents. The BMI of respondents was comparable across physical activity levels. Participants with adequate healthy food intake had the lowest proportion of obese respondents (6.4%), however, they had the highest proportion of overweight respondents (34.0%). Moderate intake of unhealthy foods had higher percentage of underweight/normal BMI (68.0%) and lower percentage of obesity (1.4%) compared to other unhealthy food patterns. These relationships were not significant. However, perceived obesity of parents and sleep pattern showed statistically significant relationships with the BMI (p=0.020 and 0.002 respectively). Most respondents who stated that none of their parents was obese had underweight/normal BMI (68.2%). Those who slept more than 8 hours a day had higher proportion of overweight and obesity compared to their counterparts who slept less than 8 hours a day.

**Table 6: Relationship between BMI of respondents and their lifestyle characteristics**

| Lifestyle characteristics | BMI categories | | | Test statistic/ p value |
|---|---|---|---|---|
| | Underweight/ Normal N=200 (58.3%) | Overweight N=105(30.6%) | Obese N=38(11.1%) | |
| **Physical activity** | | | | |
| Adequate | 48(60.8) | 21(26.6) | 10(12.7) | $\chi^2$=8.132 |
| Inadequate | 152(57.6) | 84(31.8) | 28(10.6) | P=0.775 |
| **Healthy food intake** | | | | |
| Low | 89(64.1) | 38(27.3) | 12(8.6) | Fisher's |
| Fair | 83(52.8) | 51(32.5) | 23(14.7) | exact=17.632 |
| Adequate | 28(59.5) | 16(34.0) | 3(6.4) | P=0.127 |
| **Unhealthy foods intake** | | | | |
| Very high | 49(58.3) | 20(23.8) | 15(17.9) | |
| High | 79(54.1) | 51(34.9) | 16(11.0) | Fisher's |
| Moderate | 47(68.2) | 21(30.4) | 1(1.4) | exact=7.327 |
| Low | 25(56.8) | 13(29.6) | 6(13.6) | P=0.502 |
| **Sedentariness (/day)** | | | | |
| < 1 hour | 87(64.0) | 37(27.2) | 12(8.8) | Fisher's |
| 1-8 hours | 107(55.8) | 63(32.8) | 22(11.4) | exact=8.615 |
| >8hours | 6(40.0) | 5((33.3) | 4(26.7) | P=0.376 |
| **Perceived obesity of parents** | 11(45.8) | 8(33.3) | 5(20.8) | |
| Father | 18(40.9) | 19(43.2) | 7(15.9) | $\chi^2$=18.099 |
| Mother | 8(22.2) | 20(55.6) | 8(22.2) | P=0.020* |
| Both | 165(68.2) | 59(24.4) | 18(7.4) | |
| None | | | | |
| **Sleep pattern (/day)** | | | | |
| <8 hours | 154(65.3) | 63(26.7) | 19(8.0) | $\chi^2$=16.793 |
| >8 hours | 46(42.9) | 42(39.3) | 19(17.7) | P=0.002* |
| **Body image preference** | | | | |
| Slim | 119(61.3) | 55(28.4) | 20(10.3) | $\chi^2$=15.823 |
| Fleshy | 81(54.4) | 50(33.6) | 18(12.1) | P=0.055 |

*=statistically significant (p<0.05)

Further analysis as shown in table 7 revealed that among male respondents, physical activity levels and perceived obesity of parents were significantly associated with waist circumference (p=0.045 and 0.040 respectively). Adequate physical activity levels had no abnormal waist circumference versus 4.3%of those with inadequate physical activity levels. Those who reported that their father was obese had the highest proportion of abnormal waist circumference (27.3%). Among females however, respondents who reported that their mother was obese had a significantly higher proportion (25.0%) of those with abnormal waist circumference (p=0.031).

