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Anthropometric Indices, Food Choices and Eating Habits of Adolescents in Secondary Schools in Bayelsa State

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Abstract: *Background*: Eating habits refers to why and how people eat, which foods they eat and with whom they eat, as well as the ways people obtain, store, use and discard food. *Objectives*: The objectives of this study are to assess the anthropometric indices of adolescents in Bayelsa State, their food choices, eating habits and the factors affecting their food selections. *Methods*: A simple random sampling technique was used to select 500 adolescents from ten Secondary Schools in three Local Government Areas of Bayelsa State. Students were selected from the Senior Secondary School Classes (from SSS 1 to 3). A well structured and validated questionnaire was used to obtain information on the adolescents' food choices and eating habits. Anthropometric measurements of weight and height were carried out using standard procedures. Information obtained was analyzed using Statistical Package for Social Sciences (SPSS Version 20) to provide descriptive information (percentages, mean± SD) for all the study variables. The relationship between food choices and nutritional status and eating habits and nutritional status were tested using p-value at 5% level of significance *Results*: Results show that 11.4% of the adolescents were under weight, 87.4% were of normal weight and then 0.8% were overweight. Few of the respondents reported that availability, accessibility and convenience affect their families eating habits and food choices, while 5% reported that family religion affect their eating habits. Also the result of the correlation analysis is that the coefficient of correlation is -0.120, this indicates an inverse very low relationship between the adolescents' food choices and eating habits. *Conclusion*: The study revealed that the factors affecting the food selection of the respondents were the family's income, peer groups, food likes, food dislikes and parental control. Also, that taste, texture, appearance and the smell of food are responsible for some of the respondent's food selections while cost of food affects. Also, opinion that their food selections were affected by convenience and the time for food preparation Few (2%) of the respondents indicated that their body image affect their food selection and 4.6% were of the opinion that their religion affects their food selection. Culture also affects 5.6% of the respondent's food selections.

Keywords: Anthropometric Indices, Food Choices, Eating Habits, Adolescents

1. Introduction

Eating Habits can be defined as what and how people eat, their selection of food, which foods they eat, and with whom they eat, as well as the ways people obtain, store, use and discard food. According to Salvy, Haye, Bowker, Hermans, [14] individual, social, cultural, religious, economic, environmental factors all influence eating habits. It is the habitual decisions an individual or culture makes when choosing what foods to eat. An individual's social, cultural, religious, economic, environmental and political factors all influence eating habits.

These habits are formed and may change, over a person's lifetime, for example a poor person who becomes rich would immediately change his eating habits and sometimes food choices become poor as a result of poor eating habits even with the richness, the eating habits we form may have a good or bad effect on health on the long term. Since most food choices do not have an immediate effect, it will definitely have in the long run (Fitzgerald, Heary, Nixon, and Kelly), [8].

Food Choices are range of different foods from which to

choose from. The food choices people make in selecting their foods influences their nutritional status positively or negatively. Nutritional status is the condition of the body which is influenced by the diet, the levels of nutrients in the body and the ability of those levels to maintain normal metabolic integrity, (Hanks, Just, Smith and Wansink), [9]. Good food choices is eating that which is beneficial to one's physical or mental health, often linked to a high level of discipline and self-control. Adolescents need to make good food choices to improve their nutritional status. Poor choices can cause nutritional problems which increase the adolescents' risks of being overweight or underweight while under nutrition can negatively affect adolescent's cognitive development and school performance. It increases the risk of poor obstetric outcomes for adolescent mothers and affects the development of the fetus, it also affects the health and quality of the adolescent's life negatively, (Hanks, *et, al.,*) [9]. Food choices and eating habits adolescents form as a result of nutrition awareness would normally remain for the rest of their life because they are based on facts, (Fitzgerald *et. al.,*) [8].

