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Eating Habits, Activity Pattern and Socioeconomic Factors That Affect the Prevalence of Overweight and Obesity among Adolescents in Urban Areas of Enugu State, Nigeria

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Abstract: This study was designed to assess the influence of eating habits, activity pattern and socioeconomic factors on the prevalence of overweight and obesity among adolescents in urban areas of Enugu State, Nigeria. A total of 250 adolescents (10-19 years) consisting of 114 males and 136 females were randomly selected from six private and public schools. A structured questionnaire was used to collect information on the background, food habits and activity pattern of the adolescents. Anthropometric measurements (weight and height) of the adolescents were obtained using standard instruments and procedures and used to calculate their Body Mass Index (BMI). The BMI were categorized into obesity, overweight, normal and thinness using the International Obesity Task Force (IOTF) criteria. The WHO adult BMI classification was used to classify the adolescents who were 19 years of age. Data obtained were analyzed using the Statistical Package for Social Sciences (SPSS), version 17. A total of 3.4% overweight and 5.7% obese adolescents were from highest income families. The prevalence of the overweight and obesity among adolescents who skipped breakfast was 13 and 3.7%, respectively. Family income, snacking habit, means of going to school and presence of house helps are important factors that influenced the prevalence of overweight and obesity among adolescents in the study area.

Key words: Adolescents, eating habits, obesity, overweight, physical activity, socioeconomic factors

INTRODUCTION

Adolescence is an important period during which major biological, social, physiological and cognitive changes take place. Adolescents have special nutritional needs due to rapid growth and maturational changes associated with the onset of puberty. During this period their appetite for food increase and this voracious eating habit can contribute to obesity and its associated risk factors (Ene-Obong, 2001). At this period, body proportion including indices using height and weight measurements changes substantially due to increased weight. Among children and adolescents, weight is gained as a natural part of the growth process and reflects increase in fat mass as well as lean body mass and bone. Obesity in childhood and adolescence has reached epidemic proportions in the 21st century with rising rates in both developed and developing countries (WHO, 1998; Wang and Lobstein, 2006). The society has become more sedentary, the inactive lifestyles among adolescents are mostly as a result of use of television, computers and video games. Differences in overweight and obesity prevalence amongst the adolescents on the basis of settlement area (urban versus rural), is further proof to the effect of lifestyle and socioeconomic factors on the development of overweight and obesity.

Obesity in children and adolescents is a major concern not only because of the health and social problems in the short term but also because of the increased risk if it continues into adulthood with associated long term effects (Chatwal *et al*., 2004). This study was therefore undertaken to determine the eating habits, activity pattern and socioeconomic factors affecting the prevalence of overweight and obesity among adolescents in urban areas of Enugu State, Nigeria.

MATERIALS AND METHODS

Study area: This study was carried out in Enugu State, Nigeria. Nigeria is the most populous country in Africa and the seventh most populous country in the world (Library of Congress, 2008), the population of Nigeria as at December, 2011 was 162, 470, 737 and this represents 2.35% of the world's total population. Enugu State has 17 Local Government Areas (LGAs) with a total population of 3, 267, 837 (National Population Commission, 2009). The State is made up of the 'Igbos', a major ethnic group in Nigeria that make up 18% of the country's population. The 'Igbos' number about 40 million worldwide and 30 million in Nigeria. Enugu State has a land area of approximately 7, 161 km^2 that spreads from the semi-tropical rainforest belt of the

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south towards the Guinea savannah in the north. Their staple foods include rice (*Oryza sativa*), yam (*Discorea* spp), beans (*Vigna* spp), maize (*Zea mays*), cassava (*Manihot esculenta*), cocoyam (*Colocasia esculenta*) and plantain (*Musa paradisiaca*).

