

Consumption of Ultra-Processed Foods and Anthropometric Status of Adolescents in Aba North LGA Abia State, Nigeria.

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ABSTRACT

Background: Ultra-processed foods are food and drink products that go through different types of food processing. They typically contain little or no intact foods, and are ready to eat and drink.

Objective: This study assessed the consumption of ultra-processed food, drinks, and anthropometric status of adolescents in Aba North Local Government Area, Abia State, Nigeria.

Methods: A cross-sectional survey using multistage sampling technique was conducted among 439 adolescents from in Aba North Local Government Area. A well-structured and validated questionnaire was used to obtain information on socio-economic status, frequency of consumption of ultra-processed foods and anthropometric measurements of height and weight. Respondents were subjected to anthropometric measurements using standard technique. WHO Anthro plus was used to analyze anthropometric data. Data were analyzed for descriptive statistics and Chi-square using SPSS version 23.

Results: The respondents comprised mostly of female adolescents (56.0%), while 44.0% were male. Majority (65.4%) were within the ages of 16-19 years and 36.4% were within the ages of 12-15 years. Cakes were consumed daily by 65.6% of the respondents. Most of the respondents consumed soft drinks (74.7%), packaged breads (68.8%), cookies (71.8%) and instant noodles (59.9%) from time to time. About 77.6% of the female respondents were obese. More females (48.7%) were obese than males (28.9%). Also 5.3% of the respondents were overweight. There was a significant relationship between the consumption of margarine ($p < 0.000$), sausage ($p < 0.000$), chips ($p < 0.000$), canned vegetables ($p < 0.000$), pasta ($p < 0.000$) and obesity.

Conclusion: There was a significant association between the consumption of some ultra processed foods and obesity. There was a high prevalence of obesity amongst the respondents.

Keywords: Ultra-processed foods, Anthropometry Status, Adolescents, Abia State.

INTRODUCTION

The dietary patterns of the Nigerian population are changing, mainly due to the higher availability of ready-to-eat food outlets. Ultra-processed foods are formulations made by the food industry mostly from substances extracted from foods or obtained from the further processing of constituents of foods or through chemical synthesis, with little if any whole foods (10). Compared to other foods, ultra-processed foods have less fiber and protein, more sugar, and, when solid, higher energy density (8). They are also extremely palatable and habit-forming, convenient, sold in large portion sizes,

aggressively advertised and marketed (7). Sales of ultra-processed foods have increased in parallel with the rates of obesity worldwide, particularly in middle income countries (9). In recent decades, there has been a reversal of population dietary patterns, with reductions in the consumption of traditional foods and increases in foods that are ready for consumption (6). This change has been associated to the occurrence of high prevalence of obesity worldwide (15). In this context, a new classification of foods called "NOVA", which is based on the extent, order and type of processing used in their production, has

been proposed. NOVA is a valid tool for nutrition research and classifies all foods and food products into four groups: unprocessed or minimally processed foods, processed culinary ingredients, and processed and ultra-processed food products (7).

Childhood and adolescent obesity have presented a growing prevalence over the last three decades characterizing an 'obesogenic' environment with increasing prevalence of non-healthy eating habits and decreasing prevalence of physical activity. Consumption of ultra-processed foods has been pointed out as a risk factor for increasing obesity among adolescents and adults (4). It has been shown in the literature that individuals who are obese at an early age tend to remain obese throughout life. The development and progression of cardiovascular disease is related to several risk factors that begin in childhood, such as diet. Dietary habits that are formed early are likely to track later in childhood and form the basis for adult eating patterns (13). The habit of a sedentary lifestyle and consumption of ultra-processed foods are associated with several unfavorable health outcomes including obesity (11).

Increasingly sophisticated processing methods have altered food structure, nutritional content, and taste reducing the value of foods and its nutritional content. Traditional diets that feature whole or minimally processed foods and emphasize home-cooking and food preparation are being replaced by diets comprised of industrially processed and prepared food products which are accessible to most adolescents. Childhood and Adolescence is an important phase for health promotion and the prevention of risk factors, since eating habits are acquired during this phase and tend to persist throughout life (18). However, no studies have investigated the ultra-processed food consumption and anthropometric status of children in Nigeria. Considering the growing prevalence of obesity, the consumption of ultra-processed foods by adolescents in Nigeria, and the limited number of research relating to the consumption of ultra-processed foods in Nigeria, the objective of this study is to assess the consumption of ultra-processed food and drinks and anthropometric status of adolescents in Aba North Local Government Area Abia State, Nigeria.

