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BODY MASS INDEX AND ACADEMIC PERFORMANCE OF UNDERGRADUATE UNIVERSITY STUDENTS.

U. Franz Atare[1] & Nkangude A. T[2]

Department of Physical and Health Education, University of Uyo,
Akwa Ibom State, NIGERIA.

franzatare@gmail.com

ABSTRACT

Most parents and teachers unscientifically believe that the overweight persons are sluggish, lazy and sleepy; therefore would not do well in Physical and Health Education (PHE) programme at the University. This study investigated the association of Body Mass Index (BMI) and Academic Performance of undergraduate PHE students at the University of Uyo. Actabit BMI calculator and Cumulative Grade Point Average (CGPA) scores were used to collect data from the 90 (30 males and 60 females) undergraduate students for 2011/12 academic session whose ages range from 17 - 28. Descriptive BMI analysis found 8 underweight, 42 normal weights, 11 overweight, 16 pre-obese and 13 obese. On academic performances, 9 were in 2nd class upper, 47 in 2nd class lower, 26 in 3rd class and 8 in pass categories respectively. Multivariate analyses revealed significant differences in BMI and CGPA, no significant association between body mass and academic performance ($F_{(1,89)}$ = .173; r = .04, R^2 =.002; t = .415. P .69 > .05) was observed. Therefore no basis to judge a student generally by body mass profile rather conducive learning environment (science and technology) and genetic (typology and mental) endowments would continue to influence academic performance in PHE and Sports Courses.

Keywords: BMI, Academic Performances, Undergraduate, University Students

INTRODUCTION

Ancient philosophers had posited that an individual's health is the most important asset in his or her life. Some Nigerians have not considered health maintenance a priority, not until a dysfunction intervenes. So, many people seem to take their health for granted. Globally, many are afflicted with array of diseases and disorders, arising from multifaceted causes. Among these numerous medical problems which medical science and Insurance Companies have shown great interest and concern on people is a dysfunctional body mass profile, especially the increased overweight and obesity problems on one side and underweight problems on the other side. The reason is that obese and underweight people have greater likelihood of being susceptible to premature death than those of normal (ideal) body weight (Grundy, 2004). In the United States, where medical underwriting of private health insurance is widespread, most Private Health Insurance providers use a particular Body Mass Index (BMI) as a cut-off point in order to raise insurance rates (charges) to high risk patients, thereby reducing cost of insurance coverage to all other subscribers in a normal BMI (Johanson, 2009).

Obesity has become a serious body mass profile problem today (WHO, 2004). Obesity means having too much body fats and adipocytes. It is not exactly the same as being overweight. Overweight falls into two categories - the athletic overweight, applied to trained athletes and very physically active persons doing strength developing or body building physical activities. Such are overweight due to training which enlarges muscles, promotes muscle and bone growth and allows fewer fats which are termed "essential fats". The sedentary overweight

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arises from both accumulations of essential and unessential body fats. The athletic body mass profile has little percentage of un-essential fats while the sedentary one has excessive unessential fats in the body. In both cases, the term overweight means weighing too much, and has either positive or negative health implications. Scientists have become interested in measuring body fats percentages directly or by estimation using facilities and methods to evaluate body mass, especially on the sedentary individuals. One of these methods is the use of Body Mass Index (BMI). BMI is simply a numeric measure of a person's body "thinness" or "thickness", allowing health professionals to discuss underweight and overweight problems more objectively with their patients (Flegal, Graubard, William & Gail, 2005). So, it is to assess how much an individual's body weight departs from what is normal or desirably ideal for a person of his or her height. The weight excess or deficiency may in part, be accounted for by body fats (adipose tissue) in sedentary ones, since active people do not find the overweight in them undesirable. Such active persons are the body builders who trained to beef up their muscles and bones and not fats. The BMI concept is to classify sedentary people, making it possible to project the type of body mass a person has and the health implications that may arise from such a body mass profile. The wrong impression is the thinking that BMI quantifies the amount of fats in the body. It does not directly measure Body Fat Percentage (BF %). Yet it can be done by some other formula using the BMI score (Deurenberg, Weststate & Seidell, 2007). BMI only indicates that one is thin, too thin, fat and too fat for one's body height relatively; and this has a predictive health information in which Public Health is interested, especially concerning body weight that are not normal on the International BMI classification chart.

