

Health Rating, Obesity and Hypertension Among University Students in Nigeria by Gender and Ethnicity

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Abstract: Background: There is evidence that students rating of health, obesity and hypertension are significantly related to gender, culture and ethnicity. Although, previous studies have suggested the need for regional and interregional comparison of health inequalities, however, literature indicated gaps in knowledge with regard to these variables. **AIMs:** This study explored health awareness, obesity and hypertension among university students in Nigeria by gender and ethnicity. **Method:** The study was cross sectional. Full time university students were recruited from six universities within the major three ethnic groups in Nigeria. Data collection was with an anonymous questionnaire. 1549 responses were valid, while 563 responses were rejected for missing data especially gender and ethnicity. The variables examined were, health awareness (general health, keeping eye on your health, seen a general practitioner (GP) recently, regular medication) obesity and hypertension. Descriptive statistics and chi-square tests were conducted. **Results:** Irrespective of ethnicity, more females than males saw their GP and had more regular medications. Further examination of the data, suggested that more Hausa students had seen their GP. Hausa females and Igbo males reported regular medications than other groups, while the Yoruba ethnic group saw their GP less frequently. More males were overweight or obese than females. More Yoruba males and Hausa females were overweight or obese. The study also indicated that over 90% of students reported normal blood pressure, and both by gender and ethnicity, there was no significant differences in both systolic and diastolic blood pressure. **Conclusion:** The findings indicated that the health status of female students in the sample was poorer than those of male students; with female students from the Hausa ethnic group, demonstrating the worst possible health outcome.

Keywords: Mental Health, Cognitive Health, Health Status, Gender Health Inequality, Ethnic Health Inequality, Health Evaluation, Health Evidence

1. Introduction

Despite evidence of poor health and prevalence of risky health behaviours, literature indicates that university students are the most under-researched group, with regard to their health and lifestyle patterns [1]. Moreover, university students represent a major segment of the young adult population [2]. They typically enter a dynamic transitional

period of new independence from their parents that is characterized by rapid, interrelated changes in body, mind and social relationships [3], [4]. In addition, they experience a new environment that generally involves increased workload and stress, altered patterns of life, which are significant contributors of unhealthy lifestyles and its associated health status [5].

There is evidence that majority of university students are minimally engaged in health promoting behaviours and

exhibit behavioural health risk, such as tobacco use, alcohol and drug abuse, unhealthy diet and sedentary habits which impacts on their health status [6]. More so, health risk associated diseases such as depression, psychosomatic complaints are also common among university students [7]. To better understand health awareness, obesity and hypertension among university students in Nigeria, a cross sectional survey was undertaken, which to our knowledge is the first of its kind in Nigeria. Inter-cultural comparative studies on student's health awareness, obesity and hypertension will contribute to the improvement of health of university student's, especially in developing countries where there is paucity of research, among the students population.

2. Background of the Study

Nigeria is the most populous country in sub-Sahara Africa with an estimated area of 923,773 km² [8], [9], comprising of 36 states and a population of 152 million people. Based on natural landscape, Nigeria is divided into three regions namely: Northern region, Western region and Eastern region, by the intersection of the River Niger and the River Benue before terminating into the Gulf of Guinea [10], Figure 1. The geographical location of the Federal Republic of Nigeria is on the Gulf of Guinea in the West Africa. It is between Benin in the west and Cameroon in the east, Chad in the north east and Niger in the north-west.



Figure 1. Map of Nigeria showing the three regions by the intersection of the Niger River and Benue River. Available at: <http://mans.com> [Date of accessed 20th July, 2014].

The diversity of climates observed in Nigeria are aridity in the north, tropical in the centre, and equatorial in the south, with a maximum temperature above 32 degrees Celsius in the north. The annual rainfall is more in the south 2000 millimetres than in the north 500-700 millimeters [9]. Therefore, the northern region is exposed to a prolonged heat, prolonged drought, and dry seasons, this harsh environmental conditions is expected to affect growing of crops, vegetation, and grazing of animals, sources of domestic water and sanitation and farming among others. Consequently, it is assumed that the environmental conditions will affect both the physical health and psychological health of Nigerians living in the northern region, differently from those living in the other two regions [10]. However, no comparative cultural study exists in Nigeria that examines the health and lifestyle differences of the three regions, by gender across any selected population group. In addition, Nigeria is multi-ethnic, organized into three major ethnic groups that included Igbo in the east, Yoruba in the west and Hausa/Fulani in the north [11], [12].

The current study also focused on gender differences in health status and lifestyle behaviours. The female gender in Nigeria has been subjected to various degrees of discrimination, isolation, intimidation and stigmatization in comparison to their male counterparts [13], and this may have a detrimental effects on mental and physical health. For instance, the first question people usually ask with regard to a new-born child in Nigeria is: "Is it a boy or a girl?" [14]. Such a question carries a great deal of significance for the child's entire life. A study of this nature for the first time will provide evidence of health inequality by gender which may draw the attention of stake holders for urgent redress.

