



**COMPARATIVE STUDY OF NUTRITIONAL STATUS OF ADOLESCENTS
ATTENDING PUBLIC AND PRIVATE SECONDARY SCHOOLS IN ABA, ABIA STATE,
NIGERIA.**

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ABSTRACT

Aims: The study was carried out to determine and compare the nutritional status of adolescents attending public and private secondary schools in Aba, Abia State, Nigeria. **Study Design:** A cross-sectional study was used. **Place and Duration of Study:** Aba, in Abia State, Nigeria and between March to June 2016. **Methodology:** The sample size was 600 adolescents (Male 293, female 307) aged 10 – 19 years attending Government approved Secondary Schools in Aba. Anthropometric measurements of height and weight were taken from each participant and were converted to nutritional indices (BMI-for-age and height-for-age) percentile of World Health Organization/National Center for Health statistics reference standard. A standard questionnaire was used to collect data on socioeconomic status of the adolescents' parents. **Results:** The mean nutritional indices (underweight and stunting) were found to be much lower among adolescents attending public schools as compared to those in private schools. The overall prevalence of underweight and stunting were as follows: 21%, 7% for boys in private schools and for the boys in Public schools, it was 52% and 25%. For the girls in private schools, it was 4%, 9% and for those in public school, it was 18% and 34% respectively. There was a significant difference in the height, weight and BMI-for-age of adolescents attending public and private schools in Aba ($P < 0.05$). Education and occupation, except family size of the parents have a positive significance on the nutritional status of adolescents attending public and private schools in Aba. ($P < 0.05$). **Conclusion:** The study showed poorer nutritional status among adolescents in public secondary schools than those in private schools. Hence a periodical and regular health check-up with concerted efforts towards their nutrition along with focused health education will improve the health and nutritional status of school going adolescents especially those in public secondary schools in Aba, Abia State, Nigeria.

KEYWORDS: Comparative, Study, Nutritional Status, Adolescents, Public, Private, Secondary, Schools.

INTRODUCTION

Adolescents are the best human resources and are the future generation of any country. Their nutritional needs are critical for the well being of a society. But for many years, their health has been neglected because they were considered to be less vulnerable to disease than the young children or the very old (Rao *et al*; 2003). Their health attracted global attention in the last decade only. Though the issues like Sexually Transmitted Diseases (STDs), reproductive health have been given due recognition, but limited attention has been paid to their nutritional status. Nigeria a developing country, like the other countries in that category, is experiencing changes in the dietary patterns of her people, as a result of the prevailing nutritional transition (Ejike *et al* ; 2010).

WHO (1995) defined adolescent as the period from 10–19 years of age. It is the transitional period between

childhood and adult hood. Adolescence is a significant period of human growth and maturation and is a decisive period of development because it represents the transition between life as a child, and life as an adult. During this crucial period, dietary patterns have a vital impact on lifetime nutritional status and health (Ahmad *et al*; 2009).

In Nigeria, adolescents account for approximately 30% of the total population. Adolescents constitute a group that is poorly identified in health facilities of African countries and this has led to their being grouped together with adults, and thus, a denial of the particular personalized care they deserve. Substantial rates of growth and development, combined with developmental appropriate psychosocial changes, such as an increasing need for independence and a desire to make lifestyle choices that conform to peer ideals and differ from those

of the family, place adolescents at risk for poor nutritional status. This is because biological and psychosocial growth and development are dynamic throughout adolescence, it is important that teenagers be screened for adequacy of dietary intake and nutritional status each year. Mekonnen *et al.*, (2013) enumerated the unbearable effect of malnutrition to include but are not limited to stunted growth, poor academic performance, lowered educational levels, and inability to perform job function, weakness of the immune system among others. These have been described as being the most detrimental factors responsible for poverty (Payandeh *et al.*; 2013).

According to a nutritional report published by Uthman, (2009) and UNICEF, (2013), malnutrition in developing countries has been connected to a considerable increase in the risk of morbidity and mortality. Indeed, the penalties of malnutrition are frequently expanded not only into later life but into future generations as well (Lobstein *et al.*; 2004).

Poor nutritional status during adolescence is an important determinant of health status (Deshmukh *et al.*; 2006). Short stature that results from chronic under nutrition is associated with reduced lean body mass and deficiencies in muscular strength and working capacity (WHO, 1995).

