The effect of some social factors on adolescents nutritional status in an oil-rich Niger-Delta region of Nigeria

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Abstract

Background: Adolescence is the period of transition from childhood to adulthood and the second most critical period of physical growth after the first year of life. Nutritional problems may arise from poor eating habits, snacking and consumption of nutrition deficient processed foods. Some social factors have been shown to influence their nutritional status, the result of which may have detrimental health implications as they advance into adulthood.

Aim: To determine the effect of some social factors on the nutritional status of adolescents in Port Harcourt.

Methods: A multi-staged sampling technique was used to select 960 adolescents from eightsecondary schools in Port Harcourt. Using an investigator-administered questionnaire, information on their socio-economic status, eating habits, food content and level of activity was obtained. Anthropometric measurements were taken and BMI calculated using the formula weight/height^2 (kg/m^2). This was then used to categorize their nutritional status. The results wereanalyzed using SPSS 14 and EPI Info 6.04.

Results: Eight hundred and nineteen adolescents (85.3%) had normal weight, 61(6.4%) were underweight while 17 (1.8%) were obese. Significantly more males (8.9%) were underweight compared to females (3.8%); while females were significantly more overweight and obese than males. Consumption of snacks (17.4%), soft drinks (10%), higher social economic class (11.5%) and watching television for >3hrs a day (18.6%) were associatedwith overweight and obesity.

Conclusion: Social economic status, snacking and hours spent watching television have a detrimental effect on the nutritional status of adolescents in Port Harcourt.

Keywords: Adolescents, Nutritional status, Social factors

Introduction

Adolescents constitute children aged 10-19years[1,2] and is the second most critical period of physical growth after the first year of life[3,4]. It is a period of transition from childhood to adulthood. Therefore ensuring adequate nutrition is vital for a healthy transition. The demand of growth spurt and maturation place extra nutritional demands on the adolescents, thus increasing their need for macronutrients and micronutrients[5,6].

Contributors to adolescents' nutritional status include poor eating habits which occur due to change in their diet from regular homemade meals to irregular meals, nutrition-poor snacks and fast food with high sugar content and poor nutritional value[7]. Nutritional deficiency in adolescence may also result from socioeconomic factors like parental education and occupation, family size, household food insecurity and intra-household allocation of food that does not meet their full range of dietary needs. In addition, eating disorder, lack of nutrition knowledge and life style of the adolescent may be contributory[7]. As a result, adolescents may become undernourished or over-nourished, leading to their being

underweight and overweight/obese, respectively, with attendant adverse health implications[6,8-12].

There are various methods/indices with which adolescent nutritional status can be determined[13-17], but the easiest and most widely used index is the body mass index (BMI)[18].

Port Harcourt City (PHC) is located in the oil-rich Niger-Delta region of Southern Nigeria and has a mixed population of residents, ranging from high to low socioeconomic classes. The town has experienced rapid population growth due to oil exploratory activities and this has resulted in various socioeconomic and lifestyle changes with the springing up of many fast food outlets to cater to the busy populace. The effect of these social changes as they affect adolescent nutritional status is the subject of this research.

The study thus seeks to determine the relationship (if any), between social factors such as socioeconomic class, family size, parental education, eating habits and lifestyle; and adolescents' nutritional status in Port Harcourt City. Findings from the study can potentially serve as a tool for targeted nutritional and healthy lifestyle education for adolescents in the region.

Methodology

This was a cross-sectional study carried out from April to July 2010. A stratified multi-staged sampling method was used to select 960 adolescents (10-19years) students from 8 secondary schools (4 private and 4 public) composed of 4 co-educational, 2 all girls and 2 all boys schools. A list of all secondary schools in Port Harcourt City obtained from the Rivers State Post primary school Education Board was used as the sampling frame. The schools were initially stratified into private and public schools, then within each stratum, further categorized into co-educational (mixed), all boys and all girls' schools. The 960 students were selected from each arm of the secondary schools (JSS1 to SSS3) by simple random sampling. Permission for the study was obtained from the Research and Ethics Committee of the University of Port Harcourt Teaching Hospital and Rivers State Post Primary School Education Board. Informed consent was obtained from individual school principals and parents/students. Adolescents with known existing chronic illnesses that may negatively affect growth, and those who did not give consent were excluded.