Why the Study Is on University Students in Nigeria

Measuring the health status of university students in Nigeria is important to ascertaining health intervention effectiveness, monitoring progress, and as a critical step in measuring the health of the general population. Moreover, in Nigeria, the population of young adults in the university are significant about (8.1%) of the total age group (15-64) that constitute about (54.9%) of the total population of Nigeria

[8]. These are young adults, and the attitude and lifestyle behaviours of university students are not only important for them, but also relevant to policies concerning health. In addition, students are young, and there is evidence that risky lifestyle at an early age can reflect the health of the society they are going to live in the coming years [15], [16], and university years may present a unique opportunity to develop healthy lifestyle behaviours in a particular manner. Also, Nigeria is a developing economy and in recent times have been designated the largest economy in Africa [17], [9], consequently, she will require a large percentage of healthy intellectuals who will contribute to the development of Nigeria. Furthermore, students are future leaders and potential policy makers, their health and wellbeing need to be guided at this most important phase of their development, and equipped with the right knowledge to be able to distinguish between healthy and unhealthy lifestyles [16], [18]. However, for several reasons, this study was centered on university students in Nigeria. Literature review indicated few studies on the health status and lifestyles behaviors of university students in Nigeria, although none of this studies was based on the cultural differences among the three ethnic groups. However, while these studies have provided valuable data about university student's health issues, most of these studies have considerable limitations that necessitated further studies. Some of these limitations are:

Convenience sample: Most studies on students in Nigeria are based on convenience sample [19], [20]. In this case, the researcher might select participants based on those that are easily available and by virtue of their easy accessibility to him. In other words, it have been noted that if the method used to select the sample is not random, there is the probability that human judgment will affect the selection process, making some members of the population more likely to be selected than others [21], [22]. When a study is based on such a bias, [22] maintained that *"the findings may be valuable, but the problem with convenience sampling strategy is that it is impossible to generalize."* Consequently, there is a need to repeat studies that are not based on a nationally, randomly selected probability sample, that can be generalized to the students population in Nigeria. Moreover, studies are conducted from sample taken from a single university, that special care should be taken not to generalize the findings of such a study to other students population that are not similar in nature. The current study is based on a nationally representative sample among university students in Nigeria.

Sample size: Literature shows that most previous studies on university students' population in Nigeria employed small sample size [23], [19]. Sample size is important because it is related to effect size; which is the ability of a test to detect the probability level at which result outcomes are said to be statistically significant. It is also related to the power of a test, which the ability of a test is to detected even the smallest effect size, [24], [25], and large sample size increases power [26]. The current study is based on a very large sample ($n = 1549$) of students from six different universities from the

three main regions in Nigeria.

Non-validated instruments: Most of the previous studies employed measurements that were specially designed for their particular study. Because such measures have not been generally validated in other student's sample, it becomes difficult to compare results from such studies with others. **Cultural comparative studies:** None of the studies in Nigeria examined regional differences with regard to student's rating of health status. Most of the studies are based on a single region with no investigation of interaction for inter or intra ethnic effect [7], [19], [20]. The need for inter-cultural studies has been emphasized based on the reported differences in health across ethnic groups [27]. However, despite the above limitations, there is enough evidence to show that university-aged students have a high risk of making unhealthy lifestyle choices that could affect their health and wellbeing. In the context to fulfill the goal of university education, promoting health and wellbeing of students means promoting effective learning and human development [3], [28].

Similarly, [29], postulated that efforts to improve school performance that ignored the student's health and wellbeing are ill conceived, similar to health improvement efforts that ignored health education. The purpose of the present study was to examine the prevalence of social support, body image perception and depressive symptoms, among university students in Nigeria, by gender and ethnicity. Despite evidence of poor health and prevalence of risky health behaviours, literature indicates that university students are the most under-researched group, with regard to their health and lifestyle patterns [1]. To better understand the prevalence of health rating, obesity and hypertension among university students in Nigeria, by gender and ethnicity. A cross-sectional and cross cultural study of university students in Nigeria was undertaken, which to our knowledge is the first of its kind in Nigeria. Inter-cultural comparative studies on student's rating of health status will contribute to the improvement of health of university students, especially in developing countries where there is paucity of research, among the students population.

3. Main Body

3.1. Health Rating

The rating of health based on (e.g. health awareness, general health, keeping eye on health, seen a general practitioner and regular medication). On gender, the studies of [30], [28], found that more female than male scored high on health awareness and more female reported their health as excellent. In contrast, [3], in a study among students selected from Eastern European countries found that (8.7%) of students reported their health as excellent (35.8%) very good (45.6%) good (8.9%) and fair, while (1%) of the students rated their health as poor. The study also indicated that male students rated their health better than female students did. In addition students that reported more than two visits to a

doctor rated their health lower than those who visited their doctors less than two times in six months. However, [30], argued that the observed differences in the rating of life satisfaction and self-rated health by gender and age is influenced by how people understand and interpret ratings of self-rated health and that a complex set of perceptions contribute especially in predominantly healthy samples such as university students. Similarly, [30], argued that it might be possible that self-rated health has a different meaning in the student young age group than in older people, an argument supported by [3]. Additionally [30], postulated that health awareness might be particularly limited in young men compared with women who maintain good contact with health care service and professionals.

3.2. Body Mass Index (BMI)

Body mass index (BMI) was defined as the weight in kilograms divided by the square of the height in meters kg/m^2 [17]. It was classified into four different categories: Normal weight, BMI (25-29.99 kg/m^2), underweight ($<18.5 \text{ kg/m}^2$), overweight (25.0 - 29.9 kg/m^2) and obesity (BMI $>30 \text{ kg/m}^2$). Overweight and obesity are important determinants of health and has been associated with adverse metabolic changes such as increased blood pressure, unfavorable cholesterol levels, hypertriglyceridemia, increased resistance to insulin, greater prevalence of metabolic syndromes [31], [32]. Similarly, some heart diseases, stroke, type 2 diabetes mellitus and many forms of cancer (e.g. liver, stomach) are also associated with overweight and obesity [17]. The rising prevalence of obesity is a worldwide problem. Obesity is believed to be due to excess body fat deposition, caused by an imbalance between energy intake and energy expenditure [32].