An adolescent is a person who is no longer a child and at the same time, cannot be considered as an adult. Adolescence is a period of growth development between childhood and adulthood. Understanding why and what adolescents eat is an essential knowledge to them. According to the Salvy, *et, al.*, [16], Adolescents are young people between the ages of 10 and 19 years and are often thought of as a healthy group. WHO identifies adolescence as the period in human growth and development that occurs after childhood and before adulthood World Health Organization, [24]. An adolescent is a juvenile between the onset of puberty and maturity, being of the age 13 through 19 in an early period of life or development (Oxford English Dictionary), [14]. It represents one of the critical transitions in the life span and is characterized by a pace in growth and change. Understanding why and what adolescents eat is an essential knowledge to them.

2. Materials and Methods

Study Area: Bayelsa State was created on October 1, 1996 out of the old Rivers State by the Federal Military Government of General Sanni Abacha. The name, Bayelsa, is an acronym of three former Local Government areas – Brass, Yenagoa and Sagbama – in the then Rivers State, which had earlier on comprised the entire area now constituting Bayelsa State. The then Brass LGA is what makes up the present Nembe, Brass and Ogbia Local Government Areas; the then Yenagoa LGA consist of the present Yenagoa, Kolokuma/Opokuma and Southern Ijaw Local Government Areas and the then Sagbama LGA is what makes up the present Sagbama and Ekeremor Local Government Areas, (Bayelsa State Government Website-http://www.bayelsa.gov.ng), [4].

Survey Design: The study was a cross sectional study using secondary school students in the selected schools.

Sample Selection: A simple random sampling technique was used in selecting 500 adolescents from ten randomly selected secondary Schools in Bayelsa State, Nigeria.

Validation of Study: The structured questionnaires were pretested with ten adolescents from five Secondary Schools from Kolokuma Opokuma LGA, which is different from the research area but respondents has similar characteristics with the population of the study.

Limitations of Study: The information gathered from the students on 24-hour dietary recall may not be accurate, because some of the respondents might not remember accurately the foods and drinks and snacks eaten in the last 24 hours. *Data Collection Method:* The adolescents were visited in their schools and questionnaires were given to them to fill and explanations made. Weight and height measurements were done using standard methods (UNICEF), [19].

Questionnaire: A well-structured, validated questionnaire designed to elicit information on the respondents eating habits and food choices was used in collecting data from the adolescents.

Anthropometric Measurement: Individual measurements of the adolescents weight and height were carried out to estimate their BMI which was compared to BMI reference standards.

Height Measurement: Height measurement was done according to the method of Afam-Anene, Ifenacho and Iwuchukwu), [1]. Height was measured with wooden wall meter rule. The subject was asked to stand straight on a flat floor with shoes removed, feet put together and arms hanging loosely by the sides. Heels, buttocks and upper back were in contact with the wall. Recording was done to the nearest 0.1cm.

Weight Measurement: This was done using the method of Afam Anene *et. al.,) [1]*. The subject was asked to stand straight on the scale with shoes removed. Measurement was done with minimum clothing; readings were taken to the nearest 0.1kg.

The 24- hour dietary recall: The food intake data of the respondents were collected by individual single 24 hour food recall. The interviews included a description of the foods eaten, the cooking methods and names of foods eaten. Questions were also asked to prompt the respondent to remember anything omitted in the list and included questions on the specific food groups.

Body Mass Index (BMI): Body Mass Index (BMI, Kg/m^2) was determined by dividing weight in Kg by height (m^2) squared and classified as underweight (<18.5), normal weight (18.5 – 24.9), overweight (25.0 – 29.9), obesity grade 1 (30.0 – 34.9) using WHO, [25], classification.

Table 1. Body Mass Index (BMI) Classification.

Category	BMI range – kg/m^2
Underweight	< 18.5
Normal (healthy weight)	18.5 - 24.9
Overweight	25.0 - 29.9
Obesity Grade I (Moderately obese)	30.0 - 34.9

Source: World Health Organization, Global Database on Body Mass Index. Retrieved July 27, [22].