MATERIALS AND METHODS

The study was carried out in Aba North Local Government Area, Abia State. Prior to the survey,

a preliminary visit was made to the selected communities in the Local Government Area to inform them and obtain permission to carry out the survey. Ethical approval to undertake the study was obtained from the local government authority. The participants were briefed on the objectives of the study, and their consent was obtained from the respondents before the commencement of the study.

Population of the Study: The study population consists of both female and male adolescents within the ages of 10-19 years living in Aba North Local Government Area of Abia State.

Study Area: The study was carried out in Aba North Local Government Area of Abia State. Its headquarters Eziana Urata is in the city of Aba. Aba North has an area of 23km² and a population of 107,488 at the 2006 census. Aba North comprises of 10 Autonomous towns, 12 wards and 47 villages. Majority of the inhabitants are business men and women, craftsmen and civil servants, skilled and unskilled artisans, drivers, traders and technicians. Aba North Local Government Area is the hotspot for manufacturing and industrialization in Abia State and Nigeria.

Sample size calculation

The sample size was determined using the formula (19).

$$n = \frac{N}{1 + N(e)^2}$$

n = Sample Size

N = the total number of the population in Aba North (107,488)

e = margin error (0.05)

Using the formula

$$\frac{107,488}{1 + 107,488(0.05)^2}$$

$$\frac{107,488}{269.72}$$

$$= 398.5 \approx 399$$

$$n = 399$$

Calculating for 10% drop out

$$399 \times 0.10 = 39.9$$

$$n = 39.9 + 399 = 439$$

The sample size was rounded up to 439 adolescents to make room for drop outs.

Sampling procedure: A multi-stage random sampling technique was used to select adolescents for this survey. Aba North comprises of 12 ward and 47 communities. Four wards were randomly selected from the 12 wards in Aba North Local Government Area. One community was randomly chosen from the communities in each of the four (4) selected wards. In each of the four (4) selected communities, there was an estimate of 430 households. A systematic random sampling technique was used to select every 4th house, in each community. One or more respondent were chosen from any 4th house with an adolescent living with their parents/guardian, and every 4th house with no adolescent was skipped. Adolescents were interviewed using questionnaires.

Data collection:

Data was collected using a validated structured questionnaire. Information on socio-economic, demographic characteristics, and food frequency consumption was obtained using self-administered questionnaires with the help of the research assistance.

Anthropometric Measurements:

Anthropometric measurements of height and weight were taken.

1. Height Measurement

The standing body height was measured to the nearest 0.1 cm, using a calibrated stick fixed to the wall. The subjects stood (without shoes) on a horizontal platform with their heels held together. The subjects were asked to stand erect with their feet closer together, flat on the ground and their shoulders straight.

2. Weight Measurement

Body weight was measured with a portable bathroom scale (Hansen Ireland Model). The weighing scale was placed on a flat surface, set to zero and each subject was asked to stand with minimum clothing so as to get accurate result. Each reading was made to the nearest 0.1 kg.

Consumption of ultra-processed foods: Food frequency questionnaire was used to determine how often the respondents consume ultra-processed foods.

Data analysis:

The data collected was sorted and coded using SPSS (statistical package for social science)

Version 23. WHO Anthro plus was used to analyze anthropometric data. Data were analyzed for descriptive statistics and Chi-square using. The data was analyzed with the consideration of different scales of measurement or level of measurement (Nominal, Ordinal, Interval and Ratio). The results from the data analysis were presented using frequency table and chart for qualitative and quantitative variables. Values were expressed as proportion. All analysis was done at a 5% level of significance with $p < 0.05$ considered statistically significant.