This balance between energy output and energy input can be affected by many factors like biological factors, lifestyle factors, socioeconomic factors, and demographic factors [32], [33]. Why the biological and genetic causes of obesity are beyond the scope of the current study, on the other hand, the lifestyle factors, socioeconomic factors demographic factors and psychological factors are examined below. The non-biological causes of obesity are related to food intake and physical inactivity [34], [35]. Food intake can be affected by many factors, including the price, portion size, taste, variety, and accessibility of foods. The method by which the food is prepared is also important. There are also strong cultural influences on the types of food consumed with some societies abstaining from particular types of food or only eating food if it has been prepared in a specific manner. A diet that is high in calories, lacking in fruits and vegetables, full of fast food, contributes to weight gain [17]. Modern diet of developed and developing nations has been found to contain more fat and considerably less fibre than the recommended levels [31].

For instance, a study in Nigeria by [36], showed that fat constituted (38%) of the total energy intake compared to a recommended level of less than (30%) whilst fibre intake

was 8.6g/1000 kcal per day compared to a recommended intake of 14g/1000 kcal. More so, there is evidence that food containing saturated fat results in greater weight gain compared to food containing unsaturated fatty acid [33], [32], [36]. Evidence show that modern life in addition to western culture brought with it more food with high caloric density and better taste, while new technology has made life easier and less active which resulted in a worldwide epidemic of obesity and its associated disorders [32]. Due to lifestyle changes and modernization, overweight and obesity are on the increase in Nigeria. Similarly, [19], examined the prevalence of obesity among undergraduates students ($n = 620$; males, $n = 200$; females, $n = 420$) in a university in Eastern Nigeria. The result showed overall, (16.9%) of the students reported overweight, while over (20%) reported different categories of obesity.

The study recommended that the increase of student's obesity in Nigeria is related to poor and unhealthy dietary choices. However, the study recommended for more studies that will include students from several universities in a larger sample. There is evidence that sedentary lifestyle and inactivity are one of the major causes of obesity and overweight [32]. In inactivity, a person takes in more calorie every day and burn little. Studies have revealed that inactive people may spend long hours watching television, browsing internets, eating snacks and sitting long hours in cars or sleeping long hours daily [32], [36]. These unhealthy behaviours are becoming a common routine among university students. In Nigeria, [19], found that (40%) of students who participated in their study reported not engaging in physical activity, giving reasons of excessive academic work. Consequently, the obesity prevalence in Nigeria ranges from (8% - 22%) causing public health problems [35]. However, [35], recommended for more research on the factors that are associated with students overweight and obesity in Nigeria.

In addition, Studies have shown that BMI is significantly higher among low socio-economic than middle and high socio-economic groups [37] with lower socio-economic status (SES) being associated with accelerated weight gain during adulthood [32]. There is evidence that the effect of socioeconomic status (SES) on the prevalence of obesity may be mediated by low income which will limit the availability of the more healthy options [37]. However, this finding is contradictory. In a study in Eastern Nigeria by [36], they found that the prevalence of obesity has a direct relationship with income status. According to them, this relationship arises through greater ability of the rich to afford better and excess amount of food, and been better educated with tertiary education, they tend to have sedentary jobs (in office) and stay longer in cars. While the poor walk to their farms, and actively do their farm work and walk back home, due to lack of vehicles and therefore engaging more in physical activity than the rich do.

On the contrary, similar studies in eastern Nigeria by [19], found that SES was inversely related to obesity and overweight- that people in the low socioeconomic class had a

higher prevalence of obesity and overweight. However, furthermore, there is indication that gender is associated with obesity. However, these findings are controversial. For example, [19], found that female students have higher prevalence of obesity than male student's does in a study among university students in Nigeria. According to [19] the gender differences in obesity may be attributed to the fact that female students have a higher risk of physical inactivity, and about 1.7 times higher chances of relapsing into physical inactivity than the male students. On the contrary, [3] in a study that examined the relationship between perceived body weight and body mass index among students selected from seven European countries, found that more male students reported both overweight and obesity compared to female students. However, they called for more studies among the university, to investigate the gender differences in student's body mass index. Similarly, cultural differences in obesity have been noted in other population groups especially among the elderly [17]. However, very few studies examined the effect of body weight perception among the university students population, especially in Nigeria.

However, there is evidence that psychological status (e.g. stress and depression) can influence eating habits, because most people eat in response to negative emotions [3], [32]. There is evidence that stress not only increases consumption of food, but also shifts consumption toward high caloric foods that are normally avoided [31]. Similarly, depression has been reported to promote over - eating that can lead to increased fat accumulation and overweight [38], [39]. More studies was recommended to examine the association of psychological health with body weight [32].

3.3. Hypertension

Hypertension is the elevation of systolic blood pressure (SBP) ≥ 140 mmHg, and diastolic blood pressure (DSB) ≥ 90 mmHg [17], [40]. The worldwide prevalence of hypertension affects more than one billion individuals with approximately 7.1 million deaths attributed to hypertension per year [17]. According to the [17] the suboptimal blood pressure >115 mmHg, is responsible for 62% of cerebra-vascular disease and 49% of ischemic heart diseases (IHDs) with no sex differences. However, the large percentage of people afflicted with hypertension has been attributed to inadequate health education and health promotion campaigns. Evidence showed that approximately (30%) of adults are unaware of their hypertension, while greater than (40%) of individuals with hypertension are not on treatment, and two-thirds of hypertensive patients are not being controlled to BP levels $< 140/90$ mmHg [17]. The prevalence of hypertension in Nigeria compares unfavorably with those of other African countries in the sub-Sahara.