Poor nutrition among adolescents is also associated with many concurrent and future adverse health outcomes. The health and nutritional status of the children is an index of the national investment in the development of its future manpower. Therefore, comprehensive health care of this section will fulfill the health need of 1/5 population. Achievement of optimum growth during this period is of utmost importance in maintaining good health thereafter.

Thus, adolescents face series of nutritional challenges which would affect this rapid growth spurt as well as their health as adults (Afework *et al.*; 2009). The main nutritional problems affecting adolescent populations worldwide include undernutrition (in the terms of stunting and wasting), overweight, and obesity which are emerging health problems during this time (Kalhan *et al.*; 2010).

Stunting or short stature in adolescence is not only indicative of past under-nutrition during childhood, but also may be a cumulative indicator of nutritional status during adolescence. Stunting among adolescents reflect increased health risks, particularly among females who would also tend to have a small pelvis, leading possibly to obstructed labour during childbirth. Girls constitute a more vulnerable group especially in the developing countries where they are traditionally married at an early age and are exposed to greater risk of reproductive morbidity and mortality.

The diagnostic criterion for defining stunting in adolescent is a height-for-age less than the third percentile of the World Health Organization (WHO) based on the National Centre for Health Statistics (NCHS) reference data or less than -2 z – score (WHO, 1995, 2005).

Under-weight or thinness in adolescents is indicated by a Body Mass Index (BMI weight/height²) less than fifth percentile of WHO/NCHS reference data.

In Nigeria, several recent studies have investigated nutritional status of adolescents. However, there has been scarcity of studies that dealt with assessing the level of under-nutrition among adolescents from public and private schools in Aba.

Considering the fact that under-nutrition among adolescents is a major public health problem and it creates lasting effect on the growth, development and physical fitness of a person, limits school achievement and work productivity in later years, nutritional status during adolescent period becomes an important determinant of health status.

Stunting among adolescents reflect increased health risks particularly among females who would tend to have a small pelvis, leading possibly to obstructed labour during childbirth. With the increasing population of adolescents in Nigeria, more adolescents will be expected to present to the health care facilities with different illness associated with poor nutrition. Based on the above the researcher decided to assess the nutritional status of adolescents attending public and private secondary schools in Aba, Abia State, compare the anthropometric characteristics of adolescents in public and private secondary schools in Aba, determine the influence of family size on the nutritional status of the adolescents attending public and private secondary schools in Aba, determine the influence of parents occupation and educational status on the nutritional status of the adolescents attending public and private secondary schools in Aba and also the stated hypotheses were analysed.

METHODOLOGY

A cross sectional survey research design was used for the study. The study population was drawn from adolescents aged 10 – 19 years attending public and private secondary schools in Aba Metropolis, Abia State, Nigeria, which comprised of about 82,840 students.

Multi-stage sampling method was used to select the 600 respondents. In the first stage, the schools were divided into two strata, public and private secondary schools. Two government and two private secondary schools were selected using a simple random sampling method. Each of the selected schools was stratified into six classes (JSS 1, JSS 2, JSS 3, SS 1, SS 2, SS 3), most of the classes had more than one stream and a stream was

sampled using simple random sampling method. Then 25 subjects were randomly selected from each class or stream. This gave 150 adolescents from each school ($25 \times 6 = 150$) and a total of 600 adolescents from the four schools sampled. A validated and reliable ($r=0.7$) questionnaire was used to elicit information on sex, position of birth, ethnicity, age of subjects, and the socio-economic profile of their parents such as occupation, and educational attainment. Age of the subjects was validated using the school register. Height of the subjects was measured using a measuring tape and Weighing scale (Hanson Model) was used to measure the weight of subjects. Anthropometric measurements like height and weight were measured using standard technique.

Age was determined from the register of the school. The school insists on a birth certificate at the time of admission and thereafter the age is increased by one every year. Only those children who were listed in the register to be in the age group of 10 – 19 years were included in the study. Height in centimeters was marked on a wall in the school with the help of a measuring tape. All children were asked to remove their foot wear, and stand with heels together and head positioned so that the line of vision was perpendicular to the body. The measurement was taken on the wall against the vertex of the head. Height was recorded to the nearest 0.1cm.

Body weight was measured without shoes and in light clothing (uniforms), with the use of a portable bathroom scale (Hanson Model) to the nearest 0.1kg.

