

Pattern and determinants of obesity among adolescent females in private and public schools in the Olorunda Local Government Area of Osun State, Nigeria: a comparative study

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Abstract

The prevalence of obesity has continued to rise at an alarming rate worldwide to such an extent that it has been described as a global epidemic. Our study aims to investigate the pattern and determinants of obesity among adolescent females in private and public schools in the Olorunda Local Government Area of Osun State, Nigeria. This is a cross-sectional descriptive study. Using the multi-stage sampling technique, 520 pre-tested, semi-structured questionnaires were administered to 257 girls from private schools and 263 girls from public schools. Most of the respondents from private schools (65.2%) had good knowledge about obesity and related matters while most of those from public schools (65.9%) had poor knowledge. The dietary practice of the majority of the girls from private schools (60.2%) was unhealthy while most of the girls from public schools (68.7%) had healthy dietary practices. Most of the respondents from private schools (64.2%) lived sedentary lifestyles while most from public schools (64.0%) lived active lifestyles. Using the BMI, the majority of the girls from private schools were underweight (52%), 10 (4.0%) were overweight and 3 (1.2%) were obese. For public schools, the majority (55.4%) fell within the normal group, 6 (2.3%) were overweight and none was obese. The prevalence of being over-

weight and of obesity was higher among the girls in private schools than among girls attending public schools. We concluded that awareness should be created to promote a healthy balance of food, drink and physical activity within and outside the school.

Introduction

The World Health Organization (WHO) defined adolescence as the period from 10 to 19 years of age;¹ it is the transitional period between childhood and adulthood.² However, the National Adolescent Health Policy in Nigeria viewed ages 10 to 24 years as a more appropriate range for adolescence.³ It has been found that the rapid changes in physical growth and psychological development have placed adolescents as a nutritionally vulnerable group with unhealthy eating behaviours.^{1,4-6}

The prevalence of obesity has continued to rise at an alarming rate worldwide to such an extent that it has been described as a global epidemic and it has even replaced under-nutrition as the most common public health concern for infants and children.⁷ This increased prevalence, which was initially more marked in developed countries,⁸⁻¹⁰ has become a global concern.¹¹⁻¹⁴ Although the aetiology of obesity is rather complex, increased intake of fast foods, replacement of the traditional high fibre diet with Western diets with high sugar and fats and the tendency for a more sedentary lifestyle with the advent of cars are believed to contribute to this epidemic of childhood obesity.¹⁵⁻¹⁸

Obesity is a disease process associated with the development of serious medical complications and increased mortality in adulthood. Obesity is also a risk factor associated with cardiovascular disease, atherosclerosis, diabetes and breast, colonic, endometrial and prostate cancers.^{10,19-20} Adolescent obesity is thought to be associated with some psychological problems like low self esteem, feeling of inadequacy, anxiety, social dysfunction, depression and moodiness; all of which affect the personality of the adolescents.^{21,22} A study reported that girls who are overweight or obese are prone to developing high-risk behaviours such as smoking and drinking alcohol, and are also less likely to engage in physical activities and exercise programmes that promote energy expenditure.²³

In the United States of America (USA), the incidence of obesity in adolescents rose from 11% in 1984 to 25% in 1998, with African-American girls having a 50% greater prevalence than White girls.^{10,24} In Australia, at least one in five children and adolescents are obese or overweight, with a continuous rise in

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prevalence.²⁵ The prevalence of being overweight and of obesity in Canadian children aged 7 to 13 years has also doubled and tripled, respectively, since 1981.⁸ In the United Arab Emirates (UAE), recent research suggested that the prevalence of childhood obesity is increasing dramatically, already surpassing the high levels of obesity found among children and adolescents in the USA and Europe.^{26,27} In Nigeria, data on the prevalence of being overweight and of obesity are few and scattered. A study by Omolola *et al.* in south-western Nigeria²⁸ reported no adolescent to be neither overweight nor obese among the rural dwellers studied. Another study in Lagos, Nigeria²⁹ reported overall prevalence rates of being overweight and of obesity in the urban and rural areas to be 3.7% and 0.4%, and 3.0% and 0.0%, respectively. Furthermore, the prevalence rates of obesity and being overweight in a study carried out in Cross River, Nigeria were 1.7% and 6.8%, respectively.³⁰