The unnecessary or excessive fats are associated with various diseases and these have caused serious concern to many governments (Halslam & James, 2005). From various studies, findings of risk factors from excessive body weight and obesity fall into two broad categories: Those attributed to the "effects" of increased fat-mass such as osteo-arthritis, obtrusive sleep apnea, social stigmatization (Sobal & Stunkard, 1989) and those attributed to the increased number of fat-cells such as diabetes (type 2), cancer, cardiovascular diseases, non-alcoholic fatty liver diseases (Bray, 2004). Increased body fats alter the body's response to insulin, potentially leading to "insulin resistance" and creates a proinflammatory and a prothrombotic states in the human body (Shoelson, Lee & Goldine, 2006). This condition is generally termed "Metabolic Syndrome X (MetS).

OBJECTIVES OF THE STUDY

The objectives of the study were to evaluate the body mass profile of the 2011/12 academic session students in the department of physical and health education, University of Uyo and it relates to academic performance as follows:

1. To determine if there would be significant difference on BMI classification
2. To determine if there would be significant difference in students academic performance
3. To determine the relationship between body weight and academic performance.
4. To determine if BMI would significantly predict academic performance.

SIGNIFICANCE

This study will ease the unscientific belief that most parents and teachers have the overweight persons are sluggish, lazy and sleepy; therefore would not do well in Physical and Health Education (PHE) programme at the University. It will also make advocacy for conducive teaching and learning environment (science and technology) and genetic (typology and

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mental) endowments would continue to influence academic performance in PHE and Sports Courses for and other related allied disciplines.

THEORY

Scientists have become interested in measuring body fats percentages directly or by estimation using facilities and methods to evaluate body mass especially on the sedentary individuals. Underweight individuals may be stigmatized as having little to feed and classed as being poor due to their tin bodies; while obesity is stigmatized in much of the modern world, particularly in western world and in recent times in some African cultures, even though it widely perceived, wrong of course, in the past as a symbol of wealth and fertility and some parts of the world still believe so (Haslam & James, 2007). There are growing evidence that being overweight, or obese has effect in other aspects of life such as health status, job commitment and academic performance. The rise in body size mostly in developed societies among school age children makes the latter particularly pertinent.

Of the methods used in ascertaining whether an individual thin or fat is the Body Mass Index (BMI). BMI is simply a numeric measure of a person's body thinness or thickness, allowing health professional to discuss underweight and overweight problems more objectively with their patients (Flegal, Graubard, William & Gail, 2005). So, it is to assess how much an individual's body weight departs from what is normal or desirably ideal for a person of his or her height. It only indicates that a person is thin, too thin, fat and too fat for one's body height relatively and this has a predictive health information in which Public Health is interested. The World Health Organization has used the BMI as the standard for recording obesity statistics since early 1980s. It is used as a measure of underweight owing to advocacy on behalf of those suffering from eating disorders, such as anorexia nervosa and bulima nervosua which leads to chronic depression.

Previous research has revealed cognitive deficits in patients with anorexia nervosa. McDowel, Moser, Fereyhough, Bowers, Anderson and Paulsen (2003) confirmed that there is no relationship between depression and cognitive ability of this group. Thus, suggesting that alternative explanations be explored for cognitive deficits in patient with anorexia nervosa. Studies that attempt to estimate the causal effect of obesity on economic outcomes report mixed results. Of those that focus on adults, some find that weight lowers wages, at least for white females (Cawley, 2004), whilst others find no significant effects (Norton & Han, 2008). Studies that focus on child weight and their academic achievement also report conflicting findings. Some find that weight lowers test scores, though only for girls (Sabia, 2007), whilst others report no significant differences (Fletcher & Lehrer, 2008; Kaestner & Grossman, 2009).

A lot of studies have been conducted on factors that influence academic performance of students at all levels in Nigeria. Literature is scarce on the relationship of body weight on academic performance in Nigeria not to mention among undergraduate students in Physical education where it is generally believed that those with normal weight would excel more than the overweight academically. This paper examines the relationship of undergraduate weight on their academic performance in Physical and Health Education. We focus on undergraduate because it is easy to have an objective assessment of academic performance through the cumulative grade point system. Moreover, students at this age are less concern about their weight and may not likely take drastic decisions affecting their weight. The use of BMI on the students was relevant as they have all the characteristics needed for its use which included homogeneity in environment, food, racial disposition and daily physical engagement.

