Prevalence of Underweight, Overweight and Obesity among Undergraduate Students of the University of Nigeria, Nsukka Campus

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Abstract

This study investigated the prevalence of underweight, overweight and obesity among a sample of 300 undergraduates of the University of Nigeria Nsukka, aged 16-29 years, using questionnaire and anthropometry. The questionnaire was analysed using descriptive statistics and the students' body mass index computed from anthropometric data was compared with the standards. Sixteen per cent of the students were overweight, 8.7% underweight and 2% obese. About 14% underweight students had monthly pocket money of < ₦5000 ($31.25), while 20.51% of the overweight received ₦6000 – ₦15000 per month; 61.2% cooked their meals and 47.0% ate twice a day. Among other factors, money/hunger/type of meal (31.51%) influenced meal choice of the students. About 65% of normal weight students did not perform physical exercises other than walking to lectures. Some students had poor feeding pattern, skipped meals and had insufficient physical exercise in terms of frequency and duration. There is need to re-introduce the University student cafeteria and physical exercise facilities.

Key words: Underweight, Overweight, Obesity, University Undergraduates

Introduction

Body weight is a reflection of one's nutritional and health status. Normal or average body weight in a population is used as an index of healthy living (Che, 2002). A normal body weight is appropriate for the maintenance of good health. Body weight is usually composed of fat, muscles, bones, fluids and organs (Oner, 2004) and varies from person to person depending on age, sex, height, physical activity level, food intake, body frame and heredity (Townsend,1994). Body mass index (BMI) is an index of weight-for-

height commonly used by WHO to classify underweight, overweight and obesity. It is defined as weight in kilogram (kg) divided by the square of the height in meter (m) (WHO, 2004).

The National Institute of Health indicated that a person is considered underweight when the weight is below the average weight-for-height of a reference population (National Institute of Diabetes and Digestive Kidneys, 2009) or when the body mass index is less than $18.5kgm^2$ (WHO, 2004). The consequences of underweight include amenorrhea in women (Wilson, 1994); poor physical stamina and weak immune system (Robert, 2007); anaemia and hair loss and insidious osteoporosis (Cher, 2002). The primary cause of underweight is inadequate food intake and or disease (Vatansever, 2004). Other causes of underweight are excessive physical exercise (Tate, Jeffery and Sherwood, 2007), use of stimulants, smoking, excessive alcohol consumption (Flegal and Troiano, 1995) and suppressing appetite (Chiolero and Paccaud, 2008).

Overweight is a weight in excess of the average weight-for-height for a given sex and age (Aykroyd, 2001) or a body mass index greater than $25kgm^2$ but less than $30kgm^2$ (WHO, 2004). Obesity is accumulation of body fat within the body that is adverse to health and affects life expectancy (Haslam and James, 2005). Obesity is body mass index greater than $30kgm^2.$ The health consequences of overweight and obesity are summarized as type II diabetes, cancer, cardiovascular diseases and non-alcoholic fatty liver disease, osteoarthritis, obstructive sleep apnea and social stigmatization (Bray, 2004). Others include high blood pressure, high blood cholesterol and triglyceride levels and type II diabetes (Grundy2004). These health complications are either directly caused by overweight and obesity due to poor diet and sedentary lifestyle (Bray, 2004). The primary cause of overweight is excess food intake and very little physical exercise. Like overweight, obesity occurs as a result of excess ingestion of calories, when energy intake exceeds energy expenditure (Robert, 2007). Research has showed that nutrition transition from traditional low fat, high fibre diets to those high in animal fat and refined carbohydrates and low in fibre predispose one to overweight and obesity (Okonkwo, 2009). Some metabolic disorders can also lead to obesity (Strum, 2007).

A study on the prevalence of adulthood underweight, overweight and obesity in Malawi showed that there were more underweight (20%) males than females (11%); more obese (37.14%) and overweight (43.9%) females than males (10.5%

and 12.9%, respectively) (Msamati and Igbigbi, 2000). Another study in Jos, Nigeria had a similar result (Puepet, Zoakah and Chuhwak, 2002). These results indicate that overweight and obesity have become a public health issue in developing countries.