For example, the overall prevalence of hypertension in Nigeria was reported to be (18.4%) compared with a prevalence of (10.35%) for Ethiopia, (14.30%) for Cameroun, (10.5%) for Tanzanian, and (10.5%) in Democratic Republic of Congo [36]. However, despite all

evidence of the risk associated with hypertension, and its epidemics in Nigeria, still studies that examined the factors that associated with hypertension among the university students population are still very scarce. There is evidence that adoption of healthy lifestyles by all persons is critical for the prevention of high blood pressure and is an indispensable part of the management of those with hypertension [17], [41]. Lifestyle modification reduces BP, prevent or delay the incidence of hypertension, enhance antihypertensive drug efficacy, and decreases cardiovascular risk [17]. There is evidence that physical activity reduces both systolic and diastolic blood pressure. Physical activity was reported to mediate the reduction of blood pressure in both those who are overweight and in those who are normal weight [17].

However, earlier studies did not agree on the postulated mechanism by which physical activity acts on blood pressure [42], [43]. However, another possible source of hypertension among university students is stress. There is sufficient evidence to prove that students are prone to different stressors [44], [45], and research evidence indicated a possible association between stress and hypertension [43].

For example, an earlier study by [42], among a convenience sample of ($n=150$) university students in the United States of America showed that while students DBP was associated with challenges and stressors, the SBP was associated with chronic illness and chronic stress. However, this finding is contrary to the findings of a more recent study reported by [46]. In his study, Hughes [46] found that only SBP was associated with student's stress, while DBP was not. However, Hughes called for more studies that will investigate how hypertension is related to students stress. On the other hand, gender has being implicated in students' hypertension although only few studies examined student's blood pressure by gender [42], [46], [41].

Most the studies indicated that more male students reported higher raised blood pressure than female students did. For example, [47], examined blood pressure pattern of students in a university in the Eastern Nigeria, ($n=464$). The result showed the mean SBP as 115 ± 13 mmHg, with female students having a mean SBP of 111 mmHg against the male students mean SBP of 117 mmHg. However, the study argued that the BMI among the male student's compared to their female counterparts might be responsible for the raised SBP among the male students. However, a study among traders in Nigeria by [48] hypertension was more prevalent among females than males. [47], recommended for more studies on raised blood pressure among students population, to establish the gender differences.

4. Research Methods and Measurements

4.1. Consent and Confidentiality

A letter for approval was presented by hand directly to each Vice Chancellor (VC) of the participating universities in Nigeria. The letter contained the required information concerning the research: title, objectives and the data

collection techniques. The letter also explained that the participants consent would be sought before administering the questionnaire, and that their confidentiality will be assured by employing a self-anonymous questionnaire, which does not ask participants name, address or any other form of identification. The letter also explained that the participants have a right to withdraw from the study at any time without any legal implication. The same information was passed to students before data collection with the questionnaire.

4.2. Sampling Strategy and Sample Size

This is a cross sectional survey, with students selected from the three major ethnic groups/regions in Nigeria, across all the three university categories (federal, state, and private universities). A questionnaire was sent to 2500 male and female university students in Nigeria during a class lecture and 2112 participants completed and returned their questionnaire, a total of 318 potential participants did not return their questionnaire, while 563 responses were judged to be invalid due to missing of important data (e.g. gender and or ethnicity) which was the basic criteria for the data analysis. 1549 respondents provided all the required data correctly. The overall participation was about 84.5%.

4.3. Justification of the Sample Size

With regard to sample size, [49] argued that “The decision about sample size is not a straightforward one: it depends on a number of considerations and there is no one definitive answer.” Conversely, [50] provided the guideline with regard to sample size. According to Robson, the larger the sample size, the lower the likely error in generalizing and the more variability there is in the population, the larger the sample size needed. He argued further, that the type of analysis you are going to do, have repercussions on sample size, as does the number of categories into which you will be subdividing the data.

More so, He argued further, that common techniques and

analysis such as chi-square require certain minimum cell frequencies and therefore, this reinforces the need to consider what one is going to do with the data in terms of analysis [50]. On the other hand, Field (2009) observed that the reliability of factor analysis is dependent on sample size, and that the rule is to suggest that a researcher has at least 10-15 participants per variable. However, [25] noted that the use of up to 300 participants is a good sample size, 100 is poor sample size whereas the use of up to 1000 participants is excellent. It is therefore considered that the use of 1549 participants in the current study was adequate for all the analysis conducted.

4.4. Multistage Sampling Strategy

4.4.1. Sampling of Universities

There are three categories of universities in Nigeria namely: Federal Universities, State Universities and Private Universities. To achieve a national student's representative sample, this study sampled students from each of these three university categories. To our knowledge, this is the first time that students are sampled from the three university categories in Nigeria, in a comparative study. The researcher approached the office of the Federal Ministry of Education in Nigeria and obtained a comprehensive list of all the registered higher education institutions in Nigeria.

There are 102 registered universities in Nigeria according to the National University Commission [51], comprising the three different university categories (Federal, State and Private) within the three main geopolitical zones in Nigeria Northern (Hausa) Southern (Yoruba) and Eastern (Igbo) that constitute the Federal Republic of Nigeria [52]. The universities were then stratified into three categories, and all the universities in each category were named, numbered, and put in a different bag. Then the researcher randomly selected two universities each from each of the three university categories. The overall result yielded six universities see Table 1 below.