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It is possible to think that weight may be endogenous to academic attainment, Wingfield, Graziano, McNamara and Janicke, (2011) exploited variation in genetic make-up and concluded that Genes are randomly distributed at conception under certain assumptions thus are strictly exogenous. This implies that correlations between the genetic variant and the outcome of interest cannot be due to reverse causation, behavioural, or environmental factors, including those that occur *in utero*. They therefore use recently identified genetic markers for weight as instrumental variables to identify the causal effect of child weight on academic achievement. These markers, in contrast with others used in recent studies in the economics literature, have been shown to be associated with weight in large population samples.

DESIGN AND PROCEDURE

This study is an experimental design. Participants were from a purposive sample of 90 students, ages 17 – 28, with 60 females and 30 males. All of them are Nigerians from the South-Eastern part of the country with same climatic and dietary conditions. The A-very weighing scale (Houghton Co Ltd, London) was used for the measurement of the body weight of each subject, while Houghton Stadiometer was also used to measure the height of each subject. The figures were entered into the Actabis Body mass calculator for computation and interpretation. The cumulative grade point average (CGPA) for each student was collected from the University of Uyo result template. The template converts every examination score entered into CGPA, based on which final classifications of degree are based. The reliability coefficient of the instruments are .91, .89, .98 and .75 respectively. The data collected were arranged in line with WHO (2004) body mass classification chart, while the students' academic performance as represented by CGPA were ranked as follows.

Body Mass Index

16.00 – 18.49 Underweight (1);

18.50 – 24.00 Normal weight (2);

24.01 - 24.99 Over weight (3)

25.00 – 29. 99 Pre obese (4);

30.00 - above Obese (5).

Cumulative Grade Point Average

4.50 - 5.00 First class Honour (1);

3.50 - 4.49 Second class Honour –Upper (2)

2.40 - 3.49 Second class Honour-Lower (3);

1.50 - 2.39 Third Class (4)

1.00 - 1.49 Pass(5)

The data was analyzed with descriptive statistics, chi square, Pearson Product Moment Correlation coefficient and regression analysis at .05 alpha levels.

DATA ANALYSIS

Descriptive Statistics

The analysis of the data showed that 8 students were underweight, 42 has normal weight, 11 overweight, 16 pre obese and 13 obese (over all mean = 2.82; Std = 1.25). On academic performance, 9 students were in 2nd class upper, 47 in 2nd class lower, 26 in 3rd class, and 8 had pass (overall mean = 3.37; Std = .79).

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Table 1. Cross tabulation of Body Mass Index and Academic Performance

Academic Classification	*Body Mass Index*					*Total*	*R*
	Under Weight	*Normal*	*Over Weight*	*Pre obese*	*Obese*		
2nd class upper	0	5	1	3	0	9	
2nd class lower	5	20	7	6	9	47	
3rd class	3	15	2	4	1	26	.044
Pass	0	2	1	4	1	8	
Total	8	42	11	16	13	90	

BMI $X^2_{(4)} = 41.89$. $P<.05$; CGPA $X^2_{(3)} = 44.67$. $P< .05$; r = .044. $P.68 > .05$

In year 1, out of 28 students 3 students (10.7%) were in mildly underweight class, 18 students (64.3%) were in normal weight class, none was overweight, 5 students (17.9%) were in pre-obese class, 2 students (7.1%) were mildly obese. In year 2, out of 19 students, 1 student was moderately underweight (5.3%), 1 student (5.3%) was mildly underweight class, 6 students (31.6%) were of normal weight class, 5 students (26.3%) were in overweight class, 6 students (31.6%) were class 1 obese. In Year 3; Out of 30 students 2 students were mildly underweight (6.7%), 21 students were of normal weight class (70%), 5 students were pre-obese (16.7%) and 2 students were class 1 obese (6.7%). In Year 4; Out of 13 Students, None was underweight, 9 students were of normal weight (69.2%), 1 student was overweight (7.7%), 1 student was pre-obese (7.7%), 1 student was class 1 obese (7.7%) and 1 student was class 2 obese (7.7%).

The result also showed that there are significant difference in the body mass of the students as the calculated chi square value of 41.89 was significant as P.00 < .05 at 4 degree of freedom. Also, the result revealed that there are significant difference in the academic performance of the students as the calculated chi square value of 44.67 was significant as P.00 < .05 at 3 degree of freedom.

Table 2. ANOVA and coefficients of Body Mass as Predictor of Academic Performance

Model	*SS*	*Df*	*MS*	*F*	*Sig*
Regression	.107	1	.107		
Residual	54.793	88	.623	.173	.679
Total	54.900	89			
	B	Std. Error	Beta	T	
Constant	3.288	.206		15.940	.679
BMI	.028	.067	.044	.415	

Further test on the model yielded no significant association between body mass and academic performance of the students as the calculated Pearson's r of .04 is not significant as P.68 >

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.05 at 12 degree of freedom. Finally, additional test was conducted to see if BMI could predict CGPA, the resulted showed no significant prediction effect of BMI on CGPA ($F_{(1,89)}$ = .173; r = .04, R^2 =.002; t = .415. P .69 > .05).