The age range of undergraduates in Nigeria is 17-30 years. They are therefore young adults and the future work force of the nation. The nutritional status of these young people is vital because of the direct impact on their performance in school and in labour market (ACC/SCN, 2002). The food habit of undergraduates is characterised by skipping of meals, reduced or avoidance of certain nutritious foods and or refusal to eat. There is high consumption of caloric foods, alcohol and cigarette. Alcoholism and smoking have been observed to affect appetite negatively. In addition, alcohol consumption is known to depress the absorption of some nutrients (FAO, 2009). Undergraduates in Nigeria have structured lifestyle that is adapted to stressful school programme and this might have effect on their nutritional status. In University of Nigeria, Nsukka campus there is no University managed cafeteria, where nutritionally adequate meals is planned, prepared and served to the students.

Purpose of the study

The main purpose of the study was to assess the prevalence of underweight, overweight and obesity among the undergraduate students of the University of Nigeria, Nsukka campus. Specifically the study sought to:
- assess the weight and height of the students
- calculate the body mass index of the students and compare the values with WHO reference standard
- determine the meal pattern of the students
- assess the physical exercise pattern of the students

Methodology

Design and Area of study: This was a cross sectional study was carried out in University of Nigeria, Nsukka campus in Enugu state. The University has nine faculties of learning in Nsukka campus. Some students reside within the campus hostels and some rent room(s) off-campus. Students buy foods from restaurants on and off-campus and some prepare their meals. The food crops in Nsukka are yam (*Dioscorea spp*), cocoyam (*Colocasia esculenta*), maize (*Zea mays*), cassava (*Manihot esculenta*), bambara groundnut (*Voandzeia subterranean*), pigeon pea (*Cajanus cajan*), beans (*Vigna spp*), rice (*Oryza sativa*) plantain (*Musa spp*),

palm oil (*Eloeis guinensis*) and a wide range of fruits and vegetables.

Population for the study: The population of the study was made up of seven hundred and forty-two (7042) students in 13 departments in 5 out of 9 faculties that were in Nsukka campus of the University.

Sample for the study: Three hundred (300) female and male students aged 16-29 years were selected by stratified random sampling from five out of nine faculties in the campus. The nine faculties and their departments were listed in alphabetical order and stratified into odd and even numbers. The odd numbered faculties and departments were selected giving a total of 5 faculties and 13 departments with seven thousand and forty-two (7042) students. The sample size of 300 (purposively chosen) was disproportionately stratified into faculties to give 60 sub samples (30 of each sex from each selected faculty). This procedure was used to select students from the selected departments and levels of students within each department. Students in their penultimate year were not selected. The rationale and procedure of the study were fully explained to the selected students. Those who agreed to participate in the study were given consent forms to sign.

Instrument for data collection: Questionnaire and anthropometric measurements (weight and height) were used to collect the data. The questionnaire was self -administered after validation by the lecturers in the Department of Home Science, Nutrition and Dietetics, University of Nigeria Nsukka. The questionnaire elicited information on the socio-economic status, meal and exercise patterns of the students. Each student was weighed standing erect with Camry bathroom scale of 120kg capacity with minimum clothing, no shoes and jewelleries. Measurement was taken to the nearest 0.1 kg. The height of each subject was measured with a taped height rod calibrated in centimetres (cm). Each subject stood erect on the base of the height rod without shoes, both feet together, arms at the sides and head held comfortably erect. The height was taken to the nearest 0.1 cm. The weight and height measurements were used to calculate the body mass index (BMI) of the students using this formula: BMI = Weight (kg) divided by Height^2 (m^2).

Method of data analysis: The data from the questionnaire was analysed using Statistical Package for Social Sciences (SPSS) version 14. The results were presented as frequencies, means and percentages. The BMI values of the students were

categorized according to WHO weight classification (WHO, 2004).

Findings
- The result of this study revealed the following:
- Majority of the students studied had normal weight
- A fraction were overweight, there were more overweight students than underweight ones
- Overweight was observed more among students who had ₦6,000 – ₦10,000 pocket money per month than those who had ₦11,000 and above while underweight was more in those who had less than ₦5,000
- A good percentage of the students cooked their meals
- The choice of meal was mostly influenced by money available, hunger and type of meal
- The frequency and duration of physical exercise of the students were below recommendation.