Sampling procedure: A multi-stage sampling technique was adopted. In the first stage, Enugu State was stratified into rural and urban areas. According to the US Census Bureau, an urban area is a place that has a population density of 6, 475.0 or more persons per square kilometre (2500 or more persons per square mile). Based on that criterion, Enugu North (Enugu Urban) was chosen to represents the urban area. In the next stage, three communities were randomly selected from Enugu North (Enugu Urban) by balloting. A list of schools in the selected communities was obtained from the State Education Commission and was stratified into private and public schools. From the list, one private and one public school were randomly selected from each of the communities, in order to ensure that adolescents from both low and middle income families were captured. In the last stage, every third pupil in each class (who was within the age range of 10-19 years) was chosen for the study to give a total of 250 pupils; consisting of 114 males and 136 females.

Informed consent: Approval for this study was given by the individual school authorities and the parents/ guardians of the selected adolescents.

Data collection: A structured and validated questionnaire was used to collect data on the background information, food habits and activity patterns of the adolescents. The ages of the selected adolescents were obtained from the school registers. Anthropometric measurements (height and weight) of the adolescents were obtained. Height was determined using a microtoise height meter rule placed on a flat floor. Participants were asked to remove their shoes and stand in front of the height board with heels, buttocks, shoulders and back of the head touching the wall. While the head was comfortably erect with the lower boarder of the orbit in the horizontal plane and external auditory meatus and the arms hanging freely at the sides in a natural manner, the height was then measured and recorded to the nearest 0.1 cm. Weight was determined using a Hanson (H60) bathroom scale. The scale was regularly checked and adjusted to zero mark after each measurement. Participants were measured wearing minimal clothes and no footwears. The weight was then measured and recorded to the nearest 0.1 kg.

The height and weight measurements were used to calculate the Body Mass Index (BMI) of the adolescents using the formula:

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

The BMI were categorized into obesity, overweight, normal and thinness using the International Obesity Task Force (IOTF) criteria (Cole *et al*., 2000). For adolescents who were 19 years, the WHO adult BMI classification of <18.50 (Thinness), 18.50-24.99 (Normal), ≥25.00-29.99 (Overweight) and ≥30 (Obesity) was used for their classification (WHO, 1995).

Statistical analysis: The data obtained were coded and analyzed using the Statistical Package for Social Sciences (SPSS), version 17.

RESULTS

General characteristics of adolescents: The study population was made of 45.6% males and 54.4% females (Table 1). More than half (56%) were within the age range of 15-19 years while 44% were in their early adolescence stage (10-14 years). Majority (89.2%) were Christians, 8.8% were Moslems while 2% practiced other religions. Majority (88.4%) were Igbo, 6 and 4% of the adolescents were Hausa and Yoruba, respectively while the remaining 1.6% was from the *Ijaw* and *Ibibio* tribes.

Factors responsible for overweight and obesity among urban adolescents: The socioeconomic characteristics of the adolescents' parents are shown in Table 2. A good number of the fathers were civil servants (23.6%), professionals (28%), businessmen (22%), members of the clergy (1.6%), unskilled labourers (23.6%) and had no job (1.2%). Only 2% of the mothers were full time housewives, 32.4% were civil servants, 23.6% were professionals and 26.8% were unskilled labourers. The data on educational status revealed that 21.2, 26 and 35% of the fathers had secondary school education, tertiary education I (OND, NCE, TTC) and tertiary education II (BSc, HND, MSc, PhD), respectively. Similarly, 21.6, 29.2 and 32.4% of their mothers attained secondary school education, tertiary education I and tertiary education II, respectively. The estimated family monthly income showed that 24.4% of the households earned NGN20,000 or less, 16% earned between NGN21,000 and NGN50,000, 33.2% earned between NGN51,000 and NGN99,000 while 26.4% earned a total of NGN100,000 or more monthly.