Measurement of Body Mass Index [BMI]: BMI of the participants were calculated from their respective height and weight using the relation: weight in (kg) divided by height in (m^2). $BMI = (kg/m^2)$ and was used to assess the nutritional status of adolescents.

Nutritional Status: Nutritional status of the adolescents was assessed through BMI-for-age [underweight] and height-for-age (stunting) according to WHO/NCHS criteria. Adolescents with BMI-for-age values $< 5^{th}$ percentiles and height-for-age $< 3^{rd}$ percentiles were classified as underweight and stunting respectively.

The data generated was analyzed using simplified statistical formulae such as mean, Standard Deviation (SD), Standard Error (SE) percentages and analysis of variance (ANOVA) was used for testing statistical significance.

All statistical analyses were performed using the Statistical Package for Social Science (SPSS, version 11) and the level of statistical significance for analysis was set at ($P < 0.05$).

RESULTS

Table 1: Nutritional status of adolescents based on anthropometric characteristics of adolescents. (BMI for age).

Age [yrs]	Normal weight				Underweight				Total of under-nutrition
	Private		Public		Private		Public		
	N = 148 Male	N = 152 Female	N = 145 Male	N = 155 Female	N = 148 Male	N = 152 Female	N = 145 Male	N = 148 Female	
	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)
10-14	77 (76.2)	94 (94)	53 (53.5)	81 (79.4)	24 (23.8)	6 (6)	46 (46.5)	20 (20.6)	96 (24.1)
15-19	40 (85.1)	52 (100)	17 (37)	46 (86)	7 (14.9)	0 (0)	29 (63.0)	7 (13.2)	43 (21.7)
TOTAL	117 (79)	146 (96)	70 (48)	127 (82)	31 (21)	6 (4)	75 (52)	28 (18)	140 (23.3)

The result in table 1 showed that male and female adolescents in public secondary schools in Aba were more underweight than those in private schools: (52%, 18% and 21%,4%) respectively. The result also revealed that younger adolescents (10-14 years) in both schools were more underweight than the older adolescents, except older male adolescents (15-19) in public schools who were more underweight than the younger adolescents (10 - 14 years) in public schools. The percentages of male adolescents who were underweight were more in males than in females.

Table 2: Nutritional status of adolescents based on anthropometric characteristics of adolescents. (Height for age)

Age [yrs]	Normal height				stunting				Total of under-nutrition
	Private		Public		Private		Public		
	N = 148 Male	N = 152 Female	N = 145 Male	N = 155 Female	N = 148 Male	N = 152 Female	N = 145 Male	N = 148 Female	
	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)
10-14	97 (96.0)	90 (90)	83 (83.8)	68 (66.7)	4 (4.0)	10 (10)	16 (16.2)	34 (33.3)	64 (5.9)

15-19	40 (85.1)	49 (94.2)	26 (56.5)	35 (66.0)	7 (14.9)	3 (5.8)	20 (43.5)	18 (34.0)	48 (24.2)
TOTAL	137 (93)	139 (91)	109 (75)	103 (66)	11 (7)	13 (9)	36 (25)	52 (34)	112 (8.67)

The result in table 2 revealed that the percentage of male and female adolescents who were stunted were more in public schools (25% and 34%) than their counterparts in private schools (7% and 9%). This shows that the nutritional status of adolescents in private schools was better than those in public schools in Aba. Also the older adolescents (15-19 years) were more stunted than the younger adolescents (10-14 years) in both schools. However, the result also revealed that females were more stunted than males. (9%,34% and 7%,25%).

Table 3: Comparison of Anthropometric characteristics of adolescents 10 – 19 years old attending private and public secondary schools in Aba Metropolis.

Gender	Height (Cm) Mean ± S.D	Weight (Kg) Mean ± S. D	BMI (kg/m ²) Mean ± S.D
Male private (n = 148)	149.78 ± 4.69	37.43 ± 4.96	16.64 ± 1.48
Public (n = 145)	146.25 ± 3.02	33.89 ± 1.96	15.71 ± 0.76
P – value	0.00000 ^x	0.0000085 ^x	0.0000056 ^x
Female Private (n = 152)	149.10 ± 6.70	41.00 ± 7.14	18.19 ± 1.96
Public (n = 155)	143.52 ± 3.38	34.56 ± 3.30	16.61 ± 1.16
P – value	0.00000 ^x	0.0000072 ^x	0.0000 ^x

^x = Significant (P < 0.05)

The result in table 3 showed that male and female adolescents in private schools were seen to have mean average height of 149.78 and 149.10 while that of the male and female adolescents in public schools were 146.25 and 143.52. Also the mean weight and mean BMI of male and female adolescents in private schools were also higher than those in public schools. This accounts for higher mean anthropometric characteristics of adolescents in private schools than those in public schools. The comparison of anthropometric characteristics of male and female adolescents attending public and private secondary schools were presented in table 3. Analysis of variance (ANOVA) test shows that male and female adolescents in private and public schools have significant differences in their height, weight, and Basal Mass Index (P<0.05).