**Table 7: Relationship between waist circumference of respondents and their lifestyle characteristics**

| Lifestyle characteristics | Males | | | Females | | |
|---|---|---|---|---|---|---|
| | **High risk N=6 (3.2%)** | **Normal N=181 (96.8%)** | **Test statistic/p value** | **High risk N=19 (12.2%)** | **Normal N=137 (87.8%)** | **Test statistic/ p value** |
| **Physical activity** | | | Fisher's | | | Fisher's exact= |
| Adequate | 0(0.0) | 46(100.0) | exact=9.756 | 4(12.1) | 20(100.0) | 5.427 |
| Inadequate | 6(4.3) | 135(95.7) | p=0.045* | 15(12.2) | 135(95.7) | p=0.490 |
| **Healthy food intake** | | | | | | |
| Low | 3 (3.9) | 73 (96.1) | Fisher's exact= | 7 (11.1) | 56 (88.9) | Fisher's exact= |
| Fair | 3 (3.4) | 85 (96.6) | 1.761 | 9 (13.0) | 60 (87.0) | 6.145 |
| Adequate | 0 (0.0) | 23 (100) | p=0.940 | 3 (12.5) | 19 (87.5) | p=0.407 |
| **Unhealthy foods intake** | 2 (4.8) | 40 (95.2) | | 4 (9.5) | 38 (90.5) | |
| Very high | 2 (2.4) | 82 (97.6) | Fisher's exact= | 12(19.4) | 50 (80.6) | Fisher's exact= |
| High | 1 (2.9) | 34 (97.1) | 2.684 | 3 (8.8) | 31 (91.2) | 1.155 |
| Moderate | 1 (3.8) | 25 (96.2) | p=0.614 | 0 (0.0) | 18 (100) | p=0.855 |
| Low | | | | | | |
| **Sedentariness** | | | | | | |
| < 1 hour | 3(3.7) | 78(96.3) | Fisher's exact= | 9(16.4) | 46(85.6) | Fisher's exact= |
| 1-8 hours | 3(3.1) | 93(96.9) | 3.055 | 10(10.4) | 86(89.6) | 2.449 |
| >8 hours | 0(0.0) | 10(100.0) | p=0.549 | 0(0.0) | 5(100.0) | P=0.654 |
| **Perceived obesity of parents** | 3(27.3) | 8(73.0) | | 1(7.7) | 12(92.3) | |
| Father | 0(0.0) | 28(100.0) | Fisher's | 4(25.0) | 12(75.0) | Fisher's |
| Mother | 0(0.0) | 20(100.0) | exact=15.473 | 3(18.8) | 13(81.2) | exact=3.723 |
| Both | 3(2.3) | 128(97.7) | p=0.040* | 11(9.9) | 100(90.1) | p=0.031* |
| None | | | | | | |
| **Sleep pattern (/day)** | | | Fisher's | | | |
| <8 hours | 4(3.3) | 117(96.7) | exact=0.413 | 14(12.2) | 101(87.8) | $\square^2$ =4.009 |
| >8 hours | 2(3.0) | 64(97.0) | p=0.813 | 5(12.2) | 36(87.8) | P=0.135 |
| **Body image preference** | 3(2.7) | 108(97.3) | Fisher's exact=3.852 | 10(12.0) | 73(88.0) | $\square^2$ =4.547 |
| Slim | 3(3.9) | 73(96.1) | p=0.531 | 9(12.3) | 64(87.7) | P=0.654 |
| Fleshy | | | | | | |

*=statistically significant (p<0.05)

## IV. Discussion

About a third of respondents in this study were overweight, while just over one tenth were obese. This was similar to findings obtained in a private university in Nigeria, where 31% were overweight and 9.3% were obese[29].Another study in Eastern Nigeria also reported similar findings [4].However, the prevalence of obesity in the present study was higher than was obtained in similar studies in South-east and Western Nigeria where obesity was found to be 6.5% and 1.3% prevalent respectively[6,30].These differences may be due to the cultural disparity and feeding practices of the study populations. Central obesity was seen in 7.3% of the respondents in the present study. This is lower compared to what was observed in another study in Nigeria[31],which may be explained by the younger population in this study, as prevalence of obesity is seen to increase with age [5].

Further results in the present study showed that while more females were overweight and had abdominal obesity, more males were obese. A similar pattern of more overweight females and more obese males had previously been reported in a study done in Akwa Ibom state [1].This is in contrast to other studies in Nigeria and Ghana that reported higher prevalence of overweight, obesity and central obesity in females compared to their male counterparts [5,6,32].Females generally have more excess fat compared to their male counterparts due to several factors including weight gain during and after pregnancy, the perception of weight gain as evidence of high socio-economic status, fattening practices among women and the higher likelihood of sedentariness associated with jobs available for women compared to those available for males[33,34]. The young age group and literacy level of the respondents in the present study may explain why the typical pattern of more obese females was not seen as the females are yet to begin childbearing, and may reject traditional fattening practices.