Effect of socioeconomic factors on adolescent's BMI status: The relationship between socioeconomic factors and the adolescents' BMI status is shown in Table 3 and 4. The effect of parental occupation and level of education on adolescents' BMI status (Table 3) revealed that among the adolescents, 10.3 and 14.8% who were

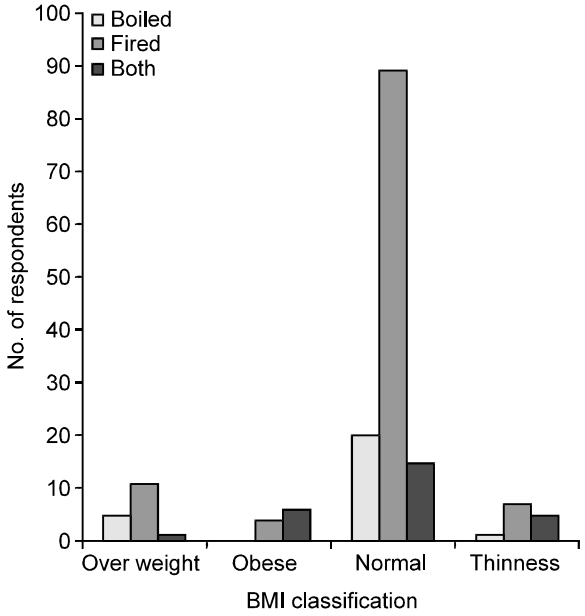

Fig. 1: Effect of forms of plantain preference on respondents BMI status

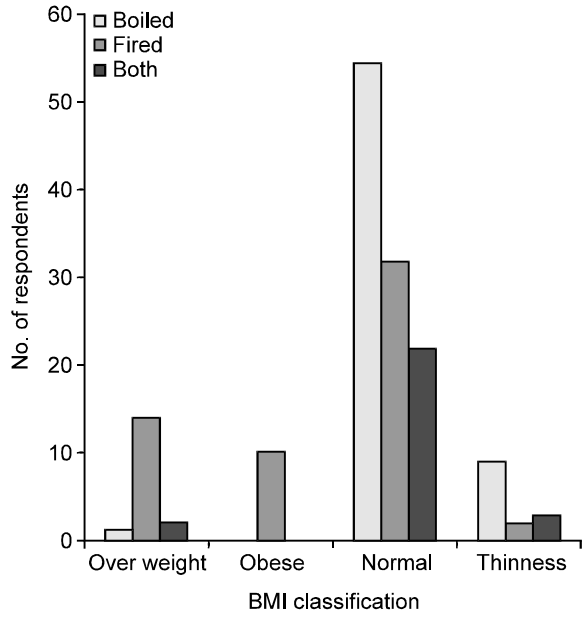

Fig. 2: Effect of forms of egg preference on respondents BMI status

overweight had fathers and mothers who were professionals. In addition, 3.8 and 5.5% of the adolescents' whose fathers and mothers, respectively were civil servants were obese. A total of 10.1% of the overweight and 5.1% of the obese adolescents had fathers who had HND, BSc, MSc or PhD.

The effect of estimated family monthly income on adolescents' BMI status (Table 4) showed a higher

Table 1: Adolescents' sex, age, religion and tribe

Variables		Frequency	Percentage
Sex	Male	114	45.6
	Female	136	54.4
	Total	250	100
Age	10-14 years	110	44.0
	15-19 years	140	56.0
	Total	250	100
Religion	Christian	223	89.2
	Moslem	22	8.8
	Others	5	2.0
	Total	250	100
Tribe	Igbo	221	88.4
	Hausa	15	6.0
	Yoruba	10	4.0
	Others (Ibibo, Ijaw)	4	1.6
	Total	250	100

prevalence of overweight (15.7%) and thinness (9.8%) among adolescents from lowest income level. The result also showed that families that earned NGN100,000 or more had 3.4 and 5.7% overweight and obese adolescents, respectively. A total of 13.5 and 5.2% of the overweight and obese adolescents, respectively were from family sizes of 2 to 6 persons. Only 3.2% of the overweight adolescents came from households with large family size (>10 persons). Among the families headed by males, 11.2, 4.5 and 74.9% were overweight, obese and normal, respectively while 8.3, 0 and 66.7% were overweight, obese and normal, respectively in families headed by females.