An investigator-administered questionnaire was used to obtain information on biodata, parental occupation and education, medical and nutritional history. Afterwards, anthropometry (weight and height)measurements were taken, and the body mass index (BMI)calculated using the formula weight/height^2 (kg/m^2); and compared to established standards of the World Health Organization/National Center for Health Statistics (NCHS)[13] to determine their nutritional status. Students whose BMI for age were $< 5^{th}$ percentile of the NCHS reference population were underweight, those whose BMI for age were between 5^{th} and 85^{th} were normal weight, BMI $\geq 85^{th}$ but $< 95^{th}$ percentile were overweight, and BMI $> 95^{th}$ percentile were classified as obese. Socioeconomic stratification was done based on the classification described by Oyedeji[19]. The mean score was used to assign the subject to one of the socioeconomic groups (I-V).

Data were analyzed using the Statistical Package for Social Sciences (SPSS) software version 14 and Epi Info version 6.04. Distributions were described as means and standard deviations. Analysis of variance was used to test statistical significance with respect to continuous variables while Chi-square was used for discreet variables. At 95% confidence interval, probability value < 0.05 was considered statistically significant.

Results

Table 1 shows the age and gender distribution of the study population. A total of 960 students were studied with age ranging from 10 to 19 years (14.25 $\pm$ 2.19 years). There were about equal distribution of males and females 481 versus 471 respectively. There was no significant age difference between males and females, except for those aged 18 and 19

years where males had significantly higher representation than females.

General characteristics of study population.

Table 2 shows the descriptive analysis of the study population. Of the 960 students, 362 (37.7%) were from private schools while 598 (62.3%) were from public schools. About half (50.6%) of the students in private schools and 17.7% in public schools belonged to the upper socioeconomic class (social classes I and II) while 16% of private and 39.5% of public school students belonged to the lower Socioeconomic class (social classes IV and V). Also, about half (49.4%) of the students from private schools had mothers with higher education (post secondary/tertiary), while a similar proportion of students (49.0%) in public school students had mothers with secondary education. There were more mothers 45(7.5%) without formal education among the public school students. More students 115(31.8%) from smaller families were in the private than public schools.

Mean weight for age according to gender

The mean weight for age, according to gender, is shown Figure 1. The mean weight of males was 49.34 ± 11.53kg while that of females was 49.62 ± 10.59kg. The difference in overall mean weight between sexes was not statistically significant (p = 0.69).

Mean height for age according to gender

The mean height of males was 1.60 ± 0.12m while that of females was 1.57 ± 0.08m. Overall, boys were significantly taller than girls (p = 0.000). (Figure 2)

Mean Body Mass Index (BMI) for age according to gender

A steady increase in growth was reflected by the BMI, which showed a gradual increase with age (Table 3). The mean BMI at 10 years for both sexes was 16.68 ± 2.34kg/m^2 and by 19 years it had risen to 21.89 ± 2.15kg/m^2. The overall mean BMI for females (20.01 ±3.50kg/m^2) was significantly higher than that of males (19.01 ±2.58 kg/m^2), (p=0.000).

Prevalence of malnutrition using BMI percentile by gender

Table 4 and Figure 4 showed that 61 (6.4%) of the study population were underweight. Majority (819 students) had normal weight (85.3%), while obesity was seen in 17 students (1.8%). According to gender, significantly more males (8.9%) were underweight compared to females 3.8% (p = 0.000). Females were significantly more overweight and obese than males (p< 0.05)

Comparison of some social factors with nutritional status of the study population

Table 5 compares the nutritional status of the study population in relation to some social characteristics. Children from upper social class were more overweight (8.7%) and Obese (2.8%) compared to those from lower social class 6.1% and 0.7%, respectively. Those whose mother were highly educated, with family size <5, television watching >5hours daily and those who snacked daily had higher rates of overweight and obesity. Underweight was more prevalent in children of lower social economic status (8.8%) and family size of 11-15 (8.7%).

