



Prevalence of Overweight and Obesity Among Children in Ile-ife, South-Western Nigeria

Prévalence de la surcharge pondérale et l'obésité chez les enfants en Ile-Ife, au sud-ouest du Nigeria

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ABSTRACT

BACKGROUND: Childhood obesity is a potential health problem in Nigeria because of our changing patterns of lifestyle. It is associated with significant health, medical and psychological consequences for children and adolescents.

OBJECTIVE: To determine the nutritional status of Nigerian children aged six to eighteen years using anthropometry.

METHODS: The study which was a school-based cross-sectional survey employed a multi-staged random sampling method. Four secondary and four primary schools (two private and two public) were selected to ensure adequate representation of the focus age group of six to 18 years and social classes. Ninety students were selected from each school. Overall, 360 subjects were selected from primary and secondary schools respectively giving a total of 720 school children. Each subject had a questionnaire complete followed by the measurement of height and weight. Nutritional status was determined using the International Obesity Task Force criteria.

RESULTS: Two (0.3%) of the 720 students studied were obese both being females. Twenty (2.8%) subjects were overweight of which 17 (85.0%) were females and three (15.0%) males. Females had a higher prevalence of overweight when compared with males ($p < 0.01$). There was a higher proportion of overweight students in the higher social classes when compared with the lower social classes ($p = 0.03$). Five hundred and sixty (77.8%) were underweight with a BMI $< 18.50 \text{ kg/m}^2$.

CONCLUSION: Obesity and overweight are rather uncommon problems among children in Ile-Ife a semi urban south-western Nigeria town. However, overweight is more common in children from high social classes and among adolescents, the girls tend to have higher BMI than the boys. Underweight is prevalent among these children. *WAJM* 2009; 28(4): 216–221.

Keywords: Obesity, Children, Prevalence, Nigeria, South west, Anthropometry.

RÉSUMÉ

CONTEXTE: L'obésité infantile est un problème potentiel pour la santé au Nigeria en raison de nos modes de changer de mode de vie. Elle est associée à la santé important, les conséquences médicales et psychologiques pour les enfants et les adolescents.

OBJECTIF: Pour déterminer le statut nutritionnel des enfants nigériens âgés de six à dix-huit années en utilisant l'anthropométrie.

MÉTHODES: L'étude, qui était une école-based cross-sectional survey occupée à plusieurs étapes aléatoires méthode d'échantillonnage. Quatre établissements secondaires et quatre écoles primaires (deux privés et deux publics) ont été sélectionnés pour assurer une représentation adéquate du groupe de réflexion de six ans à 18 ans et les classes sociales. Quarante-vingt dix étudiants ont été sélectionnés dans chaque école. Dans l'ensemble, 360 sujets ont été choisis dans les écoles primaires et secondaires donnant respectivement un total de 720 enfants non scolarisés. Chaque sujet a eu un questionnaire complet suivie par la mesure de la hauteur et le poids. L'état nutritionnel a été déterminé en utilisant les critères de l'International Obesity Task Force.

RESULTATS: Deux (0,3%) des 720 étudiants ont étudié les deux femmes étaient obèses être. Vingt (2,8%) sujets avaient une surcharge pondérale, dont 17 (85,0%) étaient des femmes et de trois (15,0%) hommes. Les femelles avaient une plus forte prévalence de la surcharge pondérale par rapport aux hommes ($p < 0,01$). Il y avait une plus forte proportion d'élèves en poids dans les classes sociales plus élevées si on les compare avec les classes sociales inférieures ($p = 0,03$). Cinq cent soixante (77,8%) présentaient une insuffisance pondérale avec un IMC $< 18,50 \text{ kg/m}^2$.

CONCLUSION: L'obésité et la surcharge pondérale sont plutôt des problèmes uncommon chez les enfants en Ile-Ife une semi urbaine du sud-ouest de la ville du Nigeria. Toutefois, le surpoids est plus fréquent chez les enfants des classes sociales élevées et chez les adolescents, les filles ont tendance à avoir un IMC élevé que les garçons. L'insuffisance pondérale est fréquente chez ces enfants. *WAJM* 2009; 28(4): 216-221.