Table 1. Sampled universities and courses of study.

University categories	Federal Universities	State Universities	Private Universities
Sampled Universities	Obafemi Awolowo University University of Uyo	Osun State University Akwa Ibom State University	Obon State University Oduduwa State University
Sampled courses	Medicine History	Accounting Agriculture	Microbiology Economics

4.4.2. Sampling of Students Course of Study

The Dean of Students Office (DSO) in participating universities provided the researchers with a list of all courses offered to undergraduate students in each academic semester according to the course level. These courses were stratified according to categories (Federal, State and Private) universities respectively. Then in each university category, the students' courses were adjusted for similarities, by merging different but similar departments together (e.g. microbiology, agricultural sciences, chemistry, botany, zoology and physics into the department of science so that

similarities will be achieved in all university categories. Then, two courses of study with regard to their respective universities were selected at random from a box specific for each university category and the outcome of these random sampling is shown in Table 1.

4.4.3. Sampling of Academic Year

Students' year of study was stratified into (1st, 2nd, 3rd, 4th, 5th, 6th) academic years. However, the cut-off year for the study was fixed at 4th year. In other words, the researcher selected students' participants from academic years (1-4). This cut-off point enabled participants to show similar

characteristics. For example, while department of medicine has students up to years (1-6) whereas microbiology and accounting departments have students only up to years (1-4) academic program. Therefore fixing a cut-off year at (1-4) ensured identical sample with similar experiences. Other studies [45], applied similar cut-offs in students population.

4.4.4. Sampling of Participants

A total of (n =2500) students sample of both male and female was given a questionnaire. To ensure that these samples have equal representation by institution, by course of study and by the academic year of study, the following steps were taken: First, the intended sample of (n = 2500) was shared equally among the three university categories resulting in (n = 833) participants estimated from each university category (Federal, State and Private). Second, since two universities were recruited from each category, consequently, (n = 833) participants were shared into two, allowing a sample of (n = 416) from each participating university.

Third, since two disciplines were sampled from each participating university, consequently (n = 416) was shared into two, allowing (n = 208) participants to be recruited from each academic discipline. Finally, since four academic years was shortlisted (cut off point) from each academic discipline, consequently, the sample (n =208) was shared into four allowing (n = 52) students to be recruited from each academic year (e.g. 1, 2, 3, & 4). All the students in each lecture room was given a questionnaire, the recruitment exercise for each year goes on, until the estimated number of participants was met. [45], applied similar strategy in a students' population.

5. Data Collection Method and Data Analysis

5.1. Subjective Data Collection

General health: Students general health was examined through different variables, which included rating of health, health awareness, regular medication and frequent visit to a GP. Students rated their general health by providing an answer to the question: "How would you describe your general health?" Five point response scales were provided, ranging from: 1. Excellent; 2. Very good; 3. Good; 4. Fair; 5. Poor.

With regard to health awareness, students were asked: "To what extent do you keep an eye on your health?" With a four point response scale: 1. 'Not at all; 2. Not much; 3. to some extent; 4. 'Very much,' adopted from [53]. [28], used similar

wordings. A higher score indicates greater health awareness. In addition, each response score above was summed and analysed separately. In addition, with regard to seeing a GP and regular medication in the last six months, categorical options such as yes, no, seldom was provided. Similar items were used by [40], [3], [28], (2006), used similar wordings. Usually, a higher score are indicative of better-perceived health.

5.2. Objective Data Collection

Objective information was obtained for the measurement of obesity and blood pressure. Participants body weight and height was measured in the calculation of BMI. In addition participants' systolic and diastolic blood pressure, were also measured for possible hypertension. Body mass index BMI in kg/m^2 was calculated as weight in kilograms divided by the square of height in meters [17]. Participants BMI was grouped into four categories based on the internationally recommended BMI cut off-points: underweight $< 18.5 \text{ kg/m}^2$, normal weight, $18.5 \text{ n } 24.9 \text{ kg/m}^2$, overweight, $25.0 - 29.9 \text{ kg/m}^2$, obesity $\geq 30.0 \text{ kg/m}^2$. Similar cut off- points were employed in the study of university students by [3], [53], [23]. On the other hand, Participants' blood pressure was measured from the readings of systolic and diastolic blood pressure in mmHg. Based on international recommended cut-off points, four categories of systolic and diastolic BP was created: Normal hypertension; SBP of 120mmHg-139mmHg, mild hypertension; SBP of 140mmHg-159mmHg, moderate hypertension; SBP of 160mmHg-179mmHg, severe hypertension; SBP $> 180\text{mmHg}$ [54]. Normal diastolic; DBP of 85mmHg- 89mmHg, mild diastolic; DBP of 90mmHg-99mmHg, moderate diastolic; DBP of 100mmHg-109mmHg, severe diastolic; DBP $\geq 110\text{mmHg}$ [54]. However, for the analysis, students were graded as not hypertensive if the blood pressure group was between 120- 139mmHg/85-89mmHg, or hypotensive if the BP was between 140-159mmHg/90-99mmHg

5.3. Statistical Data Analysis for the Present Study

Students 'responses to the questions in the present study were transferred to the SPSS statistical package, 20.0 versions for data analysis. All responses where sex and ethnicity were not indicated were automatically excluded from the analysis. To answer the research questions and achieve the research objectives, two separate tests were conducted: Descriptive statistics was conducted to provide information on frequency and percentages. On the other hands, Chi square test was employed to explore the relationship between categorical variables.