Food habits of adolescents: The effect of food habits of the adolescents on their BMI status (Table 5) shows that 5.3 and 3.5% of the obese adolescents ate three times and more than three times a day, respectively. Among the adolescents that skipped breakfast, 13% were overweight, 3.7% were obese while 72.2% were normal. A total of 11.4, 5.7 and 72.2% of the adolescents who were overweight, obese and normal, respectively reported that they did not skip meals. Data on their snacking habit revealed that among those who snack almost every day, 14% were overweight and 4.4% were obese. A total of 14.3, 3.6 and 64.3% that were overweight, obese and normal, respectively snack 3-4 times/week.

The forms in which plantain and eggs were preferably consumed by the adolescents are presented in Fig. 1 and 2, respectively. Majority of the overweight and obese adolescents preferred fried eggs and plantain.

Effect of physical activity on respondents' BMI status: The relationship between the physical activity of the adolescents and their BMI status is shown in Table 6. It revealed that 9.8 and 4.3% of the adolescents who were day students (went to school from home) were overweight and obese, respectively while 11.9 and 4.8% of the boarders were overweight and obese,

Table 2: Socioeconomic status of respondents' parents

	Father		Mother	
Socioeconomic status	Frequency	Percentage	Frequency	Percentage
Occupation				
Civil servant	59	23.6	81	32.4
Clergy/Pastor	4	1.6	1	0.4
Professionals[1]	70	28.0	59	23.6
Businessman/woman	55	22.0	37	14.8
Housewife/nothing	3	1.2	5	2.0
Unskilled labourer	59	23.6	67	26.8
Total	250	100	250	100
Educational status				
Primary education only	43	17.2	42	16.8
Secondary education only	53	21.2	54	21.6
Tertiary education I (OND, NCE, TTC)	65	26.0	73	29.2
Tertiary education II (HND, BSc, MSc, PhD)	89	35.6	81	32.4
Total	250	100	250	100
Family estimated monthly income (NGN)[2]				
≤20,000	61	24.4		
21,000-50,000	40	16.0		
51,000-99,000	83	33.2		
≥100,000	66	26.4		
Total	250	100		

[1]Professionals (Medical doctors, nurses, pharmacists, lawyers, accountants). [2]Exchange rate at the time of the study: NGN 158.62 = USD1

Table 3: Effect of parental occupation and level of education on adolescent's BMI status

	Father					Mother				
Variables	Over weight	Obesity	Normal	Thin-ness	Total	Over weight	Obesity	Normal	Thin-ness	Total
Occupation										
Civil servant	5(9.4)	2(3.8)	38(71.1)	8(15.1)	53(100)	8(11)	4(5.5)	48(65.7)	13(17.8)	73(100)
Clergy	2(50.0)	-	2(50.0)	-	4(100)	1(100)	-	-	-	1(100)
Professional[1]	7(10.3)	3(4.4)	53(77.9)	5(7.4)	68(100)	8(14.8)	1(1.8)	42(77.8)	3(5.6)	54(100)
Businessman/woman	7(14.3)	3(6.1)	35(71.4)	4(8.2)	49(100)	5(13.9)	1(2.8)	28(77.8)	2(5.5)	36(100)
Housewife/nothing	-	-	1(100)	-	1(100)	-	-	4(80.0)	1(20)	5(100)
Unskilled labourer	3(5.0)	2(3.4)	47(79.7)	7(11.9)	59(100)	4(6.0)	4(6.0)	54(80.6)	5(7.4)	67(100)
Total	24	10	176	24	234	26	10	176	24	236
Educational level										
Primary	4(16.0)	3(12.0)	13(52.0)	5(20)	25(100)	2(5.1)	2(5.1)	30(77)	5(12.8)	39(100)
Secondary	6(9.8)	1(1.6)	47(77.1)	7(11.5)	61(100)	3(7.0)	1(2.3)	33(76.7)	6(14.0)	43(100)
Tertiary I (OND, NCE, TTC)	8(12.5)	2(3.1)	46(71.9)	8(12.5)	64(100)	8(11.8)	3(4.4)	54(79.4)	3(4.4)	68(100)
Tertiary II (HND, BSc, MSc, PhD)	8(10.0)	4(5.0)	64(80.0)	4(5.0)	80(100)	12(16)	4(5.3)	52(69.4)	7(9.3)	75(100)
Total	26	10	170	24	230	25	10	169	21	225

Figures in parenthesis represent the percentages. [1]Professionals (medical doctors, nurses, pharmacists, lawyers, accountants)

respectively. A total of 10.8 and 7.2% of overweight and obese adolescents, respectively went to school by car/motorcycle. All the obese adolescents engaged in physical activities. Only 2.3% of the adolescents who had no house help were obese.