Table 4: Distribution of adolescents attending public and private secondary schools by parents' socio-economic status.

	Public %	Private %	P-Value
Parents' educational level			
No formal education	--	--	
Primary	48.7	11.6	0.000123 ^x
Secondary	35.7	32.7	6.34
Tertiary	15.7	55.7	
Parents occupation			
Higher class job	15.3	40.7	0.00085 ^x
Middle class job	47.7	39.0	9.3
Lower class job	37	20.3	
Family size			
3 or less	41	45.3	9.43
4 – 6	50.1	48.3	9.54
7 – 9	8.3	6.3	
10 or more	--	--	

^x = Significant [P < 0.05]

The result in table 4 revealed that parents' of the adolescents in private schools had higher level of education than parents' of adolescents in public schools. Literacy rate among parents of public schools adolescents was alarmingly low. Only 15.7% had tertiary education compared to 55% of adolescents' parents in the private schools who had tertiary education. Also the percentage of parents who have higher class job is more (40.7%) in parents of adolescents

in private schools than those in public schools (15.3%). The parents of adolescents in public schools have mostly middle and lower class job. The adolescents in public schools have a bit higher family size as compared to those in private schools. Analysis of variance (ANOVA) test showed that only educational level and occupation of the parents significantly influenced the nutritional status of adolescents in public and private secondary schools in Aba ($P < 0.05$), while family size of the adolescents in both schools has no statistically significant effect on their nutrition ($P > 0.05$).

Table 5: Age, sample size, mean height, weight, and BMI of adolescents attending private secondary schools in Aba.

Age (Years)	Sex	Sample Size (N)	Height (cm) Mean	Weight (kg) Mean	BMI (kg/m ²) Mean
10 – 14	Male	101	144.28	33.34	16.05
	Female	100	145.52	37.83	17.60
15 - 19	Male	47	160.79	45.61	17.82
	Female	52	156.27	47.37	19.55

The result in table 5 showed that adolescents attending private secondary schools within the age range of 10-14 years and 101 males had a mean height of 144.28, mean weight of 33.34 and mean BMI of 16.05 while the females 100 had a mean height of 145.52, mean weight of 37.83 and mean BMI of 17.60. The age range of 15-19 years had males 47 with a mean height of 160.79, mean weight of 45.61 and mean BMI of 17.82 while the females 52 had a mean height of 156.27, mean weight of 47.37 and mean BMI of 19.55.

Table 6: Age, sample size, mean height, weight, and BMI of adolescents attending public secondary schools in Aba.

Age (Years)	Sex	Sample Size (N)	Height (cm) Mean	Weight (kg) Mean	BMI (kg/m ²) Mean
10 – 14	Male	99	140.94	30.47	15.33
	Female	102	140.06	31.85	16.12
15 - 19	Male	46	156.87	40.71	16.47
	Female	53	150.43	40.00	17.58

The result in table 6 showed that adolescents attending public secondary schools within the age range of 10-14 years and 99 males had a mean height of 140.94, mean weight of 30.47 and mean BMI of 15.33 while the females 102 had a mean height of 140.06, mean weight of 31.85 and mean BMI of 16.12. The age range of 15-19 years had males 46 with a mean height of 156.87, mean weight of 40.71 and mean BMI of 16.14 while the females 53 had a mean height of 150.27, mean weight of 40.00 and mean BMI of 17.58.