6. Results

Table 2. Frequency and percentage (%) of health awareness indicators by sex and ethnicity.

Variable	Sample(total)	Female	Male	P/PHI	Hausa	Igbo	Yoruba	P/PHI
General health								0.013*/.112
Excellent	520(34)	268(31)	252(36)		192(36)	176(32)	153(32)	

Variable	Sample(total)	Female	Male	P/PHI	Hausa	Igbo	Yoruba	P/PHI
Very good	523(34)	298(35)	225(35)	0.342/.054	157(30)	196(36)	170(36)	
Good	411(27)	230(29)	118(2)		147(28)	127(23)	137(29)	
Fair/poor	95(5)	49(5)	38(4)		34(6)	43(9)	17(3)	
Eye on your health				0.011/.055				
Not at all	1(3)	29(3)	12(2)		13(3)	10(1)	18(4)	0.012*/.103
Not much	313(20)	151(18)	162(23)		108(20)	114(22)	91(19)	
To some extend	660(43)	362(43)	298(43)		233(44)	203(38)	224(47)	
Very much	532(34)	306(36)	226(32)		176(33)	213(39)	144(30)	
Seen a GP recently								
No	67(50)	492(60)	445(63)		173(36)			
Yes	782(50)	354(40)	256(37)	0.003*/.054	295(56)	339(62)	303(64)	0.020*/.071
On regular medication								
No	937(61)	492(58)	445(63)	0.033*/.054	295(56)	339(62)	303(64)	0.020*/.071
Yes	610(39)	354(42)	254(37)		234(44)	204(38)	173(36)	

P indicates P- value, while PHI indicates effect size

Table 2 indicated the prevalence of general health, keeping eye on health, seen GP and regular medication by gender and ethnicity. Examining the poor health category indicated that

more students from Igbo ethnic group reported their health to be either poor or fair when compared with Hausa and Yoruba ethnic groups.

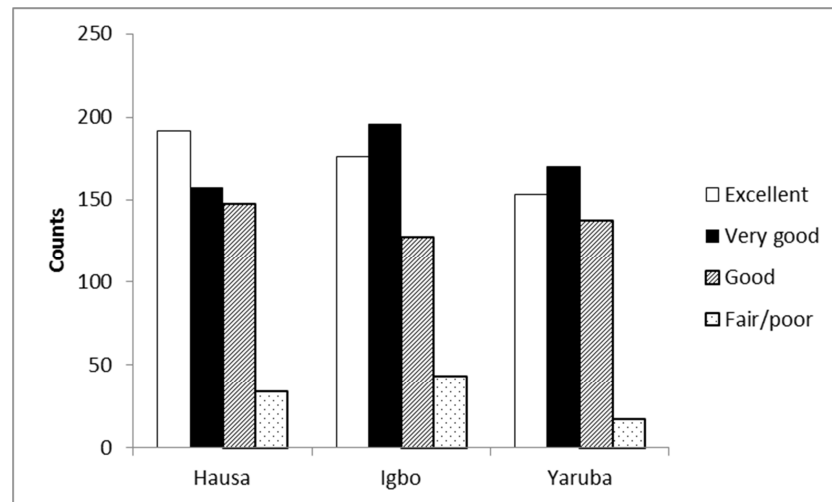


Figure 2. Frequency of reporting general health categories by ethnic groups.

After combining, the positive health categories such as (excellent, very good and good) the result shows that students from Igbo ethnic group reported better health compared to Hausa and Yoruba ethnic groups, where Yoruba reported least in this category. The differences in health categories are presented graphically in (Figure 2) for better understanding. The graph also indicated that the Yoruba ethnic group reported the least poor health (fair or poor) compared to other ethnic groups. On keeping an eye on health, the overall sample showed that about (97%) of the sample reported keeping an eye on their health in either not much, to some extent, and the very much categories (Table 2). When Chi-square analysis was conducted by gender, the result showed significant association between keeping an eye on one's health and being a male or female, although the effect size is not much ($\phi = .055$). The result indicated that more female students indicated watching their health more constantly than male students did. Similarly, when the analysis was conducted by region, there was a significant association between keeping an eye on one's health and his/her region of origin, with more Igbo students reported watching their

health than Hausa and Yoruba.

With regard to having seen a GP in the last six months (Table 2) the result showed that in the overall sample, half of the students reported seen their GP within such duration. However, when the analysis was conducted by gender, the result showed significant association between seeing a GP and gender with more female students than male reported seeing their GP within the last six months. When the analysis was conducted by region, the result showed a significant association between seeing a GP and the students' ethnic origin, with more Hausa students reported seeing their GP more constantly than Igbo or Yoruba, although with a medium effect size (.054). With regard to regular medication among the overall sample, the result showed that one-third of the sample reported being on regular medications as against more than two-third of the sample that are not on regular medications (Table 2). With regard to gender the result showed a significant gender differences with more female students reported 'yes' to taking regular medications in the last six months (41.8%) compared to (36.5%) male students that reported the same.