Table 1. Age and gender distribution of study population

Age (Years)	Males No.	(%)	Females No.	(%)	Total	χ^2	P value
10	15	(3.1)	25	(5.2)	40	2.65	0.10
11	32	(6.7)	27	(5.6)	59	0.43	0.51
12	61	(12.7)	71	(14.8)	132	0.93	0.33
13	60	(12.5)	71	(14.8)	131	1.12	0.29
14	80	(16.6)	81	(16.9)	161	0.01	0.90
15	74	(15.4)	92	(19.2)	166	2.45	0.12
16	54	(11.2)	56	(11.7)	110	0.05	0.82
17	50	(10.4)	35	(7.3)	85	2.04	0.09
18	35	(7.3)	15	(3.1)	50	0.35	0.00*
19	20	(4.2)	6	(1.3)	26	7.69	0.01*
Total	**481**	**(100)**	**479**	**(100)**	**960**		

Table 2. General characteristics of the study population

	Private		Public		Total
Gender	**No**	**%**	**No**	**%**	
Male	120	(33.1)	361	(60.2)	481
Female	242	(66.9)	237	(39.8)	479
Social class					
I	36	(9.9)	8	(1.3)	44
II	147	(40. 6)	98	(16.4)	245
III	121	(33.4)	256	(42.8)	377
IV	55	(15.2)	222	(37.1)	277
V	3	(0.8)	14	(2.3)	17
Mothers Education					
No formal	7	(1.9)	45	(7.5)	52
Primary	31	(8.5)	128	(21.5)	159
Secondary	123	(33.9)	293	(49.0)	416
Technical	23	(6.3)	41	(6.8)	64
Higher/ University	178	(49.4)	91	(15.2)	269
Family Size					
<5	115	(31.8)	119	(19.9)	234
6-10	227	(62.7)	430	(71.9)	657
11-15	20	(5.5)	49	(8.2)	69
Total	**362**	**(100)**	**598**	**(100)**	**960**

Table 3. Mean BMI (kg/m^2) at various ages by gender

Age (Years)	Males No.	Males Mean ± SD	Females No.	Females Mean ± SD	P value
10	15	17.25±2.66	25	16.34±2.11	0.20
11	32	16.20±1.68	27	17.22±3.60	0.70
12	61	17.38±2.21	71	19.21±3.09	0.00*
13	60	18.00±2.41	71	19.84±3.07	0.00*
14	80	19.06±2.29	81	20.13±2.93	0.01*
15	74	19.61±1.99	92	20.34±2.90	0.06
16	54	19.50±1.78	56	21.38±4.59	0.00*
17	50	20.72±2.44	35	21.57±3.05	0.15
18	35	20.82±2.29	15	23.23±3.20	0.00*
19	20	21.60±2.15	6	22.85±2.07	0.22
Total	**481**	**19.01±2.58**	**479**	**20.01±3.50**	**0.00***

* = Significant.

Table 4. Nutritional status by gender

Nutritional status (NCHS)	Gender Males No.	Males (%)	Females No.	Females (%)	Total	(%)	χ^2	P value
Normal	417	(86.7)	402	(83.9)	819	(85.3)	1.47	0.220
Underweight	43	(8.9)	18	(3.8)	61	(6.4)	10.83	0.000
Overweight	18	(3.7)	45	(9.4)	63	(6.3)	12.50	0.000
Obese	3	(0.6)	14	(2.9)	17	(1.8)	7.29	0.006
Total	**481**	**(100)**	**479**	**(100)**	**960**	**(100)**	**29.20**	**0.000**