The adolescents, however, are considered as the age group with the least mortality.³¹ Despite increased concerns for adolescent health worldwide, adolescence has not been considered to be a high priority stage for nutritional needs and intervention.^{1,32} Therefore, our study was carried out to assess the pattern and determinants of obesity among adolescent females in private and public schools in the Olorunda Local Government Area (LGA) in Osun State, Nigeria, with a view to compare the socio-economic characteristics of the respondents and the relationship of this to the prevalence of obesity among them.

Materials and Methods

The study was carried out in the Olorunda LGA, which is one of the 30 LGAs in Osun State, Nigeria. There are a total of 27 secondary schools in the LGA; 13 public and 14 private secondary schools, with a total number of 16,450 students. The target population was the female students aged between 10 and 19 years.

This is a comparative, cross-sectional study. The minimum sample size for each sub-sample was determined using $n = 2z^2pq/d^2$ [z =confidence limits (1.96), p =prevalence, $q=1.0-p$, d =degree of accuracy desired (0.05)] for testing differences between two sub-samples.³³ The calculated minimum sampling size for either group, taking prevalence (p) of obesity from previous studies to be 4%,²⁹ was 118. However, to take care of non-response and to increase representativeness, a total of 520 respondents from two public and three private secondary schools, 257 from private schools and 263 from public schools, were selected using the multistage sampling technique.

The data were collected using pre-tested, semi-structured questionnaires, which were either self-administered or administered by trained research assistants. The questionnaire was drafted using relevant literature and also reviewed by experts in Public Health Nutrition. To further ensure validity and reliability, independent persons translated the questionnaire to Yoruba and back to English; pre-testing was done in a public secondary school in Ofatedo, Egbedore Local Government Area. A total of 50 students were interviewed, after which necessary adjustments were made before the instrument was used for the main study.

Anthropometric measurements were used to determine obesity. This involved measuring the weight with a weighing scale and height with measuring tapes. The scoring system was done for knowledge about obesity and related matters, dietary practices and lifestyles. For knowledge, the mean score was 2.69 in a maximum score of 8; thus, any score less than 2.69 was rated as poor knowledge and 2.69 and above was rated as good knowledge. From a maximum of 17 for dietary practices, a score of 0 to 6.38 was rated as unhealthy practices and a score above 6.38 (the mean score) was rated as healthy practices. Sedentary lifestyle was from a score of 0 to 2.73 (the mean score) and active lifestyle was from a score of 2.73 to 7 (the maximum score).

The questionnaires were manually sorted, entered onto a computer and analysed using Statistical Package for Social Sciences (SPSS) version 15. Bivariate analysis was performed with appropriate test statistics and the P-value set at $P \leq 0.05$.

Results

Of the 520 respondents, 257 (49.4%) were from private schools while 263 (50.6%) were from public schools. The majority of the respondents between 10 and 14 years (163, 58.2%) were from private schools with a mean age of 13.8+1.79 years while for those between 15 and 19 years, the majority (146, 60.8%) were from public schools with a mean age of 14.8+1.97 years. For ethnicity, 245 (49.6%) and 249 (50.4%) were Yorubas; 11 (47.8%) and 12 (52.2%) were from other ethnic groups from private and public schools, respectively. The majority of respondents from monogamous family settings (226, 57.4%) were from private schools while the majority of those from polygamous family settings (88, 77.5%) were from public schools. Concerning the occupation of parents, fathers who were skilled workers were found more among girls in private schools (158, 66.7%) and unskilled fathers were found more among girls in public schools (113, 81.9%). Skilled mothers were also found more among girls attending private schools (113, 73.4%) while unskilled mothers were found more among public school attendees (190, 74.8%). More of those girls who lived with their parents were at private schools (240, 52.5%) while most of those who lived with relatives/guardians were attending public schools (37, 71.2%). Christians were found more in private schools (161, 66.5%) and Muslims were

found more in public schools (176, 65.2%).