DISCUSSION

Higher prevalence of overweight and obesity was recorded among adolescents from higher socio-economic class as well as from poor backgrounds. In addition, more of the overweight and obese adolescents' parents attained tertiary education. There is therefore, a high tendency that these parents would be more involved in their jobs than with their children, thereby exposing them to higher probability of choosing unhealthy foods and snacks. Studies have shown that parental monitoring reduced the number of less nutritious food items chosen and the overall amount of energy taken (Klesges *et al*., 1991; Jouret *et al*., 2007). These results are in agreement with the reports of Ebenezer *et al*. (2011) and Senbanjo and Oshikoya (2010). However, a study conducted in Canada (Donalelle, 2001) proved that children who lived in communities with high unemployment rates, low family income or low educational levels were at a greater risk of being overweight or obese.

Breakfast was the meal mostly skipped by the obese and overweight adolescents. Their reason for skipping breakfast was to control their weight. A higher prevalence of overweight and obese adolescents was found among those who snack, as had also been reported by Omuemu and Omuemu (2010). Up to 10.8 and 3.6% of the overweight and obese adolescents in this study took meals to school. In addition to the meal,

Table 4: Effect of estimated family monthly income, household size and head of household on respondents' BMI status

Variables	Over weight	Obesity	Normal	Thinness	Total
Monthly income (NGN)[2]					
≤20,000	8(15.7)	3(5.9)	35(68.6)	5(9.8)	51(100)
21,000-50,000	3(7.5)	2(5.0)	33(82.5)	2(5.0)	40(100)
51,000-99,000	3(6.7)	-	39(86.6)	3(6.7)	45(100)
≥100,000	3(3.4)	5(5.7)	76(86.4)	4(4.5)	88(100)
Total	17	10	183	14	224
Household size					
2-6	13(13.5)	5(5.2)	62(64.6)	16(16.7)	96(100)
7-10	12(11.8)	2(2.0)	81(79.4)	7(6.8)	102(100)
>10	1(3.2)	3(9.8)	25(80.6)	2(6.4)	31(100)
Total	26	10	168	25)	229
Head of household					
Father	25(11.2)	10(4.5)	167(74.9)	21(9.4)	223(100)
Mother	1(8.3)	-	8(66.7)	3(25.0)	12(100)
Total	26	10	175	24	235

Figures in parenthesis represent percentages. [2]Exchange rate at the time of the study: NGN 158.62 = USD 1

Table 5: Effect of respondents' food habits on their BMI status

Variables	Over weight	Obesity	Normal	Thinness	Total
Frequency of eating					
Once	-	-	5(83.3)	1(16.7)	6(100)
Twice	2(8.7)	-	20(87.0)	1(4.3)	23(100)
Three times	15(9.9)	8(5.3)	111 (73.0)	18(11.8)	152(100)
More than 3 times	9(15.8)	2(3.5)	42(73.7)	4(7.0)	57(100)
Total	26	10	178	24	238
Type of meal skipped					
Breakfast	14(13.0)	4(3.7)	78(72.2)	12(11.1)	108(100)
Lunch	1(2.4)	1(2.4)	37(90.2)	2(5.0)	41(100)
Dinner	2(9.5)	1(4.8)	17(80.9)	1(4.8)	21(100)
Do not skip meal	8(11.4)	4(5.7)	51(72.9)	7(10)	70(100)
Total	25	10	183	22	240
Frequency of snacking					
1-2 times/week	4(7.0)	2(3.4)	47(81.0)	5(8.6)	58(100)
3-4 times/week	4(14.3)	1(3.6)	18(64.3)	5(17.8)	28(100)
Almost everyday	16(14)	5(4.4)	81(71.1)	12(10.5)	114(100)
Do not snack	2(5.3)	2(5.3)	32(84.2)	2(5.3)	38(100)
Total	26	10	178	24	238
Food preference					
Home prepared food	22(11.2)	7(3.6)	148(75.5)	19(9.7)	196(100)
Fast food	4(14.8)	3(11.1)	18(66.7)	2(7.4)	27(100)
Total	26	10	166	21	223
School lunch					
Take lunch to school	15(10.8)	5(3.6)	104(74.8)	15(10.8)	139(100)
Do not take lunch to school	8(10.0)	5(6.2)	59(73.8)	8(10.0)	80(100)
Total	23	10	163	23	219