Mots-clés: obésité, de l'enfance, de la prévalence, le Nigeria, Sud-Ouest, anthropométrie.

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Abbreviations: IOTF, International obesity task force; BMI, Body mass index

INTRODUCTION

Obesity may be defined as a condition of excessive adiposity.¹ A body mass index (BMI) that is equal to or greater than 95th percentile for age and sex or greater than 30 kg/m² is regarded as obesity in adults.² Overweight on the other hand is defined as BMI that is equal to or greater than 25 kg/m² or greater than the 85th percentile for age and sex.² In children and adolescents however, the BMI varies with age, so they are obtained from sex specific curves that pass through a BMI of 25 kg/m² and 30 kg/m² by age 18 years for overweight and obesity respectively.³

Obesity is a significant health problem with medical and psychological consequences for children and adolescents.^{4,5} Childhood obesity quite often persists into adulthood.^{6,7} Over the years in most developing countries, emphasis has been on under-nutrition to the neglect of over-nutrition. Childhood obesity appears a potential health problem in this country in spite of the present poor socio-economic status of the people. A study carried out in Calabar using BMI revealed a 2.3 to 4 % prevalence rate of obesity among children aged 6 to 18 years.⁸ The prevalence of obesity from an earlier study carried out in Ile-Ife using bioelectrical impedance analysis, put the prevalence rate of childhood obesity at 18 percent among a predominantly elite population.⁹ Prevalence rates for obesity in Britain range from 15 to 30 percent in childhood and adolescence.¹⁰

Obesity in infancy has been associated with increased risks of hypernatraemic dehydration with associated risk of cerebro-vascular accident and respiratory tract infections such as bronchiolitis. Among older children, it has been associated with many emotional and physical problems, such as altered body image, poor self-esteem, depression and mental trauma¹¹⁻¹². Other complications include gastro-oesophageal reflux disease, sleep apnoea syndrome and asthma.⁴ The more obese a child is or remains obese, the more likely the child will become an obese adult.¹³ Obesity in adolescence is more related to adult obesity than a child's birth weight.¹³ Adult obesity increases the risk

of coronary heart diseases, high blood pressure, type 2 diabetes, liver diseases, dyslipidaemia endometrial cancer in women and colorectal cancer in men.¹⁴ Obesity may also contribute to the high rates of gallstones and adverse pregnancy outcomes.¹⁵

The aetiology of obesity is poorly understood. Genetic, environmental, and socio-economic factors, as well as viral infections have been proffered as possible causative factors.¹³ Genetic tendency alone, however, does not determine whether a child will become obese.¹³ Children in families with obese parents tend to be obese and this has led to the debate on whether it is nature or nurture that influences or determines overweight and obesity. Behavioural and lifestyle conditions related to diet and physical activity play a critical role in both the manifestations and degree of obesity.¹⁶ Obesity results when energy intake exceeds energy output and the excess is stored as fat.¹⁷

The potential of primary prevention of obesity hinges on helping young people and their families develop new lifestyles and creating supportive environment in which healthful eating and physical activity can be promoted.¹⁸ Schools are potentially viable delivery systems for programmes aimed at preventing or reducing childhood obesity.¹⁹ The treatment of obesity is bedevilled by several challenges. Acceptable elements of the management of obesity include health education, behavioural modification, exercise and diet. Current research is now focused on new drugs to combat obesity especially in developed countries.¹² However pharmacotherapy is currently not approved in children although, trials are on-going.²⁰

There is paucity of published work on overweight and obesity in Nigeria using the cut-off BMI designed by the International Obesity Task Force (IOTF) for children and adolescents. Owa and Adejuyigbe⁹ in 1997 undertook direct measurement of adiposity using bioelectrical impedance analysis while Ansa and Odigwe,⁸ in 2001 did indirect measurement of adiposity using the adult BMI cut off value of 30 kg/m². This study was conducted to determine the

prevalence of obesity and overweight among Nigerian children aged between six and eighteen years using the cut-off BMI designed by the International Obesity Task Force