As shown in Table 1, there was a significant association between the school type and most of the socio-demographic characteristics: age ($\chi^2=18.76$; $P=0.0001$), family setting ($\chi^2=42.04$; $P=0.0001$), father's occupation ($\chi^2=82.81$; $P=0.0001$), mother's occupation ($\chi^2=124.76$; $P=0.0001$) and religion ($\chi^2=53.32$; $P=0.0001$).

In Table 2, obesity/overweight in any of the parents or siblings is seen to occur more among girls attending public schools: 94 (60.6%) and 57 (60.6%), respectively. Girls who had one to four siblings were found more in private schools (199, 65.2%) while those with more than four siblings were found more in public schools (140, 73.3%). Good knowledge about obesity was demonstrated by more respondents from private schools (167, 65.2%) while poor knowledge was found more among girls in public schools (172, 65.9%). Active lifestyles and healthy dietary practices, however, were demonstrated more among respondents in public schools: 167 (64.5%) and 180 (63.8%), respectively. There were also significant associations between school type and the risk factors for obesity, including history of obesity in parents ($\chi^2=9.52$; $P=0.002$), knowledge about obesity ($\chi^2=50.12$; $P=0.0001$), dietary practice ($\chi^2=43.48$; $P=0.0001$) and activities/lifestyle ($\chi^2=41.15$; $P=0.0001$).

Table 3 shows the respondents who felt that they were too fat were found more in private

Table 1. Socio-demographic characteristics of respondents.

Variable	Frequency (percentage)			χ^2	P
	Private	Public	Total		
Age group (yr)					
10-14	163 (58.2)	117 (41.8)	280 (100.0)	18.76	0.0001
15-19	94 (39.2)	146 (60.8)	240 (100.0)		Significant
Class					
Junior secondary	122 (49.0)	127 (51.0)	249 (100.0)	0.21	0.885
Senior secondary	134 (49.6)	136 (50.4)	270 (100.0)		Not significant
Ethnic groups					
Yoruba	245 (49.6)	249 (50.4)	494 (100.0)	0.028	0.868
Others	11 (47.8)	12 (52.2)	23 (100.0)		Not significant
Family setting					
Monogamous	226 (57.4)	168 (42.6)	394 (100.0)	42.04	0.0001
Polygamous	25 (22.5)	86 (77.5)	111 (100.0)		Significant
Father's occupation					
Skilled	158 (66.7)	79 (33.3)	237 (100.0)	82.81	0.0001
Semi-skilled	70 (52.6)	63 (47.4)	133 (100.0)		Significant
Unskilled	25 (18.1)	113 (81.9)	138 (100.0)		
Mother's occupation					
Skilled	113 (73.4)	41 (26.6)	154 (100.0)	124.76	0.0001
Semi-skilled	78 (76.5)	24 (23.5)	102 (100.0)		Significant
Unskilled	64 (25.2)	190 (74.8)	254 (100.0)		
Custodian					
Parents	240 (52.5)	217 (47.5)	457 (100.0)	10.46	0.001
Guardian/relatives	15 (28.8)	37 (71.2)	52 (100.0)		Significant
Religion					
Christianity	161 (66.5)	81 (33.5)	242 (100.0)	53.32	0.0001
Islam	94 (34.8)	176 (65.2)	270 (100.0)		Significant

schools (15, 78.9%); 230 (53.6%) and 199 (46.4%) in private and public schools, respectively, felt that their figures were smart/fine/normal. Satisfaction with body figure was 199 (49.0%) and 207 (51.0%) in private and public schools, respectively, while dissatisfaction with body figure occurred more among respondents in private schools (23, 79.3%). The school type of the respondents had a significant association with their perception of their figures ($\chi^2=4.71$; $P=0.03$), their satisfaction with their figures ($\chi^2=9.94$; $P=0.002$) and their fear about being overweight or obese ($\chi^2=4.25$; $P=0.039$).