RESULTS

Table 1 shows the socio-economic characteristics of the respondents. Majority (65.4%) of the adolescents were within the age of 16-19 years while 36.4% were within the ages of 12-15 years. The respondents comprised mostly of Female (56.0%), while minority (44.0%) of them were male. About a quarter of the respondents (47.7%) were in primary school, 39.9% were in junior secondary school, and 8.0% were in senior secondary. About 35.8% of the respondents were Christians while 29.6% were Muslims. More than half of the respondents (54.0%) came from a household size of above 10 persons, while 29.8% were from a household of 7-9 persons. Majority of the adolescents were from Igbo ethnic group (66.7%) followed by Hausa (22.6%) and Yoruba (10.7%). Over a third of the respondent's parents (36.0%) finished primary education, while 30.3% had tertiary education. Some of the respondent's (35.1%) earn a monthly income between ₦30,000 to ₦60,000 while 31.0% of the respondent's parents earn a monthly income of less than ₦30,000.

Table 2 shows the consumption pattern of ultra-processed foods and drinks by the respondents. More than half of the respondents (59.9%) consumed instant noodles from time to time; only 18.6% consumed instant noodles daily. Soft drinks were consumed the most (74.7%) from time to time. Packaged sweetened bread (68.6%) was mostly consumed sometimes. Most respondents (65.6%) consumed cakes daily. While canned fish (54.4%), ice cream (50.3%) and canned meat (55.8%) were mostly consumed sometimes. A few of the respondents (12.8%) consumed doughnut daily. More than half of the respondents (76.1%) consumed chocolate bar. A few of the respondents (6.2%) consumed instant sauces daily. Margarine and spread which is normally known to be a complementary product

Table 1: Background information of the adolescents studied

Variables	Frequency	Percentage
Age		
12-15 years	152	34.6
16-19 years	287	65.4
Total	439	100
Gender		
Male	193	44.0
Female	246	56.0
Total	439	100
Class		
Primary	205	47.7
JSS1-3	175	39.9
SSS 1-3	35	8.0
Others	24	5.5
Total	439	100
Religion		
Christianity	157	35.8
Traditional	98	22.3
Islam	130	29.6
Others	54	12.3
Total	439	100
Household size		
1-3 Persons	31	7.1
4-6 Persons	40	9.1
7-9 Persons	131	29.8
Above 10 Persons	237	54.0
Total	439	100
Ethnic group		
Igbo	293	66.7
Hausa	99	22.6
Yoruba	47	10.7
Total	439	100
Parents educational status		
Non-formal	94	21.4
Primary	159	36.0
Secondary	253	12.1
Tertiary	133	30.3
Total	439	100
Monthly Income		
Less than ₦30,000	136	31.0
₦30,000- ₦60,000	154	35.1
₦60,000- ₦90,000	74	16.9
₦90,000 and above	75	17.1
Total	439	100

to packaged bread was consumed by 23.2% of the respondents daily. About 20.7% consumed pasta daily, while 11.5% consumed pizza daily.

More than half of the respondents (59.9%) consumed shawarma from time to time, while 12.3% consumed shawarma daily.

Table 2: Consumption of ultra-processed food and drink products

Variables	Daily		Sometimes		Never		Total	
	No	%	No	%	No	%	No	%
Instant noodles	82	18.6	263	59.9	94	21.4	439	100
Soft drinks	65	14.8	328	74.7	46	10.5	439	100
Package bread	86	19.6	301	68.6	52	11.8	439	100
Cakes	288	65.6	111	25.3	40	9.1	439	100
Canned fish	29	6.6	239	54.4	171	39.0	439	100
Canned meat	33	7.5	245	55.8	161	36.7	439	100
Doughnut	56	12.8	97	22.1	286	65.1	439	100
Breakfast cereals	86	19.6	82	18.7	271	61.7	439	100
Chocolate bars	40	9.1	65	14.8	334	76.1	439	100
Sweet or candy	47	10.7	59	13.4	333	75.9	439	100
Hotdogs	43	9.8	94	21.4	302	68.8	439	100
Ice cream	40	9.1	221	50.3	178	40.5	439	100
Margarine and spread	102	23.2	87	19.8	250	56.9	439	100
Pasta	91	20.7	68	15.5	280	63.8	439	100
Instant sauces	27	6.2	67	15.3	345	78.6	439	100
Sausages	83	18.9	32	7.3	324	73.8	439	100
Cereal bars	33	7.5	75	17.1	331	75.4	439	100
Cookies	47	10.7	15	3.4	77	17.5	439	100
Soda	51	11.6	149	33.9	239	54.4	439	100
Chip	124	28.2	136	31.0	179	40.8	439	100
Pizza	16	3.6	66	15.0	357	81.3	439	100
Shawarma	54	12.3	263	59.9	122	27.8	439	100

Table 3: Anthropometric status of adolescents studied.

