Socio-Economic Differentials In Height, Weight And Body Mass Index Of School Adolescents In Nnewi, South-Eastern Nigeria

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Citation

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Abstract

Aim: To examine the influence of and socioeconomic indices on anthropometric parameters of student adolescents in Nnewi, South-Eastern Nigeria.Subjects and Methods: Four thousand and seventy-eight student adolescents, aged 11-18 years, participated in this study. Age and gender of the participants as well as parents' socioeconomic indices were collected. Weight and height were measured using standard procedures while BMI was calculated. Results: Male adolescents in private and public school had significant difference in their heights ($p<.05$) whereas their female counterparts had significant differences ($p<.05$) in their heights and weights. Parent's occupation significantly influenced only the height of female adolescents while there were significant influences ($p<.05$) of parent's education on only height and weight of each of male and female adolescents. Conclusion: The adolescents attending private school are taller than their counterparts in public schools. Highest educational attainment of the parents influence their height and weight whereas body mass index of adolescents are different only in female by the type of school attended and highest educational attainment whereas occupation influence only height of female adolescents.

INTRODUCTION

Adolescence is the period between puberty and adulthood. Puberty is the period in which sexual and physical characteristics mature. Physical changes in girls include increase in height and hip size while, in boys, they are increased height and shoulder width.[1] Determination of growth in adolescents requires the use of standards that show normal range and, the most important criteria for assessing growth are weight, height, and body mass index (BMI).[2] Measurements of height and weight are important in understanding growth rate in adolescents.[3] As human height has been known to vary according to genetic and nutritional status[4], measurements from populations with different genetic make ups may not be easily used to explain situations in other populations.

High levels of low height-for-age or stunted growth, on a population basis, are associated with poor socio-economic conditions and increased risk of frequent and early exposure to adverse conditions such as illness.[5] High weight-for-height has a very strong correlation with obesity as measured by adiposity.[5] The social and economic consequences of obesity may be as great as the health consequences.[6] The social and economic class of a family relates most closely to the educational level and income of head of the family or the occupation of the family members, size and quality of their home and neighbourhood or community they live in.[7] Marriage, lower level of education and income has been associated with obesity in adolescents and young adults.[6] However, persistence and emergence of income gradients suggest that disparities in weight status are only partially attributable to poverty.[8]

Many studies have been carried out on height, weight and body mass index in respect of socio-economic influence.[9-12] The findings of these studies are however conflicting. Further, most of these previous studies were not on African children and their findings may not be easily extrapolated to them. This is so in view of sharp differences in socio-cultural and genetic factors. The only accessible Nigerian study[12] was on children and only examined body mass index based on the school (private or public) they attended. This study, however, examined the influence of socioeconomic indices on height, weight, body mass index of school

adolescents in Nnewi, South-Eastern Nigeria.

METHODS

PARTICIPANTS

This study was conducted in Nnewi-North Local Government Area in Anambra state of Nigeria in 2009. There are 17 secondary schools (10 private and 7 public) in this area. A sample of 12 schools (7 private and 5 public) was drawn by stratifying the schools into private and public schools and randomly selecting schools with probability proportional to size. The sample was drawn from the list obtained from the Local Educational Authority. Participants were drawn from the selected schools and this comprised 4078 (1911 males and 2167 females) adolescents, aged 11-18 years.

Ethical approval for this study was given by the Ethics Committee of Nnamdi Azikiwe University Teaching Hospital, Nnewi. Prior to the day of data collection, written informed consent was obtained from each participant's parent/guardian, and each individual gave verbal consent to taking part. Visits to the schools were as agreed upon by the principals and teachers of the schools. At each of those visits, all the qualified students for the study who were present at the time of survey were measured. 13 research assistants conducted this survey with the researcher. These research assistants were well-trained in the principles and methods involved in both weight, and height measurements and recording of information.