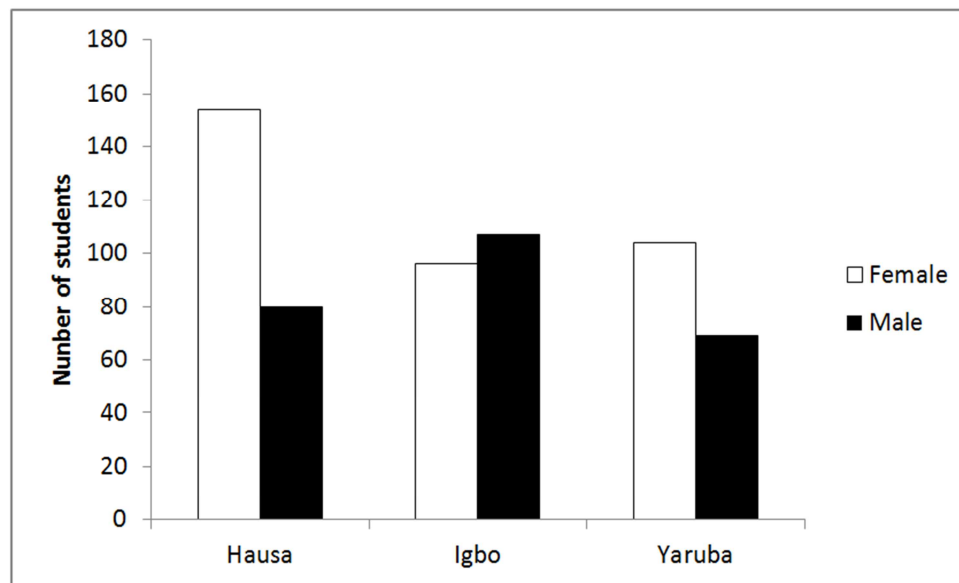


Figure 3. Differences of regular medication by sex and ethnicity.

However, when regular medication was examined by region/ethnicity, the result showed significant associations, where students from Hausa ethnic group reported the highest intake of medication compared to students from other ethnic groups. Female students from the Hausa ethnic group reported the highest intake of medication, while the Igbo females reported the least intake of medication. Among male students, the Igbo males reported the highest intake of medication, while the Yoruba males reported the least on regular medication. The frequency of students on regular medication by gender and region is presented graphically in Figure 3. While Hausa indicated the highest frequency of regular medication, the Igbo ethnic group

reported frequency of regular medication more than the Yoruba ethnic group. On the other hand, students from the Yoruba ethnic group are the least on the frequency of regular medication. However, the size of the differences among the ethnic groups was far more ($r = .071$) compared to the effect size of gender differences ($r = .054$). Consequently, with regard to general health and health indicators, students from the Yoruba ethnic group indicated the worst general health and are the least (in keeping an eye on their health; in seeing GP and in taking regular medication) these can be seen in Table 2 and in Figures 2 and Figure 3.

Table 3. Frequency and percentage (%) of obesity and hypertension by sex and ethnicity.

Variable	Sample(total)	Female	Male	P/PHI	Hausa	Igbo	Yoruba	P/PHI
Body mass index (kg/m ²)								
Underweight <18.5	151(10)	99(12)	52(7)	0.001*/.113	41(8)	56(10)	54(12)	0.001*/.126
Normal weight 18.5-24.9	769(50)	443(52)	326(47)		277(52)	276(50)	216(44)	
Overweight 25.0-29.9	388(25)	194(23)	194(28)		153(29)	125(24)	110(24)	
Obesity > 30.8	242(15)	112(13)	129(18)		59(11)	86(16)	97(20)	
Systolic BP in mmHg								
Normal BP, 120-139	1400(90)	775(91)	625(89)	0.174/.047	480(91)	491(90)	430(90)	0.174/.047
Diastolic BP in mmHg								
Normal BP, 85-89	1493(91)	816(96)	677(97)	0.238/-.043	502(95)	530(98)	462(97)	0.057/.077

P indicates P- value, while PHI indicates effect size

With regard to students' body mass index (BMI), the overall sample shows (40%) are either overweight or obesity and less than (10%) is underweight (Table 3). However, when the analysis was conducted by gender, the result indicated significant association between gender with different BMI categories with more male students reporting overweight and obesity compared to female students. However, while more male students reported overweight and obesity among the Igbo and the Yoruba ethnic groups, more females students reported overweight and obesity only

among the Hausa ethnic group.

This analysis is presented graphically in (Figure 4). It shows that more students from the Hausa ethnic group reported overweight and obesity than Igbo and Yoruba ethnic groups. However, Increasing overweight and obesity among female students in Hausa ethnic group is of public health concern due to severe health consequences.

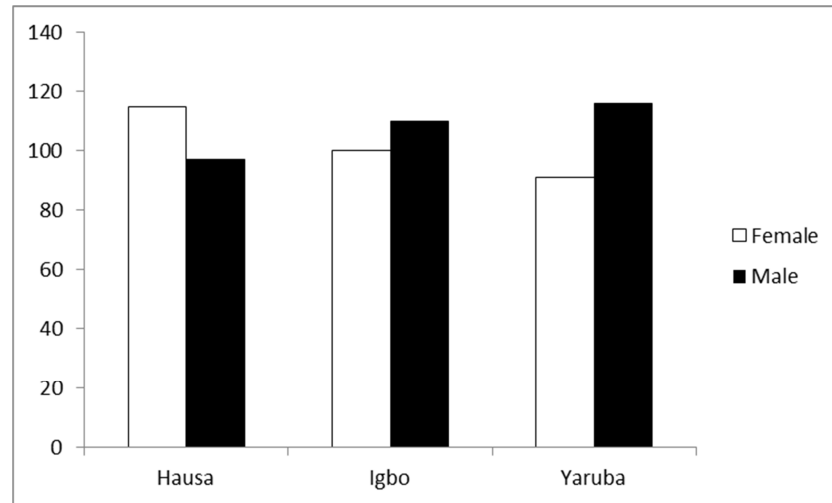


Figure 4. Frequency of overweight or obese by sex and ethnicity.