DISCUSSION OF FINDINGS

The study was for the conducted on 93 regular students of the Physical and Health Education Department of University of Uyo, in which 90 students participated. There are no comparative studies in the past years or in other Departments to compare and contrast body mass profile findings obtained. Similar studies elsewhere outside Nigeria cannot be used since they are not homogenous to our subjects. There is no known comparative study from other PHE Departments in our Nigerian Universities. Though Gilliam et al. (1979) had found girls with more BMI than boys as from 17 years and had the girls more endomorphous in somato typing. BMI did not determine body fat %, but it places individuals in the BMI chart as to the degree of fatness, over fatness, thinness and extreme thinness. But Hensley, Erort and Stillwater (1982) found that girls had more BMI as from 12 years as they get into the pubertal stage before the boys and later found that by 14 to 16 years the boys' BMI became closer to the girls' BMI. Since this study did compare age by sex interaction, it could neither support nor contrast the findings of these authors these except that in males and females in this study had no significant BMI difference and they were not of the same age group.

The important point noted in the study is that one (1) student in Year 2 was moderately underweight and needs nutritional and body building exercise programme. This will be in line with the procedure for beefing up weight as provided by Pollock and Wilmore (1990). Six (6) students were mildly underweight, and they also need to be counseled to improve their weight too, so as to avoid dropping down to severe underweight class. It was commendable that 54 students (60%) were of normal body weight class. PHE students with proper regular fitness Programme that keeps them regularly fit should be expected not to amass so much adiposity. Bucher (1979) had noted that PHE programme should not only teach health and fitness knowledge but should also enable students practise and be become models of "fitter people" worthy of emulation. Similarly, Calton (1974) stated that PHE programme that does not evaluate its students first before thinking of outsiders is inadequate in its contents. But the finding that eleven (11) students were pre-obese; six (6) were overweight; eleven (11) were mildly obese and one (1) in Year 4, were moderately obese (class 2) is a cause for concern about the health status and especially the PHE programme on the body mass profile of the students. It is interesting to note as Clarke (1971) did that PHE graduates are the epitome of fitness and health by their knowledge and morphology; that the professionals in Physical and Health Education should be known for their athletic appearance as regards posture, body built and skills. That could show that there is inadequate or no fitness programme in the Department. PHE programme for students must include regular fitness programmes like jogging, gym work-out and aerobic training monthly or bi-monthly. The All American Physical and Health Education, Recreation AAPHER Test in the United States' schools is for the fitness of all the students from the Primary Schools to the University level (Calton, 1974). At the University level no student can graduate without a pass mark in sports skills which include swimming. Similarly Britain, South Africa, Australia, France, Canada, Germany, China and Russia and other developed nations have fashioned Physical and Health Education (PHE) such that the youth and children would participate for the sake of their fitness and health.

If Fitness Programme is properly structured for the students as from Year 1, it will check obesity among the students before entering Year 2. The findings have shown that Year 2 and Year 4 students were descriptively pre-obese in their body mass profile having respectively

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obtained Mean BMI (X) of 25.8 and 25.4. Year 4 students in Physical and Health Education Programme should normally have no obese student though they are growing up. Their body weight should have dropped through regular training. By Year 4 they should look fitter than before they entered the University.

The findings of this Study that focused on Body weight and academic achievement also report conflicting findings. While it conflicts with Sabia(2007) findings that weight lowers test scores, though only for girls, it supports Fletcher & Lehrer, (2008) and Kaestner & Grossman, (2009).who found no significant differences or effects of BMI on academic performance or productivity of workers.

CONCLUSION AND RECOMMENDATIONS

Therefore, we conclude that BMI is not related to academic performance, so there is no basis to judge a student generally by body mass profile rather conducive learning environment (science and technology) and genetic (typology and mental) endowments would continue to influence academic performance in Physical and Health Education and Sports Courses. It is therefore recommended that The Physical and Health Education Department should take responsibility to provide health advice on nutritional and safe weight gain procedures to these who are underweight and weight loss procedure to those above ideal weight. Also that the study be continued longitudinally for subsequent sessions to compare trends in future in other parts of the world

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