

Prevalence of overweight and obesity among students in private and public secondary schools in a peri-urban Nigerian town

Abah S O^{1*}, Aigbiremolen A O², Duru CB², Awunor NS², Asogun AD², Enahoro FO², Akpede ME²

¹ Department of Community Health, Ambrose Alli University, Ekpoma, Edo State, Nigeria

² Department of Community Medicine, Irrua Specialist Teaching Hospital, Irrua, Edo State, Nigeria

*E mail of Corresponding Author: drsteveabah@yahoo.co.uk

ABSTRACT

Aims: To investigate the prevalence of overweight and obesity among secondary school students in Ekpoma.

Study design: Cross sectional study

Place and duration of the study: Private and public secondary schools in Ekpoma Edo state; from May to October, 2011.

Methodology: This is a school based analytical cross-sectional study of a sample of 417 students drawn from 4 secondary schools in Ekpoma using the multistage sampling technique. Semi-structured interviewer-administered questionnaires were used to obtain qualitative information from the respondents; the weight of each respondent was measured using a bathroom scale and the Body Mass Index (BMI) calculated and classified based on the American Medical Association classification. The results obtained for students in private schools were then compared with those of their peers in public secondary schools.

Results: The prevalence of overweight and obesity was found to be 8.6% and 1% respectively; the mean BMI was 19.6 ± 2.6 . More (67.5%) of those found to be overweight and obese were students in private schools (95% CI = 1.03-4.39 OR=2.11; $\chi^2 = 4.85$). Similarly, 11.59% and 1.45% of students in private schools were overweight and obese respectively compared to 5.71% and 0.95% for those in public schools. Majority (68%) of respondents had poor knowledge of the risk factors for and problems associated with being overweight or obese. Students in the upper social class are more likely to be overweight/obese compared to their peers in the lower social class ($X^2_{HM} = 10.35$; $P < .01$; common odds ratio = 3)

CONCLUSION: Over nutrition and under nutrition are both occurring in adolescents in a predominantly rural setting which suggests that Policy makers and health professionals need to implement strategies that will prevent over nutrition side by side current efforts to curb under-nutrition. Reactivation of the school health program in Nigeria is considered a helpful initial step

Keywords: Overweight, obesity, over nutrition, Body Mass Index

1. INTRODUCTION

Obesity is a global problem affecting both developed and developing countries. It is a leading preventable cause of death worldwide, with increasing prevalence in adults and children (Barness and Opitz, 2007). In developed countries an increase in obesity prevalence has been observed in the last two decades. In the United States, overweight and obesity was found to have increased by as much as 200% within 20 years from 1980 to 2000 (Mercedes and Blossner, 2000).

In developing countries, an increase in the prevalence of overweight and obesity is being observed (Ogden et al, 2002). The World Health Organisation (WHO) has expressed concern over the increasing prevalence of overweight and obesity among preschool and school age children, with a tendency to progression into adulthood and may soon replace more traditional public health concerns such as malnutrition and infectious disease as the most significant cause of poor health, particularly in developing countries ((WHO, 2011, 1998).

Overweight and obesity are associated with a number of co-morbidities such as hypertension, diabetes mellitus, coronary artery disease, gall stones, osteoarthritis and some cancers. At the root of these associated disorders are the

metabolic disorders of hyperlipidaemia and impaired glucose tolerance. It has also been associated with psychological and social disturbances like low self esteem, stigmatization and an increased risk of depression.

This is important public health concern particularly for countries like Nigeria with a significantly large population of school age children and a health sector burdened by ignorance and poverty as major driving forces for disease (Nigerian DHS, 2008).