With regard to students' blood pressure (Table 3), the result showed that more than (90%) of the sample are within the normal range of Systolic blood pressure (120 mmHg- 139 mmHg). This is very interesting especially when it shows that similar result was found in both gender and region. For example when the analysis was conducted by gender, the Chi-square test indicated no significant association between students blood pressure and their gender ($P = 0.174$), with more than (90%) of both male and female students under the normal blood pressure categories. On the other hand, only less than (10%) of the participants are within the range of both mild and moderate hypertension no severe blood pressure was reported. When the students blood pressure was analysed by regions/ethnic groups, the result showed no significant associations between students ethnic groups and their blood pressure. In other words, the measured blood pressures of students are within the same range across all the ethnic groups and across the four different blood pressure categories.

7. Discussion of the Findings

Health awareness

In the current study, students' health awareness was measured with the parameters: 'keeping an eye on your health', 'seeing a GP', taking 'regular medication,' and rating of 'general health.' The result of the tests indicated an interesting outcome. For example, the same proportion of students who reported their health to be either, excellent, very good and good, are the same proportion that reported keeping an eye on their health, as either 'not much', 'to some extent', and 'very much' (Table 2). Further analysis of the results showed that within the same sample of ($n = 1549$) students, 50% of the sample reported currently 'seeing their GP', while another 39% of the sample reported being on 'regular medication'. These findings may require further investigation. These findings can only be explained on the basis that students who reported keeping an eye on their

health (e.g. by attending screen tests for BP, diabetes, HIV, and counseling services), may wrongly perceive these services as an indication of good health. Similarly, it may also be possible for students who are seeing their GP more frequently, and taking regular medications to see themselves equally as being healthy.

On the other hand, the main effects for sex indicated that more female students reported monitoring their health than male students including being on regular medication (Table 2, Figure 3). However, there are several reasons within the findings of this study, which may support more female students than male seeing their GP and for being on regular medication. For example, other studies have indicated that generally women usually report poor health status than men especially psychological health and mental health problems have been reported as one of the commonest reasons why students go see their GP and the reason for taking regular medications such as anti-depressants or psychotic drugs [7], [54] Other studies such as [30], [28] also found that more female students than males reported seeing their GP and taking regular medications. Consequently, [30] postulated that it might be possible that health awareness may be limited in young men compared with women who always maintain good contact with health care providers. On the other hand, the current study disagreed with the findings of [3], [28] that found gender differences in health rating. [28] found that more male students rated their health better than females. On the contrary, [3] in a study among students in Egypt found that a higher percentage of female students (86%) compared to (77%) of male students rated their health as excellent/very good. In the current study, there was no significant difference between male and female students in the rating of their general health, with $P = 0.342$ (Table 2).

However, in rating general health for the present analysis, three positive health indicators such as excellent, very good and good health were all combined together, whereas in the study by [3] they combined only excellent and very good health for their rating, which might be responsible for the

difference results between the two studies. Moreover, [56] postulated that gender differences among university students health are a consequence of different structural contexts for gender (social support, income availability), lifestyle (exercise, drug use, diets, smoking), psychosocial factors (stress, life satisfaction and psychological resources). In addition, [56] noted that women's health are more influenced by structural and psychosocial factors such as stress and sense of coherence, while men's health was more affected by health behaviours such as drinking and physical activity. In addition, violence and conflict may have contributed to the general outcome of females' poor health, since they produce fear, anxiety, and general insecurity, which may have affected female students more than males. There is a need to employ mixed methods in a future study that will investigate these variables among university students in Nigeria. The present study is the first to recruit large sample of students ($n=1549$) across the three main ethnic groups in Nigeria and the first to examine students health in Nigeria on the basis of interaction effects, in addition to simple main effects for sex and ethnic. Therefore, more cultural studies of this nature need to be available so that comparisons of findings will be possible.

8. Conclusion

This study focused on the prevalence of health indicators such as health awareness, obesity and hypertension by sex and ethnicity in Nigeria. The uniqueness of the present study is that, for the first time, students data were analyzed based on gender and ethnicity. Consequently, literature evidence indicates that the findings from this study have not been presented in Nigeria, which makes comparison with previous studies difficult. However, the multi-ethnic and multicultural composition of Nigeria, demands an understanding of how ethnicity interacts with sex to determine health inequality in Nigeria, especially among university students, for the first time. The result of the study indicated that health inequality exists in Nigeria between male and female students and most important, these differences exist, between ethnic groups and within the same ethnic group. These findings are unique as it suggests that a linear intervention plan for students in Nigeria will not be effective unless it is based on specific targeted groups.

Cover Letter

This study was the first to suggest that the health status of Nigerian university students is dependent on gender and ethnicity. This study for the first time indicated that the health of female students within the Hausa ethnic group was the poorest compared to other ethnic groups.

The public health important for this paper is that health intervention for university students in Nigeria should not be generalized- but should be based on providing the health need for a specific group, such as gender or ethnicity. More so, the fundamental message from this paper is that the main determinants of health among university students in Nigeria

are dependent more on ethnicity (cultural differences) than on gender.

Contributors

Dr. Dr. Agwu M. E., originated the study, collected data, performed the analysis and led the writing. Dr. S. B. Drapper, contributed immensely on the SPSS analysis and the interpretation of the results, while Prof. M. D. S. Croix, Dr. Regina, Egimot-Nwadiaro, and Mrs. Chizoba Roseline Onuoha contributed to the editing of the final draft.

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