SUBJECTS, MATERIALS, AND METHOD,

The study was conducted in primary and secondary schools in Ile-Ife, Osun State of south western Nigeria. The town had population of about 285,500 people in 1991.²¹ Inhabitants of Ile-Ife are predominantly Yoruba people living in the two local government areas. The people are largely subsistent farmers and traders. The study was a school-based cross-sectional survey which lasted three months. Four secondary and four primary schools were selected to ensure adequate representation of age groups across the focus age group of 6 to 18 years. Ninety students were selected from each of the two categories (i.e. private and public) schools. Overall, 360 subjects were selected from primary and secondary schools respectively giving a total of 720 school children. An institutional ethical clearance was obtained from the Research and Ethics Committee of the Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife. Also, a written permission was obtained from the Local Inspectorate of Education, while informed consent was obtained from the individual parents/ guardians through the various head teachers. The subjects were also informed and educated about the study and the procedures in order to obtain their personal consent and cooperation.

A research pro-forma was administered to each child for his or her socio-demographic and anthropometric data. Social classes of parents were determined using the method described by Oyedeji²² which uses the educational attainment and occupation of both parents. The subjects' ages as at their last birthdays were used and these were cross checked with the school records. The subjects provided the answers to the questions but, where necessary, the help of their teachers was enlisted.

For each child, the height and weight, and hence the body mass index (BMI) were measured with the child

lightly clothed. Weight was measured using the digital weighing scale manufactured by *SECA* City with the subjects wearing only under garments and no shoes. The scale was standardised at each weighing by ensuring it goes back to the zero level, and was measured to the nearest 0.1 kg. Height was measured with an improvised wooden stadiometer mounted on a vertical wall, were the in barefooted subjects, with the individual standing straight and erect against the wall on a straight horizontal floor; with the feet put together, the chest out and the neck extended till the subject was looking horizontally straight ahead.⁸ The height was taken to the nearest 0.1 cm. BMI (kg/m^2) was calculated using the formula: $[\text{weight (kg)} / (\text{height in m})^2]^2$. The prevalence rates of overweight and obesity were determined on two grounds, first by using cut off points of the IOTF for children and adolescents, above the 85th and 95th percentiles respectively for overweight and obesity,³ and secondly, by using adult cut-off points of 25 kg/m^2 for overweight and 30 kg/m^2 for obesity. Data were analysed using SPSS for Windows software version 11. Means, standard deviations, range, proportions and percentages were determined as applicable. Means (SD) were compared using the Student t-test while proportions and ratios were compared using the Pearson Chi-square (χ^2) tests. Yates' continuity correction was applied to values less than 5 in one or more cells.

RESULTS

Table 1 shows details of the age and sex distribution of the 720 subjects. Of this the 720 subjects, 354 (49.2%) were males while 366 (50.8%) were females giving a male to female (M:F) ratio of 1:1.03. One hundred and forty-one (19.6%) were from the higher socio economic strata (social classes I and II), while 232 (32.2%) were from the middle stratum, and the remaining 347 (48.2%) were from the lower social classes of IV and V. Table 2 shows the mean heights-for-age for both sexes.

The mean height for both sexes increased with age. The mean height for females was, however significantly higher among those aged 13 years ($t =$

Table 1: Distribution of Study Subjects by Age and Sex

Age (Years)	Number (%)		
	Males	Females	Total
6	7 (2.0)	11 (3.0)	18 (2.5)
7	9 (2.6)	13 (3.6)	22 (3.1)
8	22 (6.2)	26 (7.1)	48 (6.7)
9	31 (8.8)	28 (7.7)	59 (8.2)
10	43 (12.1)	39 (10.7)	82 (11.4)
11	31 (8.8)	37 (10.1)	68 (9.4)
12	33 (9.3)	46 (12.6)	79 (11.0)
13	45 (12.7)	28 (7.6)	73 (10.1)
14	44 (12.4)	30 (8.1)	74 (10.3)
15	38 (10.7)	42 (11.4)	80 (11.1)
16	27 (7.6)	37 (10.1)	64 (8.9)
17	17 (4.8)	20 (5.5)	37 (5.1)
18	7 (2.0)	9 (2.5)	16 (2.2)
Total	354 (100)	366 (100)	720 (100)