Recent studies in Nigeria (Olumakaiye, 2008) reported a prevalence of 3.2% for overweight and 0.5% for obesity among adolescents in Osun State. Similarly, in another study done specifically in Ile-Ife among children age 6 to 18 years, the prevalence of overweight was 2.8% and 0.3% for obesity with higher values in females (Adegoke et al, 2009). However, in a two-country study of Ghana and Uganda, prevalence rates for overweight and obesity for school aged children were 10.4% and 0.9% among girls and 3.2% and 0.5% among boys respectively(Peltzer and Pengpid, 2011). These rates were higher than those found in Osun and lower than those found in a Quatari study where the prevalence of overweight, and obesity was 28.6%, and 7.9%, respectively, among adolescent boys and 18.9%, and 4.7% among girls age 12 to 17 years (Benner, 2006). The prevalence of overweight and obesity and the co-morbidities associated with them are well documented in developed countries. However, the same cannot be said of developing countries, especially among adolescents in peri-urban communities.

This study sought to determine the prevalence of overweight and obesity among secondary school students in Ekpoma, a peri urban town, and to compare the prevalence among students in public secondary and private secondary schools in the area. Other objectives were to determine the sex distribution of overweight and obesity in the study group and to evaluate the degree of knowledge about the risk factors for overweight and obesity in the study group. The study was based on the premise that the adolescent years are a significant period for the development of healthy habits or otherwise.

2. METHODOLOGY

This study is a school-based cross-sectional survey of secondary school students in Ekpoma, a peri-urban community which is also the administrative headquarters of Esan West Local Government Area of Edo State. The residents in the town are mainly civil servants (staff of the Ambrose Alli University), petty traders, farmers or businessmen and women. The town itself is a mosaic of rural and urban features, but more rural than urban.

2.1 Sampling Technique

With some help from the local government authority, a list of all the secondary schools in Ekpoma was obtained, consisting of 18 schools (10 private and 8 public). Separate lists of the private and public secondary schools were made. The name of each public school was written on a piece of ballot paper and dropped in an empty bag, and thoroughly mixed. An independent observer was then requested to pick two pieces of paper from the bag, one at time. The process was then repeated to select two private schools. The selected schools were Ambrose Alli University Secondary School, Zanna Royal Academy (private schools), Ujemen Secondary School, and Eguare Secondary School(public schools). The sample size formula for comparative studies was used to determine the minimum size for each study group: $n/group = [2(Za+Zb)2pq/d^2]$ (Araoye, 2000). A total of 211 respondents constituted the sample size for each group, making a total of 422. Based on the sample size calculated and given the relatively small size of pupils per school, it was decided apriori to study all the pupils in each of the junior(JSS 1-3) and senior (SSS 1-3) classes in the selected schools. The classes actually studied were JSS 1 and 2 and SSS 1 and 2; JSS 3 and SSS 3 being busy with examinations as at the time of study were exempted. Data was obtained from the respondents using a semi-structured pre-tested interviewer-administered questionnaire. There were a total of 417 students from the 4 schools who participated in the study. Of this, 207 of them were from private schools while 210 were from public schools. 7 pupils who were absent from school during the study were also exempted. All those present in school consented and took part in the study.

2.2 Anthropometry

The weights and heights of respondents were obtained using a bathroom scale and a calibrated height meter respectively. The Body Mass Index (BMI) for each student was calculated using the formula:

$$BMI = \text{Weight(kg)} / \text{Height(m}^2\text{)}$$

Respondents were classified using age-specific normograms for BMI as recommended by the American Medical Association(2007):

Percentiles	Class
≥ 95th	Obese
85th to < 95th	Overweight
5th to < 85th	Normal
< 5th	Underweight

To access knowledge, respondents were asked to identify risk factors for, and problems associated with overweight and obesity from a list provided in the questionnaire. Those who were able to correctly identify 10 or more of the 19 items on the list as risk factors and problems associated with overweight and obesity were classified as having good knowledge while those who could not were labeled as having poor knowledge.