Data analysis: The BMI of the subjects were compared

with WHO, [23] standard and classified as follows:

Statistical Analysis: Information obtained was analyzed using Statistical Package for Social Sciences (SPSS Version 20) to provide descriptive information (percentages, mean± SD) for all the study variables. The relationship between food choices and nutritional status, eating habits and nutritional status were tested using p-value at 5% level of significance.

Table 2. Factors affecting food selection of the respondents.

Variable	Freq	%
Income	108	21.6%
Pear Group	65	13%
Impact on health	15	3%
Food likes/dislikes	35	7%
Parental Control	38	7.6%
Taste, Texture, Appearance, Smell	25	5%
Cost	32	6.4%
Convenience	53	10.6%
Time	68	13.6%
Body Image	10	2%
Religion	23	4.6%
Culture	28	5.6%
Total	500	100%

Table 2 shows the factors affecting food selection of the respondents. It shows that most (21.6%) of the respondent's food selections were affected by the family's income while 13% of the respondents were affected by peer groups and 3% on health. Also food likes and dislikes affected 7% while parental control affected 7.6%. The table also indicated that taste, texture, appearance and the smell of food is responsible for 5% of the respondent's food selections

while cost of food affects 6.4%. Also, 10.6% of the respondents were of the opinion that their food selections were affected by convenience and the time for food preparation affects 13.6%. Few (2%) of the respondents indicated that their body image affect their food selection and 4.6% were of the opinion that their religion affects their food selection. Culture also affects 5.6% of the respondent's food selections.

3. Results

Table 3: shows the factors guiding respondent's choice of food. Analysis of the table indicates that 78% were of the opinion that family's income was enough to purchase the desired food stuffs while 21% were of the opinion that the families' income was not enough to purchase desired food stuff. Also, 86% were of the opinion that their family's activities allow enough time for meal preparation while 14% were of the opinion that the family's activity does not allow enough time for meal preparation. The table indicates that 6% of the respondents were of the opinion that their culture affects the family's food choices while 94% were of the opinion that their culture does not affect their family's food choices. Few of the respondents reported that availability, accessibility and convenience affect their families eating habits while 5% reported that family religion affect their eating habits. Also the result of the correlation analysis is that the coefficient of correlation is -0.120, this indicates an inverse very low relationship between the adolescents' food choices and eating habits.

Table 3. Factors guiding respondent's choice of food and Pearson Correlation Analysis of the adolescent's food choices and eating habits.

	Total		Total	
	Yes	%	No	%
Family's income to purchase the desired food stuffs	392	78%	108	21%
Family's activities to allow enough time for meal	432	86%	68	14%
Culture of the family	28	6%	472	94%
Family's religion	23	5%	477	95%
Availability, accessibility and convenience of foods in the family	53	11%	447	89%

Pearson Correlation Analysis of the adolescents' food choices and eating habits.

CORRELATIONS	Food choices	Eating habits
Food choices	1	-0.120 .613
Eating habits	-0.120 .613	1

relation coefficient (r -0.120 p<0.05).

Table 4: Indicates the that 9.4% of the males and 2.0% of the females were under weight, 40.2% of the males and 47.2% of the females were of normal weight, then 0.2% and 0.6% were overweight, while 0.2% of the males and 0.2% of the females were obese and with a mean Body Mass Index of 19.90±3.40kg/m^2 and 20.55±3.75kg/m^2 respectively. Majority (87.1%) of the subjects in the study population had normal BMI. The mean anthropometric values of the adolescents

mean heights were 1.68±0.86m for males and 1.64±0.82m for females. Mean weights were 55.90±7.60kg for males and 54.60±7.10kg for females which are below the reference standard of 63.0kg, while the mean BMI were 19.90±3.40kg/m^2 for males and 20.55±3.75kg/m^2 for females respectively. There was no significant difference p<0.05 between the parameters when analyzed statistically. In as much as the males were a bit taller and heavier than the females.