2.66, $df = 71$ and $p = 0.01$). Among those aged 17 years, the mean height for males was significantly higher than those of females ($t = 4.647$, $df = 35$ and $p < 0.01$). For those aged seven to eight years, the mean heights for males were higher than those of females. The values however levelled out at nine years, and then became higher in females until 16 to 18 years when males had higher heights. Table 3 shows the mean weights-for-age for both sexes. The mean weights for both sexes increased with age. The mean weights-for-age for females were significantly higher than the corresponding values among males aged 13 to 16

years $p < 0.05$. Also, the mean weights were higher in females aged six and seven years, but reverse trends (i.e higher mean values in males) were recorded in males aged eight to ten years. The mean weights attained by males aged 17 and 18 years were however higher than the corresponding values amongst females. Table 4 shows the mean BMI-for-age for both sexes. Among 13 to 16 year olds, the mean BMI values for females were significantly higher than the corresponding values for their males peers $p < 0.05$. But among the 7 to 10 year olds, and among the 12 and 18 year olds, there was no statistically significant difference in the mean BMI values obtained for both males and females.

Using the IOTF cut off points for the 720 subjects, 20 (2.8%) subjects were adjudged overweight, while two (0.3%) others had values consistent with obesity. Among subjects whose age ranged between six and twelve years, two (1.1%) of 176 males and five (2.5%) of 200 females were overweight. Among those aged 13 to 18 years, one (0.6%) of 178 males and 12 (7.2%) of the 166 females were overweight.

Although, a higher percentage of females whose age ranged from six to 12 years were overweight compared to males, there was no statistically significant difference in the percentage of overweight subjects between the two genders ($p = 0.33$). With regards to

Table 2: Mean Heights-for-Age of Subjects

Age (Year)	Number		Height [Mean \pm SD]		P value
	Male	Female	Male	Female	
6	7	11	1.15 \pm 0.05 (1.08-1.25)	1.20 \pm 0.07 (1.13-1.33)	0.12
7	9	13	1.22 \pm 0.05 (1.14-1.13)	1.21 \pm 0.05 (1.16-1.30)	0.65
8	22	26	1.28 \pm 0.06 (1.16-1.38)	1.26 \pm 0.07 (1.13-1.41)	0.30
9	31	28	1.29 \pm 0.05 (1.20-1.39)	1.29 \pm 0.06 (1.17-1.43)	1.00
10	43	39	1.35 \pm 0.07 (1.20-1.53)	1.34 \pm 0.07 (1.19-1.51)	0.52
11	31	37	1.37 \pm 0.08 (1.23-1.52)	1.41 \pm 0.09 (1.14-1.64)	0.06
12	33	46	1.42 \pm 0.09 (1.20-1.69)	1.44 \pm 0.09 (1.22-1.60)	0.33
13	45	28	1.46 \pm 0.10 (1.20-1.70)	1.52 \pm 0.08 (1.30-1.63)	0.01
14	44	30	1.51 \pm 0.10 (1.33-1.73)	1.55 \pm 0.07 (1.44-1.74)	0.06
15	38	42	1.55 \pm 0.08 (1.37-1.73)	1.56 \pm 0.06 (1.44-1.66)	0.53
16	27	37	1.61 \pm 0.08 (1.45-1.74)	1.58 \pm 0.05 (1.47-1.68)	0.07
17	17	20	1.65 \pm 0.07 (1.53-1.77)	1.55 \pm 0.06 (1.44-1.65)	0.00
18	7	9	1.66 \pm 0.08 (1.53-1.74)	1.60 \pm 0.08 (1.47-1.72)	0.16