Data editing was done manually and by use of computer. All identified errors were checked against the original questionnaires and corrected. Results were analysed using SPSS software version 15.0 and frequency distribution of all relevant variables was made. Means and standard deviation were calculated. The Chi square statistic was used to test for significance where necessary and the accepted level of significance was 5%. The Mantel –Haenszel procedure was used to compute the common odds ratio and to test the null hypothesis of non relationship between social class and overweight/obesity.

Ethical clearance was obtained from the Ethics committee of the Irrua Specialist Teaching Hospital (ISTH) and the Department of Community Medicine, IISTH, Irrua. Permission was also obtained from the principal in each of the schools; and individual verbal consent was obtained from each student before proceeding with the study.

3. RESULTS AND DISCUSSION

3.1 RESULTS

The respondents consisted of 215 males and 202 females aged between 9 to 18 years. Majority (54.7%) of them were in the 10-14 years age range, while the mean age was 13.8 (± 2.6) years.

Among respondents from the private schools, 11.6% and 1.4% were overweight and obese respectively while 5.7% and 0.5% of the public school students were overweight and obese respectively. Overall, 84.4% of respondents had normal weight, 6.0% were underweight, while 8.6% and 1.0% were overweight and obese respectively (Table 1).

There was a significant association between BMI grades and sex ($X^2 = 7.96, P=.03$); females (12.9%) were more overweight or obese than their male counterparts (6.5%) (Table 1). In a similar pattern, there was a significant association between the BMI grades and the type of school (Table 1; $X^2 = 4.85, 95\% CI=1.03-4.39$); a greater proportion of those in private schools (13%) were overweight or obese compared to their public school counterparts. In fact, there was a double chance of being overweight or obese for students in private schools ($OR = 2.11$).

Table 1: Distribution of nutritional status of students by type of school and sex

More respondents mentioned hereditary factors (47.5%) as the commonest risk factor associated with obesity while the lowest responses were overeating (19.4%) and lack of exercise (21.3%) respectively. Overall, 68% of the students had poor knowledge of the risk factors for and problems associated with overweight and obesity (Figure 2).

The social class was assumed to correlate with the occupation of the father, using the British Registrar General's social classification (Tulchinsky and Varavicova, 2000). In this study respondents whose father belonged in social class I or II were regarded to be in the upper social class while those in social class III, IV or V were regarded as being in the lower social class (table 1). Among Overweight/obese students, 20(74%) and 11(84.6%) had parents in the upper social class in private and public schools respectively (table 2).

By applying the Mantel –Haenszel statistic, a significant association was determined between overweight/obesity and social class ($X^2_{HM} = 10.35; P <.01$ and common odds ratio of 3.0) This indicate that children in the upper social class were three times more likely to be overweight or obese compared to their peers in the lower social class.

Table 2: Distribution of students by type of school and social class of the father

Table 3: Distribution of students in public and private schools by nutritional status and social class of the father

3.2 Discussions

The number of children not in private or public schools in the study area is not known. However based on recent studies, the Gross Attendance Ratio (GAR), which is the number of secondary school students of any age expressed as a percentage of the official secondary school age population is 100.6% in males and 97.2% in females in the study region (National Population Commission, 2008). This indicates that most children are in school.

The prevalence of overweight and obesity were 8.6% and 1% respectively while the total prevalence (overweight and obesity) was 9.6%. This was higher than a prevalence of 3.0% and 0.0% found in a study in Lagos by Bassey et al (2007) and 0 -8.1% in the Akinpelu et al (2008) study. The finding is however fairly comparable with findings in Musa et al (2012) which estimated an overall overweight of 9.7% and obesity of 1.8%. The variance in the observation may be explained by the smaller sample size in this study (417 versus 3240). Compared to a cohort study done among secondary schools in Mauritius, (Shamachum et al, 2004) the prevalence of overweight was lower (6.6%), while the prevalence of obesity was much higher (6.4%). The children in this study had a lower under-weight prevalence compared to the regional average of 12.8% (National Population Commission, 2008). This may be attributable to the predominant occupation of farming and high food production in the area.