Table 1: Body mass index distribution of the students classified according to WHO standards

WHO BMI	classification	Frequency	Percentage (%)
<18.5kg/m2	Underweight	26	8.7
18.5 – 24.99kg/m2	Normal weight	220	73.3
25.0 – 29.99kg/m2	Overweight	48	16.0
≥30.0kg/m2	Obesity	6	2.0
Total		**300**	**100**

The BMI classification of the students in Table 1 showed that more than half (73.3%) had normal weight, 16% and 8% were overweight and obese, respectively while 8.7% was underweight.

Table 2: Weight category according to pocket money (₦) received per month

	Pocket money (₦) per month			
Weight category	<5000	6000-10000	11000-15000	>15000
Underweight	15 (14.85)	6 (5.13)	3 (6.52)	2 (5.56)
Normal weight	72 (71.29)	87 (74.36)	33 (71.74)	28 (77.77)
Overweight	12 (11.88)	24 (20.51)	8 (17.39)	4 (11.11)
Obesity	2 (1.98)	0 (0.0)	2 (4.35)	2 (5.56)
Total	**101 (100)**	**117 (100)**	**46 (100)**	**36 (100)**

Figures in parenthesis are percentages (%)

Table 2 shows the weight category of the students according to their monthly pocket money. Majority (39.0%) of the students received ₦6000 – ₦10000 per month as pocket money, 33% got less than ₦5000 and 12% more than ₦15000 per month. Out of those who received less than ₦5000, 71.29% had normal weight, 14.85% were underweight, 11.88% overweight and less than 2% obese. In the greater than ₦15000 category, 77.77% had normal weight, 11.11% overweight and 5.56% obese. Conversely, in the ₦6000 – ₦10000 group, there was no obese student, 20.51% were however overweight but majority were within the normal weight.

Table 3: Weight category respondents according to money spent on food per month

| Weight category | Money spent on food per month (₦) | | | |
	1000-2000	2100-4000	4100-6000	>6000
Underweight	8 (11.76)	11 (8.80)	5 (8.93)	2 (3.92)
Normal weight	50 (73 53)	93 (74.40)	37 (66.07)	40 (78.43)
Overweight	10 (14.71)	17 (13.60)	14 (25.00)	7 (13.73)
Obesity	0 (0.00)	4 (3.20)	0 (0.00)	2 (3.92)
Total	**68 (100)**	**125 (100)**	**56 (100)**	**51 (100)**

Figures in parenthesis are percentages (%)

The money spent by the students on food ranged from ₦1000 - > ₦6000 per month as shown in Table 3. About 125 (41.67%) students spent between ₦2100 and ₦4000 on food out of which 74.40% were of normal weight, 8.80% underweight, 13.60% overweight and 3.20% obese. In the group that spent over ₦6000 on food, there were less underweight (3.92%) students and more overweight (13.73%), obese (3.92%) and normal weight (78.43%) students.

Table 4: Weight category of students according to eating pattern

Eating pattern	Weight category				
Source of meal	Under weight	Normal weight	Over- weight	Obesity	Total
Cooked own food	19 (10.38)	131 (71.58)	31 (16.94)	2 (1.10)	183(61.20)
Bought from restaurants	3 (6.52)	37 (80.43)	6 (13.04)	0 (0.00)	46 (15.38)
Both sources	3 (4.29)	52 (74.29)	11 (15.71)	4 (5.71)	70 (23.41)
Total	**25 (8.36)**	**220 (73.58)**	**48 (16.05)**	**6 (2.01)**	**299 (100)**
Frequency of meal/day					
Once	3 (27.27)	8 (72.73)	0 (0.00)	0 (0.00)	11 (3.67)