Information on age and gender of the participants was collected. Height and weight were measured according to International Society for Advancement of Kinanthropometry (ISIAK) standards for anthropometric assessments[13]. Weight was measured to the nearest 0.01 decimal place using a bathroom scale (Hana, model BR9011; 120 x 0.01kg, China). Before measurement, the pointer of the scale was set at zero point. The participants were on their school sport shorts and vest, and barefooted. They stood erect on the weighing scale, looked straight ahead and relaxed. The research assistants took the readings by bending over the scale with their eyes directly over it. The readings were taken when the pointer stabilized.

Height was measured to the nearest 0.01 decimal place using a height meter (Seca, model 206, Germany). The participants were dressed as for weight measurement. The height meter was mounted on the wall and the participants stood erect, barefooted, and looked straight ahead. The measurement was taken on the meter against the vertex of the head. Body mass index of the participants were calculated from their respective height and weight using the relation= Weight/Height$^{2.}$

Information on the particpants' parents' occupational status and highest educational attainment was collected from the participants using a questionnaire. From these two variables, their respective parents' socioeconomic status was calculated. The information on father's and mother's occupational status and highest educational attainment was collected separately and an average of the two scores was finally recorded for the two variables. The occupation questionnaire was a 5-point scale: social class I (SC I) (professional), social class II (SC II) (Managerial and technical), social class III (SC III) (Skilled-Manual and Non Manual), social class IV (SC IV) (Partly skilled), and social class V (SC V) (Unskilled).[14] For the purpose of analysis, the groups were, however, merged as SC I and II (Professionals); SC III (Skilled); and SC IV and V (Unskilled).

The participants' parents' highest educational attainment was assessed on a 6-point scale questionnaire: Pre-primary (0), Primary (1), Lower secondary (2), Upper secondary (3), Post secondary non-tertiary (4), First stage of tertiary education (5), and secondary stage of tertiary education (6).[15] However, for the purpose of analysis, the groups were merged as 0 and 1 (No education/ primary level); 2, 3 and 4 (secondary level) and; 5and 6 (Tertiary level).

DATA ANALYSIS

The data from this study was summarised using descriptive statistic of mean and standard deviation while the inferential statistics of Analysis of Variance (ANOVA) were used to analyse the statistical significance of difference across gender, age, educational attainment, occupation and socioeconomic status. Where there were significant differences, a post-hoc test of Bonferroni comparison was carried out to know where there were significant differences between the mean values.

RESULTS

The mean ages of male (46.9%) and female (53.1%) student adolescents in this study were 14.85±1.86 years and 14.64±1.83 years respectively. Table 1 shows the distribution of proportions of participants at different categories of their socioeconomic Backgrounds.

Figure 1

Table 1: Distribution of Proportions of Participants at Different Categories of Socioeconomic Status of their Parents

Socioeconomic Indices	Frequency	Proportion (%)
Occupation:		
Unskilled	844	20.7
Skilled	1941	47.6
Professional	1293	31.7
Education:		
Primary	799	19.6
Secondary	2296	56.3
Tertiary	983	24.1
School:		
Public	1815	44.5
Private	2263	55.5

Figure 2

Table 2: Physical Characteristics of 1911 Male and 2167 Female Nigerian School Adolescents

	Male	Female	Overall
Height	1.60±0.11	1.59±0.07	1.60±0.09
Weight	49.06±10.48	51.82±9.51	50.56±10.06
Body Mass Index	18.95±2.40	20.41±3.13	19.74±2.91

Table 3 shows that male adolescents in private and public had no significant difference (P>0.05) in their weights and body mass index but in their heights (P<0.05). However, their female counterparts had significant differences (P<0.05) in their heights and weights but not in their body mass index (P>0.05). Overall, the results were similar to the findings in male adolescents.