Differences in BMI values among individuals and among communities and populations are related to intrinsic and extrinsic factors. Intrinsic factors consist of genetic variations while extrinsic factors include environmental and socio-cultural variations. Adolescents in different socio-economic backgrounds are exposed to different diets that range from mostly-caloric to mostly-nitrogenous diets with many variants between the two extremes. This observation may also partly explain the differences between BMI values among adolescents from different settings.

In this study, more females (12.9%) were overweight or obese when compared to the males (6.5%) and the difference is statistically significant ($P = .05$). This is consistent with the findings in a Portharcourt study (Buowan, 2010), which showed more females (2.4%) being overweight than males (0.42%) and in Ibadan (Omigbodun et al, 2010) which also showed a higher prevalence of overweight and obesity among females when compared to their male counterparts. These findings are in keeping with normal human physiology which explains the accelerated growth of females compared to males during adolescence. During puberty and throughout adolescence, females lay down a lot of subcutaneous fat which is responsible for the rotundity noticed in them. The high levels of testosterone in their male counterpart inhibit this process. There was also a significant difference in the prevalence of overweight and obesity in private schools compared to those in public schools. This is consistent with the Olorunda study (Ebenizer et al, 2011) which also showed a higher prevalence of overweight and obesity in students of private schools (4.5% and 1.2% respectively) compared to their counterparts in public schools (2.3% and 0.0% respectively).

The finding of significantly higher prevalence of overweight among students in private school is reflective of the observation that parents of higher social class commonly send their children or wards to privately-run educational institutions. Another finding in this study is the statistically significant association between overweight and upper social class. Although dietary habits was not reported in this study, this observation may be attributed to dietary preferences, with a tendency towards urbanized and western lifestyles among the upper social class and consequently higher risk of over-nutrition as noted by others (Van der Sande et al, 2001; Nwizu et al, 2011). A 2006 study in the area had indicated inadequate consumption of meat and dairy products by growing children due to poverty (Abah et al 2006). Higher socio-economic status was identified as an independent risk factor for obesity in a study done among Israeli school children (Huerta et al, 2005).

The knowledge of risk factors and effect of overweight and obesity was quite low, being only 32%. This finding negates what is expected in an academic environment that is supposed to provide health education for the students. Health education, including nutrition education is an important aspect of school health programme which has virtually collapsed in most schools in Nigeria (Abah, 2009).

Finally, although the BMI distribution in this study tend to suggest a relatively normal distribution and hence overweight and obesity as not of public health concern, when viewed against the relatively rural setting of this study, results from previous studies in other parts of the country which indicated lower prevalence values for both overweight and Obesity and the trend towards increasing prevalence of overweight and obesity globally (Mercedes and Blossner, 2000, Ogden et al, 2002), this paper is of the view that it is important to periodically evaluate the prevalence of weight disorders in children and adolescents so that appropriate preventative strategies can be instituted. Adequate nutrition education in secondary schools will also be important from a health promotion and preventive medicine perspective.

3.3 Limitations

The major challenge is with the small sample size, which although comparable to that of Akesode and Ajibode, is regarded to be relatively small, and hence the study may be regarded as a pilot study.

4. CONCLUSION

Over nutrition and under nutrition are both occurring in adolescents in a predominantly rural setting which suggests that Policy makers and health professionals need to implement strategies that will prevent over nutrition side by side current efforts to curb under-nutrition. Reactivation of the school health program in Nigeria is considered a helpful initial step.

5 ACKNOWLEDGEMENTS

This study had no funding sponsors. However, we like to appreciate all our colleagues in the department of Community Medicine, ISTH, Irrua for their support and useful suggestions

COMPETING INTERESTS

The authors hereby declare that no competing interests exist.