Values in parentheses are range. Height is in metres

Table 3: Mean Weights-for-Age of Subjects

Age (Year)	Number		Weight [Mean ± SD (kg)]		P value
	Male	Female	Male	Female	
6	7	11	19.53±1.70(17.0-22.2)	20.94±5.06(16.4-33.5)	0.49
7	9	13	21.43±2.54(18.8-25.6)	21.72±3.05(15.5-27.4)	0.82
8	22	26	24.02±2.64(19.4-29.1)	23.77±3.57(17.0-32.1)	0.79
9	31	28	26.19±3.79(17.4-37.5)	25.71±5.81(18.0-50.1)	0.71
10	43	39	28.38±4.01(19.9-38.9)	28.14±4.41(19.4-37.0)	0.80
11	31	37	30.00±4.89(23.9-39.6)	31.29±7.04(16.6-52.0)	0.39
12	33	46	32.35±5.12(20.4-44.9)	34.46±7.28(23.6-55.9)	0.16
13	45	28	36.86±9.19(22.4-66.3)	43.04±10.20(25.5-68.3)	0.01
14	44	30	38.72±7.65(26.5-60.4)	44.92±8.75(33.7-77.5)	0.00
15	38	42	41.94±6.22(32.2-53.6)	45.56±6.21(33.0-60.0)	0.01
16	27	37	42.26±7.03(35.7-58.7)	52.29±9.46(38.8-88.6)	0.00
17	17	20	51.62±8.02(40.4-66.6)	49.15±7.01(39.9-60.4)	0.32
18	7	9	52.17±7.28(38.5-61.9)	49.14±5.90(42.3-62.3)	0.37

Values in parentheses are ranges

Table 4: Mean BMI profiles for Males and Females

Age (Year)	Number		BMI [Mean ± SD (Kg/m ²)]		P value
	Male	Female	Male	Female	
6	7	11	14.73±0.49(14.0-15.3)	14.24±1.61(12.4-18.5)	0.45
7	9	13	14.43±0.90(13.2-15.9)	14.65±1.46(11.5-16.2)	0.69
8	22	26	14.81±1.25(11.7-16.8)	14.86±1.26(13.3-17.4)	0.89
9	31	28	15.69±1.97(12.1-20.9)	15.18±2.11(12.7-24.5)	0.34
10	43	39	15.55±1.32(13.5-19.7)	15.72±1.65(13.6-20.3)	0.61
11	31	37	15.92±1.41(13.8-18.8)	15.71±1.84(12.1-20.8)	0.61
12	33	46	15.99±1.32(14.0-19.4)	16.50±1.96(13.6-21.8)	0.20
13	45	28	16.84±2.40(12.7-25.6)	18.59±3.98(14.5-33.4)	0.02
14	44	30	16.84±1.67(13.6-20.8)	18.58±2.95(14.6-25.9)	0.00
15	38	42	17.31±1.44(15.2-21.5)	18.88±2.13(15.5-25.0)	0.00
16	27	37	18.07±1.55(15.1-21.0)	20.39±2.79(15.9-27.8)	0.00
17	17	20	18.78±1.91(15.5-24.2)	20.33±2.60(16.7-26.7)	0.05
18	7	9	18.79±1.81(16.4-21.2)	19.22±1.80(17.4-22.3)	0.64

Values in parentheses are ranges

Table 5: Relationship between Social Class and Overweight in Study Subjects using IOTF Standards

Social-Class	Number %		
	Overweight	Non-overweight	Total
I	0(0.0)	35(5.0)	35(4.9)
II	7(35.0)	99(14.1)	106(14.7)
III	9(45.0)	223(31.9)	232(32.2)
IV	4(20.0)	337(48.1)	341(47.4)
V	0(0.0)	6(0.9)	6(0.8)
Total	20 (100)	700 (100)	720 (100)

($\chi^2 = 11.55$, $df = 4$ and $p = 0.02$).

adolescent subjects whose age ranged from thirteen to eighteen years, a higher proportion of females compared to males was overweight and this was statistically significant ($p = 0.04$). More females were overweight compared to their male counterparts. This gender-related difference in the prevalence was statistically significant ($p < 0.01$).