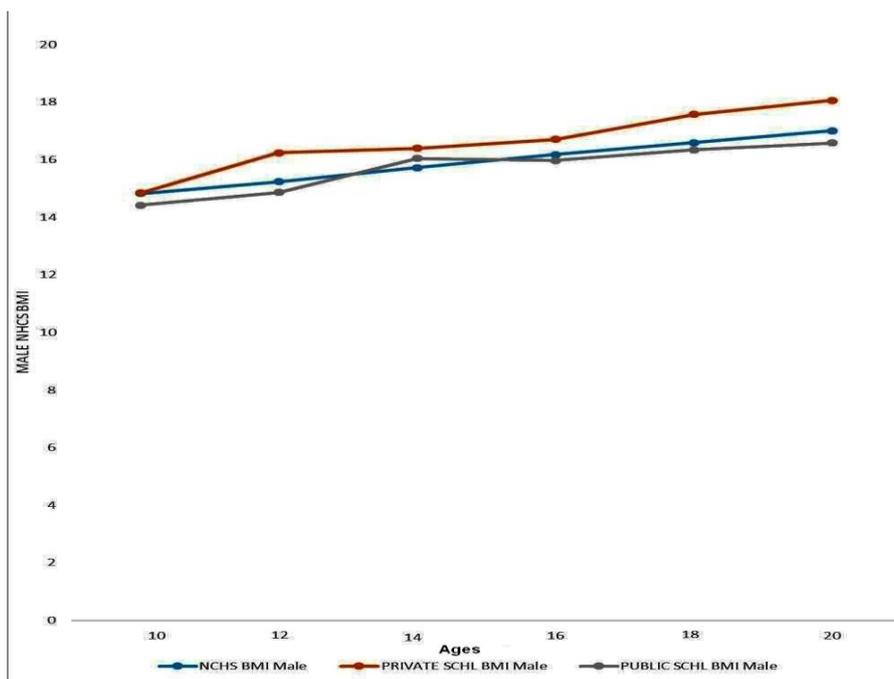


Figure 1: Comparison of WHO/NHCS BMI with BMI of Male Adolescents in Private/Public Secondary Schools in Aba

The result in figure 1 is a chart of BMI of male adolescents from private and public schools and National Center of Health Statistics recommended BMI-for-male values. Male adolescents from private school have better BMI values than those from public schools when compared to National Center of Health Statistics (NCHS) values.

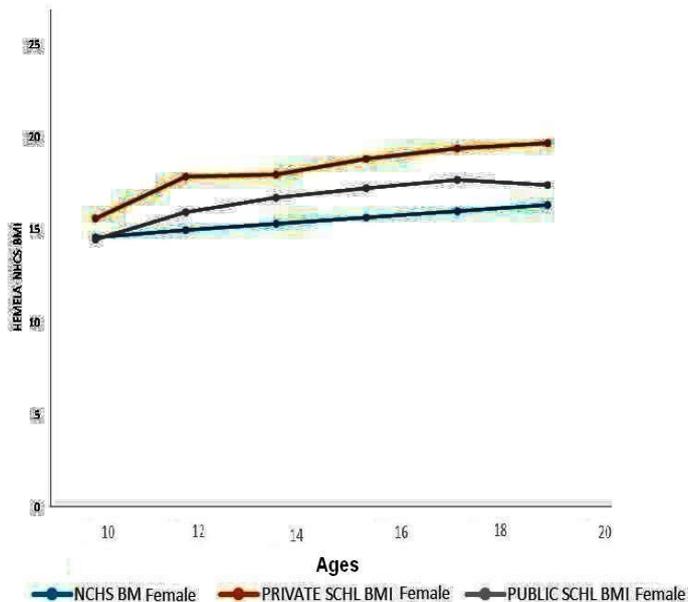


Figure 2: Comparison of WHO/NHCS BMI with BMI of Female Adolescents in Private/Public Secondary Schools in Aba

The result in figure 2 is a chart of National Center of Health Statistics (NCHS) recommended BMI values for female adolescents and the BMI values of females from private and public schools. It showed that the BMI of females from private schools were higher than their counterparts in public schools.