Figure 3

Table 3: Comparison of Age, Height, Weight and Body Mass Index of 1911 Male and 2167 Female Nigerian School Adolescents in Public and Private Schools

Gender	Height (m)	Weight (kg)	Body mass Index (kg/m^2)
	X±S.D	X±S.D	X±S.D
Male: Private(n=983)	1.61±0.12	49.22±10.56	18.77±2.20
: Public(n=993)	1.60±0.11	48.33±10.03	18.80±2.27
P-Value	0.01*	0.06	0.91
Female: Private(n=1345)	1.60±0.07	51.54±9.09	20.16±0.98
: Public(n=871)	1.59±0.07	50.43±8.71	19.93±2.71
P-Value	0.01*	0.00**	0.06
Overall: Private(n=2263)	1.60±0.1	50.30±9.97	19.42±2.64
: Public(n=1815)	1.59±0.09	49.54±9.35	19.45±2.59
P-Value	0.00**	0.11	0.79

*=Significant, **= Very Significant

Table 4 shows that Parents' occupation had no significant influence (P>0.05) on height, weight and body mass index of male and female adolescents except for the height of the female adolescents (P<0.05). Bonferroni comparison showed that the significance influence in height actually lied between the 'unskilled' and 'skilled' adolescents. Overall the findings for height, weight and body mass index were similar to that of male adolescents (P>0.05).

Figure 4

Table 4: Comparison of Age, Height, Weight and Body Mass Index of 1911 Male and 2167 Female Nigerian School Adolescents across their Parents' Occupation

Parents' Occupation	Height (m)	Weight (kg)	BMI (kg/m^2)
	X±S.D	X±S.D	X±S.D
Male: Unskilled	1.60±0.12	48.06±10.00	18.68±2.16
Skilled	1.61±0.12	49.14±10.57	18.83±2.26
Professional	1.60±0.11	48.75±10.01	18.82±2.23
P-Value	0.25	0.20	0.50
Female: Unskilled	1.60±0.070	51.47±9.00	20.04±2.78
Skilled	1.59±0.073	50.69±8.77	20.00±2.77
Professional	1.59±0.074	50.85±8.93	20.03±2.82
P-Value	0.030*	0.302	0.97
Overall: Unskilled	1.60±0.09	49.79±9.647	19.37±2.59
Skilled	1.60±0.10	49.92±9.729	19.42±2.60
Professional	1.60±0.09	49.96±9.457	19.52±2.65
P-value	0.704	0.920	0.408

*= significant

There were significant influences (P<0.05) of parents' education on height, weight and body mass index of male and female adolescents except for the male height (P>0.05). Bonferroni comparison showed that the significant influence actually lied between the 'primary' and the 'tertiary' for male adolescents' height and weight whereas for the female, it lied between the 'primary' and the 'tertiary', and the 'secondary' and the 'tertiary' for height and weight, and between only the 'tertiary' and the 'secondary' for body mass index. Overall, the findings were similar to those of the male with Bonferoni comparison indicating significant influence across the occupation categories for height, between the 'tertiary' and the 'primary', and the 'tertiary' and 'secondary' for weight (Table 6).

Figure 5

Table 5: Comparison of Age, Height, Weight and Body Mass Index of 1911 Male and 2167 Female Nigerian School Adolescents across their Parents' Highest Educational Attainment

Parents' Education	Height (m)	Weight (kg)	BMI (kg/m^2)
	X±S.D	X±S.D	X±S.D
Male: Primary	1.61±0.113	49.40±10.09	18.79±2.06
Secondary	1.60±0.113	48.88±10.49	18.83±2.27
Tertiary	1.59±0.107	47.54±9.84	18.66±2.28
P-Value	0.01**	0.03*	0.43
Female: Primary	1.60±0.07	51.19±8.30	20.01±2.71
Secondary	1.60±0.07	51.48±9.24	20.14±2.86
Tertiary	1.58±0.07	49.57±8.37	19.78±2.71
P-Value	0.00**	0.00**	0.04*
Overall: Primary	1.61±0.10	50.19±9.38	19.33±2.44
Secondary	1.60±0.09	50.26±9.93	19.53±2.68
Tertiary	1.58±0.09	48.76±9.04	19.33±2.60
F-value	15.40	13.80	5.55
P-Value	0.00**	0.00**	0.06