Twice	14 (9.93)	103 (73.05)	22 (15.60)	2 (1.42)	141 (47.0)
Three times	8 (7.08)	81 (71.68)	22 (19.47)	2 (1.77)	113 (37.67)
More than three times	1 (2.86)	28 (80.00)	4 (11.43)	2 (5.71)	35 (11.66)
Total	**26 (8.67)**	**220 (73.33)**	**48 (16.00)**	**6 (2.00)**	**300 (100)**
Meal choice determinant					
Time available	2 (10.53)	13 (68.41)	2 (10.53)	2 (10.53)	19 (6.51)
Money available	1 (3.23)	24 (77.41)	6 (19.35)	0 (0.00)	31 (10.62)
Health status	0 (0.00)	6 (66.67)	3 (33.33)	0 (0.00)	9 (3.08)
Hunger/type of food	7 (8.97)	55 (70.51)	14 (17.95)	2 (2.56)	78 (26.71)
Time/hunger/type of food	7 (11.86)	42 (71.19)	9 (15.25)	1 (1.69)	59 (20.21)
Money/hunger/type of food	8 (8.70)	72 (78.26)	11 (11.96)	1 (1.08)	92 (31.51)
Health/hunger/type of food	0 (0.00)	4 (100.00)	0 (0.00)	0 (0.00)	4 (1.36)
Total	**25 (8.56**	**216 (73.97**	**45 (15.41**	**6 (2.05)**	**292 (100)**

Figures in parenthesis are percentages (%)

Table 4 showed that 183 (61.20%) of the students cooked their food, out of which less than 2% were obese, 16.94% overweight and 10.38% underweight. The rest (71.58%) had normal weight. Buying food from restaurants was not popular with the students, 46 (15.38%) used this source while 23.41% partly cooked and partly purchased food. There were less underweight (4.29%) and more obese (5.71%) students among the group that used both sources. Majority (47%) of the students ate twice daily. Others ate three times, more than three times and once daily (37.67%, 11.66% and 3.67%, respectively). In the group that ate once none of the student was overweight or obese, however, 27.27% were underweight. In the more than three times daily group, 5.71% were obese. Many factors determined what the students ate. Prominent among these were money/hunger/type of food (31.5%), hunger/type of food (26.71%) and time/hunger/type of food (20.21%). Amongst the students who choose their meals based on available money, hunger and type of food, 78.26% had normal weight.

Table 5: Weight category of respondents according to frequency and during of physical exercise

Physical exercise	Weight category				
	Under weight	Normal weight	Over weight	Obesity	Total
Frequency					
No exercise	7 (20.00)	23 (65.71)	5 (14.29)	0 (0.00)	35 (11.67)
Once daily	7 (8.97)	59 (75.64)	11 (14.10)	1 (1.30)	78 (26.00)
Twice daily	5 (17.24)	20 (68.97)	4 (13.79)	0 (0.00)	29 (9.67)
Once a week	1 (1.32)	57 (75.00)	15 (19.74)	3(3.94)	76 (25.33)
More than once a week	6 (7.32)	61 (74.39)	13 (15.85)	2 (2.44)	82 (27.33)
Total	**26 (8.67)**	**220 (73.33)**	**48 (16.00)**	**6 (2.00)**	**300 (100)**
Duration					
30 minutes	9 (8.91)	76 (75.25)	15 (14.85)	1 (0.99)	101 (38.11)
>30 - <60 minutes	3 (5.26)	39 (68.42)	12 (21.05)	3 (5.26)	57 (21.51)
60 – <90 minutes	4 (15.00)	20 (74.10)	2 (7.40)	1 (3.70)	27 (10.19)
90 – 120 minutes	2 (8.00)	16 (64.00)	7 (28.00)	0 (0.00)	25(9.43)
Above 120 minutes	1 (1.00)	46 (83.63)	7 (12.73)	1 (1.82)	55 (20.75)
Total	**19 (7.17)**	**197 (74.34)**	**43 (16.23)**	**6 (2.26)**	**265 (100)**

Figures in parenthesis are percentages (%)

Table 5 showed that about 11% of the respondents did not perform any form of physical exercise, the rest performed physical exercises, once daily (26%), twice daily (9.67%), once per week (25.33%) or more than once a week (27.33%). None of the students who did not perform physical exercise was obese, 14.29% were however overweight while 65.71% had normal weight. The least percentage (1.32%) of underweight students was found among those who exercised once a week. The duration of the exercises performed by the students ranged from 30 minutes to more than 120 minutes. Most (38.11%) of the students exercised for 30 minutes, this was followed by those who exercised for more than 30 minutes but less than 60 minutes. More overweight was observed in those whose exercise lasted for >30 - <60 minutes and 90 – 120 minutes (21.05% and 28.0%, respectively). Underweight on the other hand was more in the 60 – 90 minutes group (12%).