Using the BMI, the majority of the girls from private schools were underweight (52.0%), 10 (4.0%) were overweight and 3 (1.2%) were obese. For public schools, the majority (55.4%) fell within the normal group, 6 (2.3%) were overweight and none was obese. This weight classification using BMI had a significant association with the school type ($\chi^2=10.85$; $P=0.013$). When the socio-demographic characteristics of respondents were cross tabulated against weight classification using BMI, there were significant associations with age ($\chi^2=42.76$; $P=0.000$) and mothers' occupation ($\chi^2=18.996$; $P=0.004$) (Table 4).

Discussion

The significant association between the school type and many of the socio-demographic characteristics of respondents underscores the fact that they are from different socio-economic backgrounds with the girls from private schools being significantly younger and more from monogamous family types. For their parents' occupations, the parents of the girls from private schools were more likely to be professionals compared to those from public schools who were more often unskilled workers. This clearly illustrates that the adolescents attending private schools were from richer and more enlightened homes on average when compared with their colleagues from public schools.

About two-thirds of students who had good knowledge about obesity were from private schools while two-thirds of students who had poor knowledge about obesity were from public schools and this association was found to be significant. This may be expected as the adolescents in private schools are from more enlightened families with better educated parents and, thus, may have better exposure to information at home, coupled with the fact that private schools are usually less populated, better organised and hence may offer better quality training than public schools. Unhealthy dietary practice, however, was found in about

Table 2. Risk factors for obesity in the respondents.

Variable	Frequency %			χ^2	P
	Private	Public	Total		
Obesity/overweight in any of the parents					
Yes	61 (39.4)	94 (60.6)	155 (100.0)	9.52	0.002 Significant
No	194 (54.2)	164 (45.8)	358 (100.0)		
Obesity/overweight in any of the siblings					
Yes	37 (39.4)	57 (60.6)	94 (100.0)	6.19	0.013 Significant
No	215 (53.6)	186 (46.4)	401 (100.0)		
Number of siblings					
1 - 4	199 (65.2)	106 (34.8)	305 (100.0)	69.80	0.0001 Significant
More than 4	51 (26.7)	140 (73.3)	191 (100.0)		
Position among the children					
1 - 4	237 (53.6)	177 (46.4)	442 (100.0)	19.31	0.0001 Significant
More than 4	17 (25.0)	51 (75.0)	68 (100.0)		
Knowledge about obesity					
Poor	89 (34.1)	172 (65.9)	261 (100.0)	50.12	0.0001 Significant
Good	167 (65.2)	89 (34.8)	256 (100.0)		
Dietary practice					
Unhealthy	154 (65.3)	82 (34.7)	236 (100.0)	43.48	0.0001 Significant
Healthy	102 (36.2)	180 (63.8)	282 (100.0)		
Activities/lifestyle					
Sedentary	165 (63.7)	94 (36.3)	259 (100.0)	41.15	0.0001 Significant
Active	92 (35.5)	167 (64.5)	259 (100.0)		

Table 3. Perception of respondents about obesity.

Variable	Frequency %			χ^2	P
	Private	Public	Total		
Self perception of own figure					
Too fat	15 (78.9)	4 (21.1)	19 (100.0)	4.71	0.030 Significant
Okay/smart/normal	230 (53.6)	199 (46.4)	429 (100.0)		
Satisfied with figure					
Yes	199 (49.0)	207 (51.0)	406 (100.0)	9.94	0.002 Significant
No	23 (79.3)	6 (20.7)	29 (100.0)		
Peers making fun of your figure					
Yes	101 (55.5)	81 (44.5)	182 (100.0)	1.73	0.189 Not significant
No	152 (49.4)	156 (50.6)	308 (100.0)		
Scared about being overweight/obese					
Yes	143 (47.7)	157 (52.3)	300 (100.0)	4.25	0.039 Significant
No	106 (57.3)	79 (42.7)	185 (100.0)		

Table 4. Cross-tabulation of socio-demographic characteristics of respondents against body mass index groupings.