Variables	Male		Female		Total	
	No	%	No	%	No	%
Underweight	10	4.3	1	0.2	11	2.5
Normal	36	8.2	28	6.4	64	14.6
Overweight	19	2.3	4	0.9	23	5.3
Obese	127	28.9	214	48.7	341	77.6
Total	192	100	247	100	439	100

Table 3 shows the anthropometric status of the respondents. Majority of the respondents (77.6%) were obese, while 5.3% were overweight. About 14.6% had normal weight while 2.5% were underweight. Out of the total number of obese respondents, 48.7% were females while 28.9% were males. Males were more overweight (2.3%) than females (0.9%).

Table 4 shows the relationship between ultra-processed foods and drinks and the

anthropometric status of the respondents. More obese adolescents (85.7%) consumed soft drinks from time to time. Most obese adolescents (89.7%) consumed instant noodles from time to time. A high number of obese respondents (49.4%) consumed canned meat sometimes. The consumption of cake was higher amongst obese respondents (49.4%). Similar to the consumption of margarine (39.8%), sausage (49.4%), and chips (34.6%) were consumed majorly by obese respondents. There was a significant relationship

between consumption of candy/sweets (p=0.000), cakes (p=0.000), margarine (p=0.000), pasta (p=0.000), sausage (p=0.000)

and chips (p=0.000) and the anthropometric status of the adolescents studied

Table 4: Relationship between ultra-processed food consumption and body mass index

Variables	Underweight		Normal		Overweight		Obese		Total		P-value
	N	%	N	%	N	%	No	%	No	%	
Soft Drinks											
Daily	6	1.3	10	2.2	10	2.2	39	8.8	65	14.8	0.059
Sometimes	2	0.4	36	8.2	9	2.0	281	64.0	328	74.7	
Never	2	0.4	18	4.1	4	0.9	22	5.0	46	10.4	
Total	10	2.2	64	4.5	23	5.2	342	77.9	439	100	
Candy											
Daily	2	0.4	12	2.7	12	2.7	21	4.7	47	10.7	0.000
Sometimes	6	1.3	15	3.4	7	1.5	31	7.0	59	13.4	
Never	2	0.4	37	8.4	4	0.9	290	66.0	333	75.8	
Total	10	2.2	64	4.5	23	5.2	342	77.9	439	100	
Instant Noodles											
Daily	8	1.8	20	4.5	10	2.2	44	10.0	82	18.6	0.188
Sometimes	1	0.2	25	5.6	1	0.2	236	53.7	263	59.9	
Never	1	0.2	19	4.3	12	2.7	62	14.2	94	21.4	
Total	10	2.2	64	4.5	23	5.2	342	77.9	439	100	
Canned meat											
Daily	7	1.5	8	1.8	10	2.2	8	1.8	33	7.5	0.093
Sometimes	1	0.2	20	4.5	7	1.5	217	49.4	245	55.8	
Never	2	0.4	36	8.2	6	1.3	117	26.6	161	36.6	
Total	10	2.2	64	4.5	23	5.2	342	77.9	439	100	
Cakes											
Daily	2	0.4	37	8.4	11	2.5	238	54.2	288	65.6	0.00
Sometimes	8	1.8	17	3.8	3	0.2	82	18.7	110	25.0	
Never	0	0.0	10	2.2	9	2.0	17	3.8	36	8.2	
Total	10	2.2	64	4.5	23	5.2	337	76.8	439	100	
Margarine											
Daily	0	0.0	12	2.7	0	0.0	7	1.5	19	4.3	0.00
Sometimes	4	1.1	32	7.2	15	3.4	175	39.8	226	51.4	
Never	4	1.1	3	0.6	0	0.0	58	16.6	65	14.8	
Total	8	1.8	53	2.0	23	3.4	240	54.6	439	100	
Pasta											
Daily	8	1.8	20	4.5	10	2.2	44	12.6	82	18.6	0.00
Sometimes	1	0.2	25	5.6	1	0.2	236	53.7	263	59.9	
Never	1	0.2	19	4.3	12	2.7	62	14.1	94	21.4	
Total	10	2.2	64	4.5	23	5.2	342	77.9	439	100	
Sausages											
Daily	7	1.5	8	1.8	10	2.2	8	1.8	31	7.0	0.00
Sometimes	1	0.2	20	4.5	7	1.5	217	49.4	210	47.8	
Never	2	0.4	36	8.2	6	1.3	117	26.6	198	45.1	
Total	10	2.2	64	14.5	23	5.2	342	77.9	439	100	
Chips											
Daily	6	1.3	5	1.1	8	1.8	12	2.7	31	7.0	0.00
Sometimes	3	0.6	45	10.2	10	2.2	152	34.6	210	47.8	
Never	1	0.2	14	3.1	5	1.1	178	40.5	198	45.1	
Total	10	2.2	64	14.5	23	5.2	342	77.9	439	100	