Respondents between 18 and 24 years had the highest prevalence of obesity while more of those above 24 years were overweight. This finding was statistically significant (p=0.006). A study done in Abuja, Nigeria found that older age groups had significantly higher prevalence of obesity and overweight[35]. Married or divorced respondents had significantly higher prevalence of overweight and obesity compared to singles. This may be because married and divorced respondents are generally older in age when compared to singles. Students who worked and those who had monthly income/allowance more than ₦50,000had significantly higher prevalence of overweight and obesity, in keeping with the WHO's report that prevalence of obesity could be linked to higher socioeconomic status[36]. Another study in Nigeria had similar findings[35]. A similar pattern was

seen with abdominal obesity as males who were employed and earned more than ₦50,000 had higher prevalence, and females who were married and divorced also had higher prevalence of abdominal obesity.

The high prevalence of overweight and obesity in the present study can also be attributed to the poor physical activity levels and the high intake of unhealthy foods among the respondents as these have been found to be the two major modifiable risk factors for obesity and its attendant comorbidities [34,37]. Lack of a built environment that supports physical activity such as open sporting facilities and secure environments can lead to poor physical activity levels as seen in the present study, where only 23.0% of the respondents had adequate physical activity levels. This finding is at variance with findings in a similar study where majority of the respondents (59.8%) had at least 30 minutes of exercise daily. The study also reported that those who were at least moderately physically active were more likely to be overweight and obese. This is similar to findings in the present study that showed that those with adequate physical activity levels had higher prevalence of obesity, although more individuals with inadequate physical activity were overweight. These findings may be due to increased physical activity levels among obese individuals who are trying to lose weight.

Feeding patterns are usually shaped by individual, cultural and economic factors. Majority of the respondents in this study had unhealthy dietary patterns. Most had fair intake of fruits and vegetables and high intakes of unhealthy foods. Similar study in Eastern Nigeria also reported high intakes of unhealthy foods among undergraduates[6]. Respondents with monthly income/allowance of more than ₦50,000 were noticed to have healthier feeding patterns, with higher intakes of fruits and vegetables and lower intakes of unhealthy foods compared to those of other income groups. Other studies have shown significant relationships between socioeconomic status and eating behaviours [38].Young undergraduates are prone to have poor dietary habits [39,40], mainly as a result of sudden changes in the environment and resources available, and frequent exposure to unhealthy foods and habits[41].

High intake of high calorie foods and low intake nutrient-dense foods can cause accumulation of excess fat. This study showed no significant association between BMI, waist circumference and intake of fruits and vegetables and unhealthy foods. This however differs from other studies that found significant association between dietary intake and overweight and obesity [29,42]. Apart from physical activity and dietary patterns, sedentariness[43,44],and sleep pattern[45] have been linked to overweight and obesity in individuals. In the present study, individuals who spent more than 8 hours on sedentary activity such as watching TV, playing games, sitting at a desk had higher prevalence of overweight (33.3%) and obesity (26.7%), while those who spent less than 1 hour having higher prevalence of normal weight (64.0%). This was however not significant. Sleep pattern showed significant relationship with BMI, and perceived obesity of parents showed significant relationship with BMI and waist circumference. A study found that reduced duration of sleep was associated with increased weight[45], disagreeing with the present study where those who slept more than 8 hours had higher prevalence of overweight (39.3%) and obesity (17.7%) compared to those who slept for less than 8 hours daily.

Previous literature has linked parental obesity with increased weight gain and consequent obesity in the child[46,47].In the present study, those with perceived obesity in both parents had the highest prevalence of overweight and obesity (22.2% and 55.6% respectively) while those who didn't perceive any of their parents as obese had the lowest prevalence of overweight and obesity. Also, among male respondents, those who considered their fathers obese had significantly higher prevalence of abdominal obesity ($p=0.040$) while females who considered their mothers obese had higher prevalence of abdominal obesity ($p=0.031$). Previous studies however suggests that people with familial predisposition to obesity can adapt a healthy lifestyle to maintain an ideal body weight[48]. This study also assessed the association between body image preference and BMI and waist circumference. These associations were not statistically significant, however, those who preferred a fleshy body type were more likely to be overweight and obese. This was same for waist circumference in males and females, as those who preferred fleshy body types had slightly higher prevalence of abdominal obesity. Similar findings were seen in another study [49]. Body image perception has been linked with increased weight especially among black African women who tend to perceive larger body sizes as ideal body size[34].