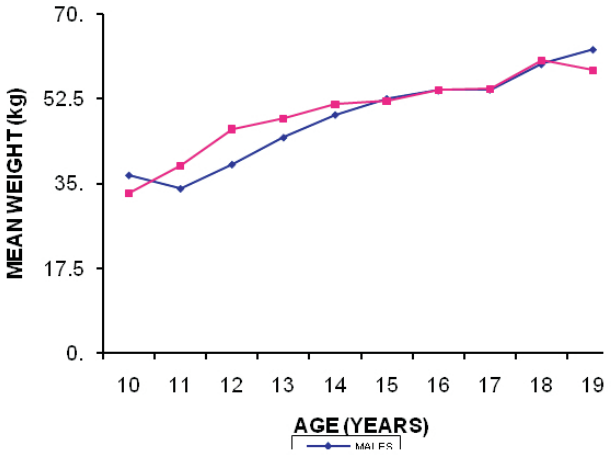

Figure 1. Mean weight (kg) at various ages according to gender

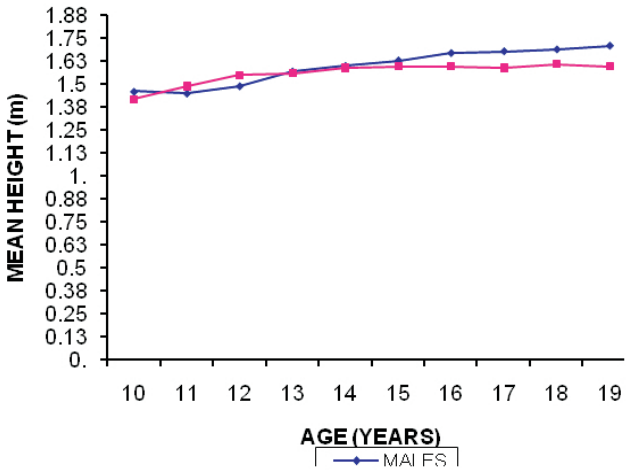

Figure 2. Mean height for age according to gender

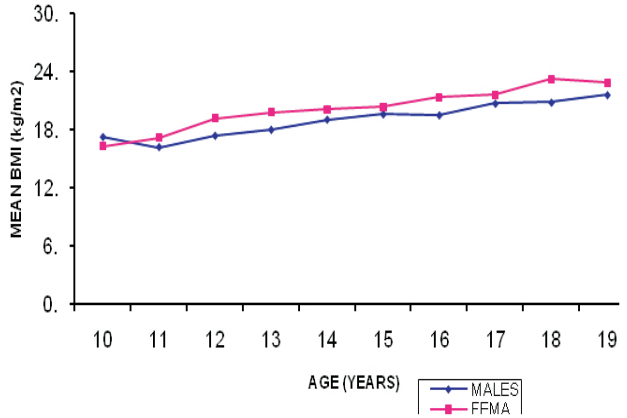

Figure 3. Mean BMI for age according to gender

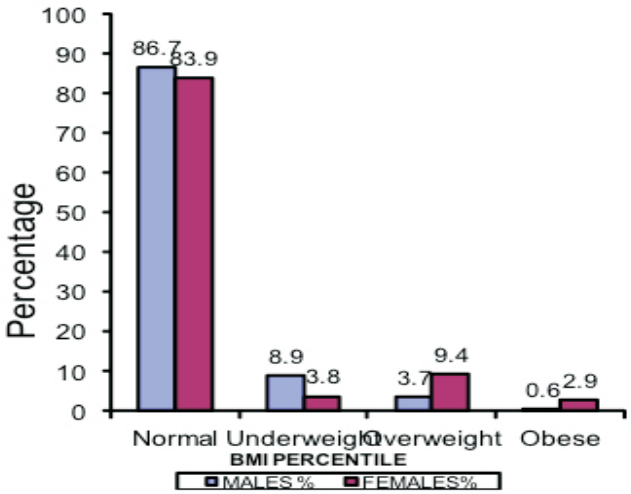

Figure 4. BMI Percentile according to gender

Table 5. Comparison of some social factors with nutritional status of the study population

Characteristic	Normal No (%)	Underweight No (%)	Overweight No (%)	Obese No (%)	Total No (%)
Social class					
Upper	244 (84.4)	12 (4.1)	25 (8.7)	8 (2.8)	289 (100)
Middle	327 (86.7)	23 (6.1)	20 (5.3)	7 (1.9)	377 (100)
Lower	248 (84.4)	26 (8.8)	18 (6.1)	2 (0.7)	294 (100)
Mother's education					
No education	47 (90.4)	4 (7.7)	1 (1.9)	0 (0.0)	52 (100)
Primary	139 (87.4)	10 (6.3)	9 (5.7)	1 (0.6)	159 (100)
Secondary	358 (86.1)	26 (6.3)	24 (5.8)	8 (1.9)	416 (100)
Technical/commerce	55 (85.9)	5 (7.8)	3 (4.7)	1 (1.6)	64 (100)
Higher/University	220 (81.8)	16 (5.9)	26 (9.7)	7 (2.6)	269 (100)
Family size					
≤5	198 (84.6)	19 (8.1)	13 (5.6)	4 (1.7)	234 (100)
6-10	563 (85.7)	36 (5.5)	45 (6.8)	13 (2.0)	657 (100)
11-15	58 (84.1)	6 (8.7)	5 (7.2)	0 (0.0)	69 (100)
Hours spent watching TV					
0-2	477 (86.1)	33 (6.0)	37 (6.7)	7 (1.3)	554 (100)
3-4	238 (85.0)	19 (6.8)	19 (6.8)	4 (1.4)	280 (100)
"	104 (82.5)	9 (7.1)	7 (5.6)	6 (4.8)	126 (100)
Snack intake/week					
Once	101 (87.1)	5 (4.3)	6 (5.2)	4 (3.4)	116 (100)
1-2	137 (87.3)	11 (7.0)	9 (5.7)	0 (0.0)	157 (100)