AUTHORS' CONTRIBUTIONS

AAO, ASO and AME designed the study while AAO, DCB and ANS wrote the first draft. AAO, AAD, and EFO managed the literature review, while DCB and ANS managed the analysis. In addition ASO reviewed the draft. All authors read and approved the final manuscript.

REFERENCES

1. Abah, S.O., Ilevbare, U., Asogun, A.D.(2006). Infant feeding practices in a rural Nigerian community. Journal of Applied and Basic Sciences, 4:25-31 Abah, S.O. (2009). Assessment of school health programme in a semi-urban area of Nigeria: current situation, challenges and way forward. Journal of Applied and Basic Sciences; 5 (1, 2), 30-40
2. Akinpelu, A.O., Oyewole, O.O., Oritogun, K.S. (2008). Overweight and Obesity: Does it occur in Nigerian Adolescents in an urban community? Int. J. Biomed 7 Hlth Sci. Vol. 4, (1); 11-17
3. American Medical Association. (2007). Expert committee recommendations on the assessment, prevention and treatment of child and adolescent overweight and obesity. AMA: Chicago. Available online at www.ama-assn.org; assessed 6th May, 2011.
4. Adegoke, S.A., Olowu, W.A., Adeodu, O.O., Elusikan, J.B., Dedeke, I.O. (2009). Prevalence of overweight and obesity among children in Ile-ifé, south-western Nigeria. West Afr J Med. Jul-Aug;28(4):216-21.
5. Akesode, F.A and Ajibode, H.A. (1983). Prevalence of obesity among Nigerian school children. Social Science and Medicine 17(2):107-11
6. Araoye, M.O. (2000). Research methodology with statistics for health sciences. First edition. Nathadex Publishers, Ilorin, Nigeria.

7. Barness, L.A. and Opitz, J.M. (2007). Obesity; genetic, molecular and environmental aspects. American Journal of Medical Genetics, 12, 3016 – 34.
8. Ben-Bassey, U.P., Oduwole, A.O., Ogundipe, O.O. (2007). Prevalence of overweight and obesity in Eti-osa local government area, Lagos State, Nigeria. Obesity Reviews. 8, (6), 475-479.
9. Benner, A. (2006). Prevalence of obesity, overweight, and underweight in Qatari adolescents. Food Nutr Bull. Mar ; 27 (1):39-45.
10. Buowan, Y. (2010). Obesity among students attending a tertiary institution in Nigeria. The internet journal of tropical medicine. 7 (1), 102- 9
11. Musa, D.I., Toriola, A.L., Monyeki, M.A., and Lawal, B. (2012). Adolescent overweight and Obesity in Benue State, Nigeria. Tropical Medicine & International Health, 17:1369-1375
12. Ebenizer, O. O..., Adenike, I. O. B.., Daniel, A. A..., Adeleye, A. A. (2011). Pattern and determinants of obesity among adolescent females in private and public schools Olorunda local government area of Osun State, Nigeria: a comparative study. Journal of public health in Africa. 2, 45-49
13. Huerta, M., Haviv, J., Bibi, H., Scharf, S., and Gdalevich, M. (2005). Socioeconomic determinants of overweight and obesity among Israeli schoolchildren; American Public Health Association, 133rd Annual Meeting & Exposition December 10-14, 2005 Philadelphia, PA
14. Mercedes, O. and Blössner M (2000): Prevalence and trends of overweight among preschool children in developing countries. Am J Clin Nutr., 72(4) 1032-1039 .
15. National Population Commission. (2008) ND ORC Macro. Nigeria Demographic and Health Survey. Calverton, MD: Nigeria National Population Comission and ORC.
16. Nwizu, S.E, Njokanma O.F., Okoroma C.A.N., David N.A. (2011). Relationship between Bioelectrical Impedance Analysis and Body Mass Index in Adolescent Urban Nigerians. WAJM. 30(2):99-103
17. Ogden, CL., Kuczmarski, R.J, Flegal, K.M., Mei, Z., Guo, S., Wei, R., Grummer-Strawn, L.M., Curtin, L.R., Roche, A.F, Johnson, C.L. (2002). Centers for Disease Control and Prevention 2000 growth charts for the United States: improvements to the 1977 National Center for Health Statistics version. Pediatrics. 109: 45-60.
18. Olumakaiye, M.F. (2008). Prevalence of underweight: a matter of concern among adolescents in Osun State. Pakistan Journal of Nutrition. 7 (3): 503-508
19. Omigbodun, O.O., Adediran, K.I., Akinyemi, J.O., Omigbodun, A.O., Adedokun, B.O., Esan, O. (2010). Gender and rural-urban differences in the nutritional status of the in-school adolescent in western Nigeria. Journal of Biosocial Sciences. 42(5): 65-76.
20. Peltzer, K., Pengpid, S. (2011): Overweight and Obesity and Associated Factors among School-Aged Adolescents in Ghana and Uganda. Int. J. Environ. Res. Public Health. 8, 3859-3870.
21. Shamachurn, B., Goorah, S.S.D., Oogarah-Pratap, B. (2008). Prevalence of overweight and obesity in a cohort of secondary school children in Mauritius in 2008. University of Mauritius Research Week, 1-5 September 2008.
22. Van Der Sande, M.A.B., Ceesay, S.M., Miligan, P.J.M., Nyan, O.A., Banya, W.A.S., Prentice, A. McAdam, K.P.W.J., and Walraven, G.E.L (2001). Obesity and undernutrition and cardiovascular risk factors in rural and urban Gambian communities. American Journal of public Health 91(10): 1641-1644
23. Tulchinsky, T.H., Varavikova, E.A., (2001): The new public health, an introduction for the 21st century. Toronto: Academic Press.
24. World Health Organisation, WHO (1998). Obesity Prevention and managing the global epidemic. Report of the WHO Consultation on obesity. WHO, Geneva.
25. WHO (2005). Preventing chronic diseases: a vital investment. WHO Global Report. Available at www.who.int; assessed 23rd October, 2011.
26. WHO (2011). Obesity and overweight fact sheet. WHO Media Centre. Available online at www.who.int; assessed 4th December, 2011.