* = Significant **= Very Significant

DISCUSSION

In Nigeria, there is a reasonable amount of dichotomy in attendance of private and public schools. Public schools are owned by the government and are relatively subsidised or even made free at some levels. Private schools, on the contrary, are run by individuals, missions or organisations, in most cases, for profit making. Going by these clear-cut features of these categories of schools in Nigeria, there is a natural segregation as to which school a parent can afford to send his child or ward, and this therefore boils down to the socio-economic status of the family. The outcomes of this study revealed that weight and body mass index were not significantly different between male adolescents in private and public schools. However, male adolescents in private schools were significantly taller than their counterparts in public schools. Also, female adolescents in private schools were significantly taller and heavier than their counterparts in public schools. However, there was no significant difference in their body mass index. Overall, adolescents in private schools were significantly taller than their counterparts in public schools. The significance difference in height between the two groups may be attributed to the fact that students in private schools tend to come from financially better-off and more enlightened parents who feed and take good care of their children for healthy growths. This corroborates the fact that human height has been known to vary according to genetics and nutritional status.[4]

There were no significant influence of parent's occupation on height, weight and body mass index of the adolescents in this study. The comparison of height and weight across the parent's educational status, however, showed significant influence of parents' highest education attainment on only height and weight of the adolescents. When these findings were controlled for gender, parent's occupation was found to significantly influence only the female adolescent's height. Also, only the male adolescent's height and weight were influenced by the highest educational attainment of the parent while the height, weight, and body mass index of the female were influenced the same socio-economic index. This may suggest that educational background rather than earning of the parents is a determinant of the anthropometric indices of adolescents. Higher educational background may encourage and foster careful choice of food items in a nutritionally balanced and healthful manner such that the child grows healthily and not consume excessive calories that may result in weight gain. On the other hand higher earning without adequate education can result in indiscriminate choice of food items that may take the fancy of an individual, unaware of the health implications and caloric supply of such items. This logical interpretations, however, does not hold for the finding of shorter height among adolescents with higher educational background. The factor that is possibly at play here could be the genetic make-up. According to Lai[4], human heights vary according to genetic make-up and nutritional status as opposed to superior nutritional status alone that could be fostered through a superior socioeconomic background.

Gyenis and Joubert[9] found a significant difference in heights of adolescents with different parent's occupations and educational level as well as place of birth and geographical location of the participants. They, however, found that body mass index were significantly different across the parents' educational status as opposed to across their occupational status, with appreciable difference seen at the interface between secondary and tertiary parent's educational attainment. Also, Aurelius et al[16] found that overall height, weight, and body mass index between schoolchildren whose parents were of different occupational and educational groups showed no significant difference, except for girls whose mothers were workers/farmers who were shorter, lighter, and had a lower body mass index than girls whose mothers were from upper occupational status. Harrison[17] noted that children from high socioeconomic class are taller with reduce body mass. Anyiam et al[12] found no statistically significant difference in the body mass index of the 'privileged' and the 'less privileged' healthy Nigerian schoolchildren and young adults. Stamatakis et al[10], however, found that children from manual social classes had marginally higher odds and children from higher income households had lower odds to be obese than their peers from non-manual class, and lower income households, respectively. A similar study by Gnavi et al[18] showed that the economical resources of the family influenced the prevalence of weight gain in prepuberal children.

The data from this study have shown that the adolescent with higher educational background are shorter and lighter than his counterpart with lower educational background whereas the adolescent in private school are taller and heavier than the one in public school.

CONCLUSION

The adolescents attending private school are taller than their counterparts in public schools. Highest educational

attainment of the parents influence their height and weight whereas body mass index of adolescents are different only in female by the type of school attended and highest educational attainment while occupation influence only height of female adolescents.

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