Worthy of note are the limitations of this study. One of the limitations is that causality cannot be deduced from cross-sectional analyses because the data was collected at one point in time and the direction of the association cannot be determined. Also, dietary data were collected using a food frequency questionnaire which did not collect detailed information on the preparatory methods of foods consumed or their portion sizes which affect the calorie content of the food. This could have influenced the information relating to dietary habits and their association to BMI and waist circumference in the study. The study was conducted among university students who are more exposed. The findings in this study may therefore not be a reflection of the general population of young people, especially those in rural areas. Similar studies should be conducted in the rural areas to provide a basis for comparison.

## V. Conclusion

This study demonstrated a high prevalence of overweight and obesity, poor physical activity levels and poor dietary habits among the students. Inadequate physical activity, high intake of unhealthy foods and low intake of fruits and vegetables was associated with higher prevalence of overweight, general obesity and abdominal obesity. Sedentariness, increased hours of sleep daily, presence of obesity in parents and preference of a fleshy body type were also seen to be associated with higher prevalence of overweight and obesity. Since the study population are young people who are future leaders, nutrition and lifestyle education that focuses on increased consumption of fruits and vegetable, reduced intake of unhealthy foods and snacks, increased physical activity and reduced sedentariness should be given to them to promote good health and also reduce the incidence of NCDs in adulthood.

## References


[1]. Opara DC, Ekanem US, Akwaowo CD. Prevalence and Risk Factors for obesity and some diet related chronic diseases in a military settlement. Ibagwa, Nigeria. *Niger J Nutr Sci*. 2014;2:43-51.

[2]. Hossain P, Kawar B, El Nahas M. Obesity and diabetes in the developing world--a growing challenge. *N Engl J Med*. 2007;356(3):213-215. doi:10.1056/NEJMp068177

[3]. World health organisation. Obesity and Overweight. WHO. Published 2020. Accessed August 13, 2020. https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight

[4]. Chukwuonye I, Chuku A, John C, et al. Prevalence of overweight and obesity in adult Nigerians – A systematic review. *Diabetes Metab Syndr Obes*. 2013;6:43-47. doi:10.2147/DMSO.S38626

[5]. Ejike C, Ijeh I. Obesity in young-adult Nigerians: variations in prevalence determined by anthropometry and bioelectrical impedence analysis, and the development of % body fat prediction equations. *Int Arch Med*. 2012;5(22).

[6]. Ukegbu PO, Uwaegbute AC, Echendu CA, et al. Obesity and associated factors in young adults attending tertiary institutions in south-eastern Nigeria. *South African J Clin Nutr*. 2017;30(2):43-48. doi:10.1080/16070658.2016.1259032

[7]. Opara DC, Ekanem US. Lifestyle Diseases : Knowledge and Related Practice among Residents of Uyo Metropolis. *Asian J Med Heal*. 2016;1(3):1-12. doi:10.9734/AJMAH/2016/28771

[8]. Sikaris KA. The clinical biochemistry of obesity. *Clin Biochem Rev*. 2004;25(3):165-181. https://pubmed.ncbi.nlm.nih.gov/18458706

[9]. Oladimeji AM, Fawole O, Nguku P, Nsubuga P. Prevalence and factors associated with hypertension and obesity among civil servants in Kaduna, Kaduna State, June 2012. *Pan Afr Med J*. 2014;18(1):13. doi:10.11604/pamj.supp.2014.18.1.3260

[10]. Nielsen LA, Nielsen TRH, Holm J-C. The Impact of Familial Predisposition to Obesity and Cardiovascular Disease on Childhood Obesity. *Obes Facts*. 2015;8(5):319-328. doi:10.1159/000441375

[11]. Sandholt CH, Grarup N, Pedersen O, Hansen T. Genome-wide association studies of human adiposity: Zooming in on synapses. *Mol Cell Endocrinol*. 2015;418 Pt 2:90—100. doi:10.1016/j.mce.2015.09.029

[12]. Bouchard C, Tremblay A, Després JP, et al. The response to exercise with constant energy intake in identical twins. *Obes Res*. 1994;2(5):400-410. doi:10.1002/j.1550-8528.1994.tb00087.x