Discussion of Findings
Majority of the students fell within the normal weight category according to WHO BMI classification. However, the fraction, who were overweight were more than the underweight. This could be a signal of the emergence of overweight as a public health

problem among the student population. More female students were underweight than their male counterpart, probably because they were watching their weight and figure. This is not an uncommon feature in female adolescents and young adults. The finding is however, in contrast to the reports of some studies (Puepet *et al.*, 2002 and Msamati *et al.*, (2007). The two studies showed more underweight in males than in females.

The monthly pocket money of the students to some extent had effect on their weight distribution. For example, underweight was more within the group who received less than ₦5000 per month. This result confirms that of earlier study which showed underweight among students with financial constraints (Black, Morris and Bryce, 2003). It is likely they spent less on food and therefore consumed less food. The higher percentage of overweight students among the ₦6000 - ₦10000 group than the ₦11000 - ₦15000 and above ₦15000 was rather surprising because it has been shown in developing countries, that people from high socioeconomic class had higher rate of overweight and obesity than those from lower socio-economic class (McLaren, 2007 and Desalu, Salami and Olarinoye, 2008). The reason for the discrepancy in this study could be wrong choice of food by the students in this income group.

This study also revealed that most (61.20%) of the students cooked their meals. More than half of the students in this category had normal weight but there were more overweight students than underweight and obese. About the same percentage of students were underweight (4.29%) obese (5.71%) amongst those (23.41%) that partly cooked and partly bought from restaurants. Again those who were overweight and obese in this group probably had poor dietary choices; consumed more than their requirements (Rosenheck, 2008 and Wright and Kennedy, 2004) and exercised less while the underweight had inadequate food intake Msamati *et al.*, 2007 and Black *et al.*, 2003). Some of the students skipped meals and this might have contributed to inadequate food intake and low weight observed.

The choice of meals of the students was greatly influenced by money available, hunger and the type of meal. More students in this group were overweight than underweight and obese. Although the number of students whose choice of meal was determined by availability of money was low, the overweight ones amongst this group were more than the underweight. Time and money constraints could have contributed to the consumption of snacks and junk foods which were energy dense and low in other

nutrients and consequently overweight.

The result of this study also showed that a proportion of the students population was overweight (63.48%) or obese (7.68%) even with some physical exercise. The frequency and duration of the exercises were found to be insufficient in most cases to either initiate weight loss or maintain normal body weight. According to WHO about 60% of the world population do not exercise sufficiently, hence the high prevalence of overweight and obesity (WHO, 2009). The frequency and duration of physical exercises by some of the students reported in this study fell short of the recommendation of the American Heart Association (American Heart Association, 2007). The association recommended a minimum of 30 minutes of physical exercise 5 days a week. All the same, about 12% of the students who had up to 2 hours were still overweight. This means that they might require other management procedures like reducing caloric intake. Underweight reported amongst the students who exercised could be attributed to excessive exercise. More than half of the students who did not perform any kind of exercise part from walking to lecture halls had normal weight; some were however, underweight or overweight.

Conclusion

Finance, meal choice and pattern as well as frequency and duration of physical exercise affected the BMI distribution of the students in this study. The prevalence of underweight was lower than overweight. The contributing factors to obesity were mainly poor dietary pattern and insufficient duration of physical exercises.

Recommendations

- It is pertinent that the University administration re-establishes student cafeteria where nutritionally adequate meals would be prepared and served at affordable price. This would also eliminate the time factor which made some of the students to go for 'easy-to-grab' (junk foods) or skip meals.
- There is also need for re-establishment and modernization physical exercise facilities on campus.
- The University curriculum should include courses aimed at re-orientating the students on the importance of healthy eating habits, daily exercise and the dangers of overweight/obesity.

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