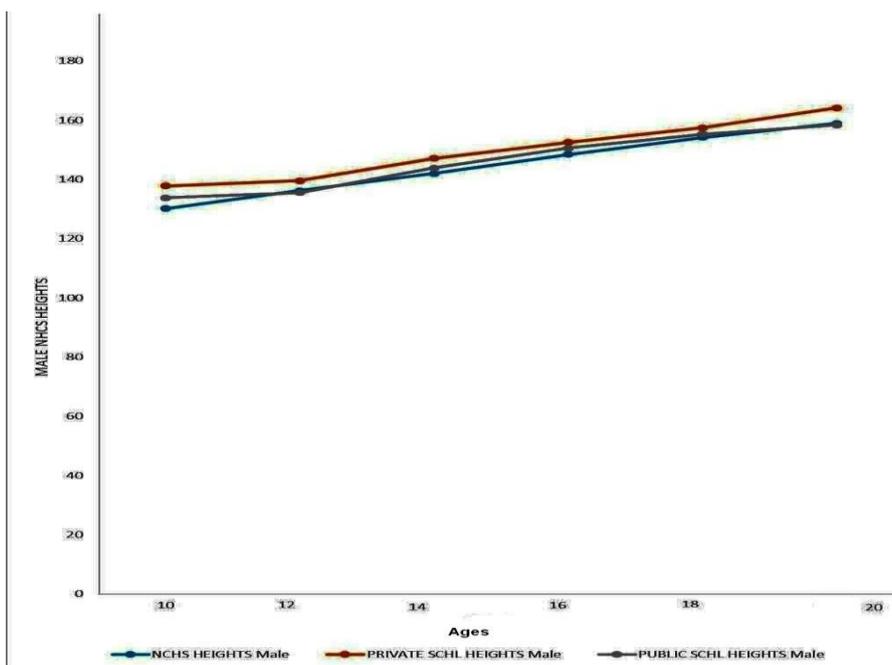


Figure 3: Comparison of WHO/NCHS Heights and Heights of Male Adolescents in Private and Public Secondary Schools in Aba

The result in figure 3 is a chart of height of male adolescents from private and public schools compared to National Centre for Health Statistics (NCHS) recommended male values. The height of male adolescents from private schools was slightly higher than those from public schools and WHO/NCHS values at all ages.

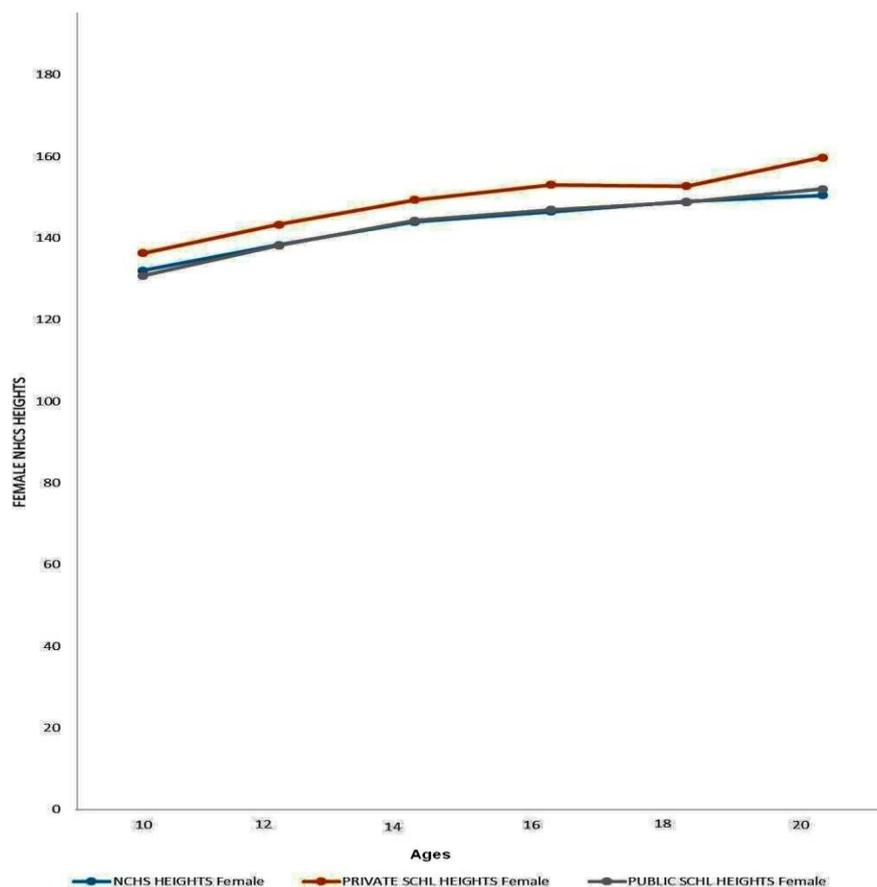


Figure 4: Comparison of WHO/NCHS Heights and Heights of Female Adolescents in Private and Public Secondary Schools in Aba

The result in figure 4 showed a chart of height of female adolescents from private and public schools and National Center of Health Statistics (NCHS) recommended height values for female adolescents. Female adolescents from both schools showed higher velocity rate except female adolescents from public schools which fell below standards at ages 12 and 15. However, female adolescents from public schools are more stunted than their counterparts in private schools.