Figures in parenthesis represent percentages

money could be given to these pupils and they would end up purchasing junk foods high in sugar, saturated fat and low in fibre, which contribute to their weight gain. The food most frequently consumed by the adolescents were plantain and eggs in the fried form which must have contributed to the increased weight gain noticed in both overweight and obese respondents. Researchers have noted that the consumption of fried food, may promote obesity through greater intake (Astrup *et al*., 2002) and energy density (Bell *et al*., 1998).

Several studies (Collins *et al*., 2008; Mahfouz *et al*., 2008; Planinsec and Matejek, 2004) showed a relationship between physical activity and BMI status, suggesting that increased sedentary lifestyle plays a role in weight gain. Others (Al-Nakeeb *et al*., 2007; Caspersen *et al*., 2000) demonstrated a null association between physical activity and weight gain. This study however, showed a positive relationship between means of going to school, number of house helps and BMI status, as most of the obese and overweight adolescents went to school by car/motorcycle and had house helps at home. The present study also showed that all the obese adolescents engaged in physical exercises in order to control their increasing weight.

Table 6: Effect of students' residential status, means of going to school, participation in school games and physical exercise and house helps on respondents' BMI status

Variables	Over weight	Obesity	Normal	Thinness	Total
Type of student					
Day-student	18(9.8)	8(4.3)	137(74.5)	21(11.4)	184(100)
Boarder	5(11.9)	2(4.8)	32(76.2)	3(7.1)	42(100)
Total	23	10	169	24	223
Means of going to school					
Car/motorcycle	12(10.8)	8(7.2)	78(70.3)	13(11.7)	111(100)
Walk/trek	9(10.0)	2(2.2)	71(78.9)	8(8.9)	90(100)
Total	21	10	149	21	201
No of school games involved in					
One game	9(9.5)	3(3.2)	74(77.9)	9(9.4)	95(100)
More than one game	6(10.7)	7(12.5)	37(66.1)	6(10.7)	56(100)
Total	15	10	111	15	151
Type of physical exercise engaged in					
Jogging	5(11.6)	3(7.0)	30(69.8)	5(9.8)	43(100)
Football	4(4.6)	5(5.8)	63(73.3)	14(27.5)	86(100)
Tennis	8(34.8)	2(8.7)	13(56.5)	-	23(100)
Swimming	1(33.3)	-	1(33.3)	1(33.3)	3(100)
Others	-	-	23(100)	-	23(100)
Do not engage in physical exercise	7(9.7)	-	34(47.2)	31(43.1)	72(100)
Total	25	10	164	51	250
Number of house helps					
1-2	9(13.6)	5(7.6)	44(66.7)	8(12.1)	66(100)
>2	4(12.1)	2(6.1)	21(63.6)	6(18.2)	33(100)
Do not have house help	11(8.6)	3(2.3)	103(80.5)	11(8.6)	128(100)
Total	24	10	168	25	227

Figures in parenthesis represent percentages

This study has shown high levels of risk factors of overweight and obesity (family income, snacking habit, means of going to school and presence of house helps) among obese and overweight adolescents. The findings of this study suggest that in order to reduce obesity and overweight, good nutritional practices, healthy eating behaviours and physical activity should be inculcated.

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