Soft drink: $X^2=3.56$, $df=1$, $p=0.059$. Candy: $X^2=34.76$, $df=1$, $p=0.00$. Instant noodles: $X^2=1.7$, $df=1$, $p=0.188$. Canned meat: $X^2=2.822$, $df=1$, $p=0.093$. Cakes $X^2=2.86$, $df=1$, $p=0.00$. Margarine $X^2=4.76$, $df=1$, $p=0.00$. Sausages $X^2=3.86$, $df=1$, $p=0.00$. Chips $X^2=2.822$, $df=1$, $p=0.00$.

DISCUSSIONS

In this study, more than half of the respondents were older adolescents, and there were more females than males. Majority of the respondents were primary school pupils. Almost half of the respondents were Christian; this is so because Christians dominate most of the South-Eastern part of the country. This is in support of Ismene. (3) Who reported same. A lot of the respondents were from large households; this result correlates with the findings of Anyanwu. (1). Most of the respondent's parents had low educational level and this confirms Mais *et al.* (5) report that Parents with low educational level is associated with a two-fold increase in the risk for the child to consume ultra-processed foods. There was high proportion of low monthly income earned by respondent's parents, this could be a factor for the consumption of ultra-processed foods, and this statement can be supported by Darmon and Drewnowski. (2) who studied the causal relationship between income and diet quality; where diet quality can be affected by the income level of an individual, this simply means that low income earner would not be able to afford the high cost of nutritious foods and potential inaccessibility of fresh whole foods in some neighborhood, instead they opt for ultra-processed foods because they are cheap and readily accessible. The result of this findings showed that most of the ultra-processed foods were often consumed sometimes by the respondents this is similar to a study reported in Iran by Nikbakht *et al.* (14) who stated that the differences in consumption frequency of these food items could be attributed to affordability of these items, as the expensive food items are least consumed, also, individual preferences and likes may also contribute to the low and high consumption of some of the ultra-processed foods. The High prevalence of obesity in this study is disturbing and could be as a result of the frequency of consumption of ultra-processed foods in addition to leading a sedentary lifestyle. This is in relation with Moubarac *et al.* (12) who reported that ultra-processed food consumption may increase the risk of overweight and obesity by increasing the total intake of calories, added free sugars, and fats and providing an inadequate relation of nutrients potentially involved in the genesis of the accumulation of body fat. The results of this study was in inline with a meta-analysis of cohort studies and randomized clinical trials which provided evidence of the relation between the intake of sugar and the development

of overweight and obesity (17). There was a significant relationship ($p < 0.05$) between most of the ultra-processed foods and drinks consumed and anthropometric status of the respondents studied. This means that the excess weight observed from among the respondents could be caused by the consumption of ultra-processed foods and drinks as shown on the food frequency table. Though the consumption of some ultra-processed foods and drinks showed a significant relationship with the respondent's weight gain, other factors as such a sedentary lifestyle and genetics have also been linked to excess weight. This finding is in order with Styne. (16) who reported that soft drink consumption is marginally related to body mass index among adolescents in North America.

Conclusion

This study showed high consumption of ultra-processed foods by the adolescents. There was also a high prevalence of obesity amongst the respondents, females being more obese than males. There is need for nutrition education to create awareness on the effect of consumption of ultra-processed foods.

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