Table 1: Distribution of nutritional status of students by type of school and sex

Nutritional status	Private School			Public School		All schools	
	M*(%)	F**(%)	Total (%)	M(%)	F(%)		
Underweight	5(1.2)	5(1.2)	10(2.4)	4(1)	11(2.6)	15(3.6)	25(6.0)
Normal	88(21.1)	82(19.7)	170(40.8)	98(23.5)	84(20.1)	182(43.6)	352(84.4)
Weight							
Overweight	10(2.4)	14(3.3)	24(5.8)	6(1.44)	6(1.44)	12(2.88)	36(8.6)
Obese	0(0)	3(0.72)	3(0.7)	0(0)	1(0.3)	1(0.3)	4(1)
TOTAL	103(24.7)	104(24.9)	207(49.6)	108(25.9)	102(24.5)	210(50.4)	417(100)

*- Male; ** - Female

Table 2: Distribution of students by type of school and social class of the father

Social Class	Private School		Public School		Total	
	Frequency	%	Frequency	%	Frequency	%
I	36	17.39	17	8.09	53	12.71
II	58	28.02	35	16.67	93	22.3
III	46	22.22	41	19.52	87	20.86
IV	44	21.26	49	23.33	93	22.3
V	23	11.11	68	32.38	91	21.82
TOTAL	207	100	210	100	417	100

Table 3: Distribution of students in public and private schools by nutritional status and social class of the father

Social Class	Nature of school					
	Private			Public		
	Overweight/Obese	Normal	Overweight/Obese	Normal	Total	
I	11	20	7	15	53	
II	9	58	4	28	93	
III - V	7	91	2	155	271	
Total	27	180	13	197	417	