DISCUSSION

The result of this study revealed that the nutritional status of adolescents in private secondary schools was better than those in public secondary schools, (Table 1). 21 % of male and 4% of female adolescents in private schools were underweight, while 52% of male and 18% of female adolescents in public schools were underweight. Also, the prevalence of stunting is higher in male and female adolescents in public secondary schools than those in private secondary schools (Table 2). Twenty five percent (25%) of males and 34% of females in public schools were stunted while 7% of males and 9% of females in private schools were stunted. The difference in the nutritional status of adolescents in private and public schools could be attributed to the socio-economic differences of the families. Parents of the adolescents in the private schools have higher family income and education than those in the public schools. Hence, these influence the choice of food and nutrient intake of these school going adolescents. This result that adolescents in private schools have better nutritional status than those in public Schools and agrees with Joseph et al; (2014) who

stated that adolescents in government schools were more stunted and underweight than their counterparts in private schools in Addiss Ababa. The result is also in conformity with Pshadra (2001), who found out that boys from private schools had better nutritional status as compared to those from public schools due to their higher family income.

The result of this cross- sectional study also revealed that male and female adolescents attending private secondary schools in Aba had higher mean height, and weight than their counterparts in public schools. 149.78, 37.43 and 149.10, 41.00 for male and female adolescents in private schools and 146.25, 33.89 and 143.52, 34.56 for male and female adolescents in public schools. The result agrees with Pshadra (2001) who found out that boys from private schools had better mean height, weight, and BMI than those in public schools.

Also Manif et al. (2010) found out that adolescents attending private schools are taller and heavier than the ones in public schools.

There was a significant difference in the height, weight and BMI for-age of adolescents attending private and public schools in Aba ($P < 0.05$). (Table 3). The significant difference in their height and BMI may be attributed to the fact that students in private secondary schools tend to come from financially better-off and more enlightened parents who feed and take good care of their children for healthy growth. This confirms the fact that human height has been known to vary according to genetics and nutritional status (Laic-Q; 2006).

The result of these findings showed that education and occupation of the parents had positive significant influence on the nutritional status of adolescents ($P < 0.05$). The research showed that the better nutritional status of adolescents attending private school in Aba Metropolis tend to come from the fact that adolescents in private schools come from parents who were well educated and have better jobs than those whose children were in public schools. The educational levels of parents significantly influenced nutritional status of their children which may affect their children's nutritional health status. These results agree with several studies reported in Sudan (Waboubicty and Shaikh, 2009 and Ahmad et al; 2009). The result also agrees with the work of Manif et al. (2010) who stated that higher educational attainment of the parents influence the height and weight of Nigerian adolescents in private and public schools while occupation influence only height of female adolescents.

This result also agrees with Ashok et al. (2004), who stated that children of private schools who belong to high socio-economic class was better nourished compared to government school students who belonged to low socio economic class. The study by Nebeela et al; (2010) also confirms the above.

This study found out that family size does not have any statistically significant influence on the nutritional status of adolescents attending public and private schools, ($P > 0.05$). This may be attributed to the fact that financially endowed parents with good education know the value of adequate nutrition and tend to feed and take good care of their children irrespective of their family size. This result did not agree with the result of Omer (2010) who found out that family size is one of the most determinants of the children nutritional status. However, the result agrees with Nabeela et al. (2010), who found no significant relation between family size and nutritional status.

CONCLUSION

The present study concludes that adolescents from private secondary schools had better nutritional status as compared to their counterparts from public schools. Occupation and educational attainment of the parents influenced their nutritional status while there was no significant difference in their family size.

Improvement of the nutritional status of adolescents require a multi-sectoral approach in order to ensure adequate food supply, maintain equity in food distribution and promote improved knowledge about nutrition and healthy eating habits (WHO, 2011).

ETHICAL CONSIDERATIONS AND INFORMED CONSENT

An approval was given by research ethical committee of Federal University of Technology Owerri and informed consent given by head of the institutions and the participants.

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COMPETING INTEREST

Authors hereby declare that there is no competing interest.

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