Variable	Grouping for BMI %				Total	χ^2	P
	Under-weight	Normal	Over-weight	Obesity			
School type							
Private	131 (52.0)	108 (42.9)	10 (4.0)	3 (1.2)	252 (100.0)	10.85	0.013 Significant
Public	110 (42.3)	144 (55.4)	6 (2.3)	0 (0.0)	260 (100.0)		
Age groups (yr)							
10-14	166 (60.4)	103 (37.5)	5 (1.8)	1 (0.4)	275 (100.0)	42.76	0.000 Significant
15-19	75 (31.6)	149 (62.9)	11 (4.6)	2 (0.8)	237 (100.0)		
Religion							
Christianity	111 (47.0)	120 (50.8)	4 (1.7)	1 (0.4)	236 (100.0)	3.52	0.318 Not significant
Islam	126 (47.0)	128 (47.8)	12 (4.5)	2 (0.7)	268 (100.0)		
Family setting							
Monogamous	191 (49.4)	179 (46.3)	14 (3.6)	3 (0.8)	387 (100.0)	6.87	0.076 Not significant
Polygamous	43 (38.7)	66 (59.5)	2 (1.8)	0 (0.0)	111 (100.0)		
Father's occupation							
Skilled	119 (51.1)	105 (45.1)	7 (3.0)	2 (0.9)	233 (100.0)	9.29	0.157 Not significant
Semi-skill	67 (51.1)	60 (45.8)	3 (2.3)	1 (0.8)	131 (100.0)		
Unskilled	51 (37.5)	79 (58.1)	6 (4.4)	0 (0.0)	136 (100.0)		
Mother's occupation							
Skilled	70 (46.7)	72 (48.0)	7 (4.7)	1 (0.7)	150 (100.0)	18.996	0.004 Significant
Semi-skill	64 (63.4)	32 (31.7)	4 (4.0)	1 (1.0)	101 (100.0)		
Unskilled	104 (41.4)	141 (56.2)	5 (2.0)	1 (0.4)	251 (100.0)		

two-thirds of girls from private schools whereas more than six out of 10 girls who had healthy dietary practices were from public schools. This knowledge-behaviour gap may be owing to the fact that the girls attending private schools, because of better economic status, have an increased likelihood of having Western diets and eating junk-foods than their counterparts in public schools. Furthermore, about three-fifths of the girls who lived sedentary lifestyles were from private schools while about two-thirds of those who lived active lifestyles were from public schools and these associations were also found to be statistically significant. This can be understood, considering the fact that most of the students at private schools were from relatively richer homes where most house chores will be carried out by housemaids; they also have ready access to cars, which encourage a more sedentary lifestyle.

Using the BMI, the prevalence of being overweight and of obesity was higher among the girls from private schools, being 4.0% and 1.2%, and 2.3% and 0%, respectively. The difference in this prevalence in private and public schools may be because of the poor healthy dietary practice and the sedentary lifestyles of the students from private schools, because these have been strongly linked to the pathogenesis of obesity.¹⁵⁻¹⁸ The prevalence is similar to what has been reported in different parts of the country.²⁸⁻³⁰ This prevalence, however, is very low compared to figures from other parts of the world,^{8,10,24-27} and this may be owing to the fact that there is still widespread poverty in Nigeria with about 70% of the population still living below the international poverty line of 1.25 US dollars a day.³⁴

However, it is quite surprising that about half of the girls from private schools were underweight. This may be owing to the fact that many of these girls from above average families may, by reason of exposure or travel, have been attracted to the Western beauty figure of a slim lady and may intentionally modify their diets so as to fit the Western beauty figure. This may also explain the reason why significantly more girls in private schools felt they were too fat and one out of 10 of them was dissatisfied with her figure, as compared to those at public schools, where almost all of the girls were satisfied with their figures. This brings to mind the issue of anorexia nervosa, which is found mainly in the developed countries but has been reported also in sub-Saharan Africa.^{35,36} This may be a subject for further research.

Conclusions

The girls from private schools had a better knowledge about obesity but had more

unhealthy dietary practices and lived more sedentary lifestyles as compared to their colleagues from public schools who had poorer knowledge about obesity but had healthier dietary practices and lived more active lifestyles. Consequently, the prevalence of being overweight and of obesity was higher among the girls at private schools than among girls attending public schools. Parents and teachers should be encouraged to promote a healthy balance of food, drink and physical activity within and outside the school. It is also recommended that enlightenment programmes on obesity targeted at adolescents should take their different socio-economic backgrounds into consideration to be effective.

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