[13]. Center for disease prevention and control. Adult Obesity Causes & Consequences. Overweight and Obesity. Published 2020. Accessed August 14, 2020. https://www.cdc.gov/obesity/adult/causes.html

[14]. Pi-Sunyer X. The medical risks of obesity. *Postgrad Med*. 2009;121(6):21-33. doi:10.3810/pgm.2009.11.2074

[15]. Allison DB, Downey M, Atkinson RL, et al. Obesity as a disease: a white paper on evidence and arguments commissioned by the Council of the Obesity Society. *Obesity (Silver Spring)*. 2008;16(6):1161-1177. doi:10.1038/oby.2008.231

[16]. Nguyen NT, Nguyen X-MT, Lane J, Wang P. Relationship between obesity and diabetes in a US adult population: findings from the National Health and Nutrition Examination Survey, 1999-2006. *Obes Surg*. 2011;21(3):351-355. doi:10.1007/s11695-010-0335-4

[17]. Onuoha FM, Ebirim CC, Ajonuma BC, Alabi NT, Eseigbe P, Okezue OS. Correlation between central obesity and blood pressure in an adult Nigerian population. *J Insul Resist Vol 1, No 1 (2016)DO - 104102/jir.v1i116* . Published online December 3, 2016. https://insulinresistance.org/index.php/jir/article/view/16/35

[18]. Saad S, Latif M. Correlation between Obesity and Coronary Heart Disease Risk among Saudi Subjects at Madinah Region. *Epidemiol*. 2017;7:298. doi:doi: 10.4172/2161-1165.1000298

[19]. Brown J, Ligibel J. *The Relationship between Obesity and Cancer*.; 2016. https://www.acc.org/latest-in-cardiology/articles/2016/10/06/10/05/the-relationship-between-obesity-and-cancer

[20]. Ghilotti F, Bellocco R, Ye W, Adami H-O, Trolle Lagerros Y. Obesity and risk of infections: results from men and women in the Swedish National March Cohort. *Int J Epidemiol*. 2019;48(6):1783-1794. doi:10.1093/ije/dyz129

[21]. Huttunen R, Syrjänen J. Obesity and the risk and outcome of infection. *Int J Obes (Lond)*. 2013;37(3):333-340. doi:10.1038/ijo.2012.62

[22]. Karlsson EA, Beck MA. The burden of obesity on infectious disease. *Exp Biol Med (Maywood)*. 2010;235(12):1412-1424. doi:10.1258/ebm.2010.010227

[23]. Sattar N, McInnes IB, McMurray JJV. Obesity Is a Risk Factor for Severe COVID-19 Infection: Multiple potential mechanisms. *Circulation*. 2020;142:4-6. doi:10.1161/CIRCULATIONAHA.120.047659

[24]. Apovian CM. The Clinical and Economic Consequences of Obesity. 2010;19(11):219-228.

[25]. Schneider P, Popkin B, Shekar M, Dayton JE, Block C, Okamura KS. *Health and Economic Impacts of Overweight/Obesity*. The World Bank; 2020. doi:doi:10.1596/978-1-4648-1491-4_ch3

[26]. Lozano R, Naghavi M, Foreman K, et al. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*. 2012;380(9859):2095-2128. doi:10.1016/S0140-6736(12)61728-0

[27]. Wikipedia. University of Uyo. Published 2020. Accessed August 18, 2020. en.m.wikipedia.org/wiki/University_of_Uyo

[28]. World health organisation. *Waist Circumference and Waist-Hip Ratio: Report of a WHO Expert Consultation, Geneva, 8-11 December 2008*.; 2011.

[29]. Kayode OO, Alabi QK. Food consumption patterns, physical activity and overweight and obesity among undergraduates of a private university in Nigeria. *Clin Nutr Exp*. 2020;31:28-34. doi:https://doi.org/10.1016/j.yclnex.2020.01.001

[30]. Ogunlade O, Abiola A. Pattern and Prevalence of Underweight, Overweight and Obesity Among Young Adult Nigerians. *Am J Biomed Life Sci*. 2015;3. doi:10.11648/j.ajbls.20150302.11

[31]. Chukwuonye II, Chuku A, Onyeonoro UU, et al. Prevalence of abdominal obesity in Abia State, Nigeria: results of a population-based house-to-house survey. *Diabetes Metab Syndr Obes*. 2013;6:285-291. doi:10.2147/DMSO.S43545