On the whole, two (0.3%) of the 720 were obese, both were females aged nine and 13 years. None of the male subjects was obese. The two obese subjects were from the higher social classes (i.e. I and II). Table 5 shows the relationship between subject's social class and overweight using IOTF for the 720 subjects. Seven (5.0%) of 141 subjects in higher social classes I and II, nine (3.9%) of the 232 in the middle social class III and four (1.2%) of 347 in the lower social classes IV and V were overweight. The higher proportion of subjects with overweight in the higher social classes compared with the lower social classes was statistically significant ($p = 0.03$ comparison of proportion). However, when compared with the middle social class, there was no statistically significant difference in the proportion of obese subjects among those in the higher and the middle social classes ($p = 0.62$).

Obesity was noticed only in subjects attending private schools involving two (0.6%) of the 360 subjects studied. Overweight was seen in 17 (4.7%) of the 360 attending private schools and three (0.8%) of the 360 subjects from public schools. The higher percentage of subjects with overweight from private schools compared to those from public schools was statistically significant ($p < 0.01$).

Using the adult BMI of $> 25 \text{ kg/m}^2$ and $> 30 \text{ kg/m}^2$ however, eight (1.1%) of 720 subjects were overweight comprising seven (87.5%) females and one (12.5%) male. One (0.1%) of the 366 females was aged 13 was obese. None of the males was obese. Of the 720 subjects, 152 (21.1%) had BMI within the normal range of 18.5 to 25.0 kg/m^2 . Fifty (32.9%) of these 152 subjects were males and the remaining 102 (67.1%) were females. Five hundred and sixty (77.8%) of the 720 subjects were underweight with a BMI

of less than 18.5 kg/m², 303 (54.1%) were males, while 257 (45.9%) were females.

DISCUSSION

Excess weight may have a great impact on the health, and quality of life of individuals. It has now become a global problem spreading to the developing world and resulting in increased threat to health.²³ In the present study, the prevalence of obesity using the IOTF cut-off points in children was 0.3 percent, while the prevalence of overweight was 2.8 percent in both sexes with the boys having 0.8 percent and girls 2.8 percent. Obesity (0.3 percent) was found only among the female subjects. This shows that overweight and obesity were significantly more prevalent in females than males. These prevalence rates are low when compared with values obtained from other studies done within and outside Nigeria. Akesode and Ajibode²⁴ in 1983 reported the prevalence of obesity to be 3.2% and 5.1% while overweight was 9.3 and 7.9% in males and females, respectively. Owa and Adejuyigbe⁹ reported in 1997 a prevalence rate of 18% for obesity in Ile-Ife, while the prevalence of obesity obtained by Ansa *et al*⁸ in 2001 was two to four percent. Oner *et al*,²⁵ in Istanbul Turkey reported a prevalence of 11.3 and 10.6 percent for overweight and 1.6 and 2.1% for obesity in boys and girls, respectively. The reported prevalence rates of obesity from the western countries were 15 to 30. percent.¹⁰

The possible reasons for these disparities in prevalence rates include differences in methodology used. While the present study used the IOTF cut off points in children and adult cut-off values in adult to determining the prevalence of overweight and obesity, other studies have used adult cut-off points alone (Ansa *et al*),⁸ bioelectrical impedance analysis (Owa and Adejuyigbe),⁹ weight and triceps skin-fold measurement (Akesode and Ajibode).²⁴ The distribution of body fat is not uniform throughout the body; this may introduce factors resulting in over or under-estimation of the prevalence of overweight and obesity. In this present study, the adult cut-off points of 25 kg/m² and 30 kg/m² appears to underestimate