Discussion

This study showed that most adolescents (85.5%) in secondary schools in Port Harcourt had normal weight when compared to standard NCHS charts. Underweight malnutrition was seen in6.4% of the students, 6.3% were overweight and 1.8% was obese. These findings have also been reported by Ijarotimi *et al*[12] in Nigeria and Mukhopadhyay *et al*[11] west Bengal. Although reports of obesity was comparatively higher in more affluent developed countries like USA (15%), UK (20%), France (14%), Russia (6.7%), and China (3.6%)[20] possibly because there is more consumption of high caloric, readily available and comparatively cheaper fast food in these developed countries.

The nutritional status of adolescents in Port Harcourt was also observed to be influenced by a variety of social factors. Specifically, underweight malnutrition was more prevalent in adolescents of lower social class, whereas overweight and obesity were more prevalent in adolescents whose parents were of higher social class. This is not surprising as there is growing evidence that people of affluence tended to have decreased physical activities as they have cars, technology and domestic help to assist them, making their lifestyle more sedentary. Altered eating patterns and increased fat content of the meals, which is common in fast foods and snacks, may also have been contributory as these are more easily afforded by those of higher socio-economic class. This relationship between obesity and socioeconomic status varies across countries. The higher the social class, the more the risk of obesity in Russia and China; while in USA, the lower the social class, the higher the risk of obesity[21]. The unusual higher prevalence of obesity in the lower class populations of the USA has been insinuated to be due to consumption of relatively cheaper fat laden junk food from fast food outlets. It has also been theorized that food deprivation or the fear of

deprivation in this social class can lead to overeating when food is available[22].

Adolescents who drink sodas (commercial fizzy or carbonated drinks) everyday tended to be overweight in this study population. Dehghan *et al*[20] have reported that excessive soft drink consumption has been associated with epidemic of obesity and type II diabetes mellitus in children and adolescents. This is because soft drinks have a high caloric content and regular or daily consumption promote weight gain. It was also observed in this study that those who ingest snacks (mainly pastry-based) everyday were more overweight than those who ate it only once a week. This may also be explained by the same reason that pastries have relatively higher caloric content for potion consumed and as such daily ingestion of these highly processed foods with poor nutritional value will result in weight gain. Additionally, regular consumption of snacks between meals causes a reduction in appetite, and as such consumption of nutritious foods provided at home will be reduced.

Television viewing greater than three hours per day was associated with increased prevalence of overweight and more than 5hours a day was seen in more obese subjects. The risk associated with this behavior may operate through several mechanisms, including reduction of time spent in higher intensity physical activities, a sedentary lifestyle, a lowering of metabolic rate and more frequent snacking[23]. It is known that fast foods are the most advertised products on television, and children and adolescents are often the targeted market. Therefore it is not surprising that there may be increased snacking while viewing television.

Another finding in this study was worsening of the nutritional status of subjects with increasing family size. Although this finding was not statistically significant, other studies in children less than five years have shown an association between nutritional status and family size[24,25].Other authors have also observed that subjects from small family sizes, higher socioeconomic class, with highly educated mothers tended to be more obese[20]. This study actually observed that students with highly educated mothers were comparatively more obese than those whose mothers had no formal or only primary education. This finding is important, as one would have expected that mothers with higher education would have better nutrition knowledge and as such make better food choices and active lifestyle for their children, to prevent malnutrition (both over and under nutrition). That their children tended to be relatively more overweight/obese in this study may imply that affluence in our sub-region may not necessarily correlated to better food and lifestyle choices. Instead, overweight and obesity may erroneously be seen as a sign of affluence. This trend is potentially dangerous as an unhealthy adolescent population will transform eventually to an unhealthy adult population with increased weight related morbidity and mortality, if left unchecked.

The findings from this study is limited to adolescents found in secondary schools in Port Harcourt City and as such may not be entirely applicable to the general population.

Conclusion

The study concludes that adolescent nutritional status is adversely influenced by social factors like daily consumption of snacks and soft drinks, prolonged television watching, high social class and small family size.

Recommendation

The study recommends education on adolescent nutrition and social factors influencing it, targeted specifically at adolescents and their mothers, for promotion of healthy food choices and lifestyle.

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