[32]. Mogre V, Nyaba R, Aleyira S, Sam NB. Demographic, dietary and physical activity predictors of general and abdominal obesity among university students: a cross-sectional study. *Springerplus*. 2015;4(1):226. doi:10.1186/s40064-015-0999-2
[33]. Holdsworth M, Gartner A, Landais E, Maire B, Delpeuch F. Perceptions of healthy and desirable body size in urban Senegalese women. *Int J Obes Relat Metab Disord J Int Assoc Study Obes*. 2004;28(12):1561-1568. doi:10.1038/sj.ijo.0802739
[34]. Opara DC. *Fundamentals of Public Health Nutrition*. 1st ed. Heritage Digi-Link Int'l; 2019.
[35]. Akarolo-Anthony SN, Willett WC, Spiegelman D, Adebamowo CA. Obesity epidemic has emerged among Nigerians. *BMC Public Health*. 2014;14(1):455. doi:10.1186/1471-2458-14-455
[36]. World health organisation. *Obesity - Preventing and Managing the Global Epidemic: Report of a World Health Organisation Consultation on Obesity*.; 1998.
[37]. Wareham N, Vansluijs E, Ekelund U. Physical activity and obesity prevention: a review of current evidence. *Proc Nutr Soc*. 2005;64:229-247.
[38]. Opara DC, Motilewa O. Nutritional knowledge, physical activity and eating behaviour of adolescents in public secondary schools in Uyo; implications for chronic disease prevention. *World J Biomed Res*. 2014;2(2):52-63.
[39]. Strong KA, Parks SL, Anderson E, Winett R, Davy BM. Weight Gain Prevention: Identifying Theory-Based Targets for Health Behavior Change in Young Adults. *J Am Diet Assoc*. 2008;108(10):1708-1715.e3. doi:https://doi.org/10.1016/j.jada.2008.07.007
[40]. Cluskey M, Grobe D. College Weight Gain and Behavior Transitions: Male and Female Differences. *J Am Diet Assoc*. 2009;109(2):325-329. doi:https://doi.org/10.1016/j.jada.2008.10.045
[41]. Wengreen HJ, Moncur C. Change in diet, physical activity, and body weight among young- adults during the transition from high school to college. *Nutr J*. 2009;8:32.
[42]. Mushtaq MU, Gull S, Mushtaq K, Shahid U, Shad MA, Akram J. Dietary behaviors, physical activity and sedentary lifestyle associated with overweight and obesity, and their socio-demographic correlates, among Pakistani primary school children. *Int J Behav Nutr Phys Act*. 2011;8(1):130. doi:10.1186/1479-5868-8-130
[43]. Mitchell JA, Mattocks C, Ness AR, et al. Sedentary behavior and obesity in a large cohort of children. *Obesity (Silver Spring)*. 2009;17(8):1596-1602. doi:10.1038/oby.2009.42
[44]. Suliga E, Cieśla E, Rębak D, Kozieł D, Głuszek S. Relationship Between Sitting Time, Physical Activity, and Metabolic Syndrome Among Adults Depending on Body Mass Index (BMI). *Med Sci Monit*. 2018;24:7633-7645. doi:10.12659/MSM.907582
[45]. Beccuti G, Pannain S. Sleep and obesity. *Curr Opin Clin Nutr Metab Care*. 2011;14(4):402-412. doi:10.1097/MCO.0b013e3283479109
[46]. Bahreynian M, Qorbani M, Khaniabadi BM, et al. Association between Obesity and Parental Weight Status in Children and Adolescents. *J Clin Res Pediatr Endocrinol*. 2017;9(2):111-117. doi:10.4274/jcrpe.3790
[47]. Eternod CG, Borja M, Delan D, Williams J, Fewtrell M, Wells J. Disentagling the associations between parental BMI and offspring body composition using four-component model. *Am J Hum Biol*. 2016;28:524-533.
[48]. Temelkova-Kurktschiev T, Stefanov T. Lifestyle and genetics in obesity and type 2 diabetes. *Exp Clin Endocrinol Diabetes*. 2012;120(1):1-6.
[49]. Kakeshita I, Almeida S. Relationship between body mass index and self-perception among university students. *rev saude publica*. 2006;40:497-504.

Dr. Dominica Opara, et. al. "Factors Associated with Overweight and Obesity Among Tertiary Education Students in Uyo, South-South Nigeria.*" IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(9), 2020, pp. 43-53.