overweight and obesity in children and adolescents with a tendency to overestimate the prevalence of underweight in these age categories. Hence, they are unsuitable for determining overweight and obesity in children and adolescents. BMI, using the international cut-off points for children still remains the gold standard since it takes into account the lean body mass in relation to the height and weight. Furthermore, Owa and Adejuyigbe⁹ determined the prevalence of obesity among children of the affluent and the elite in the University staff school compared with the poor and the disadvantaged, living in the other parts of Ile-Ife and attending public schools. This less privileged group constituted the focus of the present study. Evidently, the high socio-economic status of the pupils studied by Owa and Adejuyigbe could have accounted for the higher prevalence rate of obesity recorded in their series. In the present study, overweight and obesity was seen to be more prevalent in children from the high social classes, and this is also evident in the higher prevalence among the pupils in private schools compared to public schools. The lower prevalence rate in the present study when compared with the higher rate obtained by Ansa *et al*⁸ may be due to differences in the level of urbanisation of the two communities; Ile-Ife is a semi-urban community while Calabar, is an urban city and state capital in the oil-rich South-south region of Nigeria. Hence, the standard of living is expected to be higher, with the consequent expectation of a higher prevalence rate of obesity as was the case in the series of Ansa *et al*.⁸ The cultural effects on nutrition in Calabar may also be a factor in the higher prevalence rate obtained by Ansa *et al*.⁸

The lower prevalence rates obtained from the present study compared with the earlier studies done outside Nigeria are probably the result of poor socioeconomic status of the people and inadequate intake of foods. Children in- Western Countries eat more of fast food and engage more in sedentary lifestyle; even toddlers are reportedly lazy.²⁶ It may also be a reflection of body build in the different

population. Owa and Adejuyigbe⁹ made a similar observation. In the present study, obesity and overweight were found to be the most common among females and this- was similar to the findings. of earlier workers.^{8,9,24} Aina *et al*²⁷ earlier contended in their report that there were no gender differences in the prevalence of obesity and overweight. This however is in contrasts to the findings of the present study. The present study also showed that BMI as well as other anthropometric parameters in children and adolescents in Ile-Ife increased progressively with age. This is consistent and corroborates the result of those of a similar data on black children and adolescents in the United States.²⁸ The well described physiologic growth spurt associated with puberty noticeable at the age of 11 to 16 years in females was also shown in this study. Females were found to be heavier than males during this period and were also taller at age 11 years. However, at age 16 years, males were taller than females.

In the present study, using the IOTF cut off points in children, the two obese female subjects were from social classes I and II respectively. Obesity and overweight were significantly prevalent among the higher social classes. This finding is in agreement with the conventional wisdom that the main reason for small stature and slow growth of people in many parts of the world is poverty and not their genes.²⁹ The difference between the rich and poor is apparent in different communities throughout the world.²⁹ Obesity is more common in the higher social classes because these families by virtue of their better economic power, can afford better food that will likely be in excess for their children. This observation is consistent with that of Villa-Caballero *et al*³⁰ which indicated that socio-economic status is closely related to the prevalence of obesity.

The values of BMI have shown an increase over the years in the developed countries,³¹ an observation that has been ascribed to a secular trend towards higher values of BMI.²⁸ Such secular trends are also supported by data from the Paediatric Nutrition Surveillance System,³² which interestingly suggested that socio-

economic status was unrelated to the prevalence of obesity. This is at variance with the findings of the present study as well as those of earlier works which showed that socio economic status is related to the occurrence of overweight and obesity.^{8,9,24} With improvement in the standards of living, communities like Nigeria with undefined prevalence rate of obesity may witness a rise in BMI values and thus suffering the obesity problem in the near future.⁹ This is due to the fact that obesity is multi-factorial with contributions from genetic and the environment.¹¹ Moreover, the trend observed in other parts of the world may also occur here.

This study showed that obesity and overweight occurred commonly in children who attended private schools compared with public schools. This is consistent with the findings of Villa-Caballero *et al*³⁰ among Hispanics living in Mexico. This may be due to the fact that the affluent tend to send their children to private schools, because such families by virtue of their better economic power can afford a higher cost of living and better lifestyle. Obesity and overweight in these children may also be enhanced by the fact that they are more prone to inactive lifestyle.²⁶

It is thus concluded from this study that obesity and overweight are relatively rare problems among children in Ile-Ife with prevalence rates of 0.3 and 2.8 percent respectively, and they tend to have a female preponderance. Body mass index increases with age with females having higher values. There is higher frequency of obesity and overweight in the children from high socio-economic compared to the low socioeconomic classes.

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