Table 4. *BMI Status of the respondents.*

Variables	Male		Female		Total	
Freq (N)	Freq (N)	%	Freq (N)	%	Freq (N)	%
BMI (kg/m^2)						
Underweight (<18.5)	47	9.4	10	2.0	57	11.4
Normal weight (<18.5- 24.9)	201	40.2	236	47.2	437	87.4
Over weight (25.0-29.9)	1	0.2	3	0.6	4	0.8
Obese ($\geq$ 30)	1	0.2	1	0.2	2	0.4
Total	250	50	250	50	500	100
Mean ± SD	19.90±3.40 kg/m^2		20.55±3.75kg/m^2		20.22±5.45kg/m^2	

Parameter	Males	Female	Reference Standard	t-Value
Height (m)	1.68±0.86m	1.64±0.82m	1.64m	0.000
Weight (kg)	55.90±7.60kg	54.60±7.10kg	63.0kg	0.001
BMI (kg/m^2)	19.90±3.40kg/m^2	20.55±3.75kg/m^2	23.2kg/m^2	0.007

Table 5 Presents the 24 hour dietary recall of the respondents. Analysis of the 24 hour dietary recall of the respondents indicates that 11% of the respondents ate cereals, sugar/ honey within the specified 24hrs, 20% ate roots and tubers, 17% ate fruits and vegetables. Majority (31.6%) ate fish and sea foods, 30.8% ate meat and poultry, while milk and milk products were being consumed by 15%.

It also showed that the mean score of the male adolescents on their food choices was 3.12 while that of the female adolescents was 3.17. The data were further subjected to t-test analysis in order to find out whether a significant difference exists in the mean scores of the two groups. The result of the analysis shows that significant difference was not found as the P-Value of 0.864 is greater than the 0.05 alpha level of significance. The table also shows the result of the t-test analysis of p-value of 0.021 less than the 0.05 alpha level of significance. Thus the mean scores of the male and female adolescents on their eating habits do not differ significantly.

Table 5. *The 24hour Dietary Recall of the respondents and t test statistics of significant difference between the male and female adolescents.*

Food Groups	Males	Females	Total
Cereals	21 (4.2%)	34 (6.8%)	55 (11.0%)
Root and Tubers	54 (10.8%)	46 (9.6%)	100 (20.0%)
Vegetables/Fruits	45 (9.0%)	40 (8.0%)	85 (17.0%)
Meat/Poultry	76 (15.2%)	78 (15.6%)	154 (30.8%)
Eggs	20 (4.0%)	34 (6.8%)	54 (10.8%)
Fish and sea foods	78 (15.6%)	80 (16.0%)	158 (31.6%)
Pulses/Legumes/Nuts	34 (6.8%)	37 (7.4%)	71 (14.2%)
Milk and Milk Products	35 (7.0%)	40 (8.0%)	75 (15.0%)
Oils/Fats	43 (8.6%)	44 (8.8%)	87 (17.4%)
Sugar/Honey	21 (4.2%)	34 (6.8%)	55 (11.0%)

t-test statistics of significant difference between the male and female adolescents on their food choices

Male	Female	t-test	Level of Sig	
Food choice	3.12±1.09	3.17±1.02	0.864	p>0.05
Eating habit	3.17±0.829	3.11±0.806	0.021	p<0.05

4. Discussions

The practice of consuming more than two cups of water by most respondents is commendable and should be encouraged. Water is for hydration and is very important for optimum health and it is necessary to drink enough water daily. The rate of skipping meals by the adolescents was quite alarming, major reasons were loss of appetite and not being able to afford three meals a day. Skipping meals leads to under nutrition and this can have a negative effect on the health and Nutritional status of the adolescent. An adolescent should have about three meals a day. Skipping of meal is bad habit and should be discouraged. Although access to more money does not automatically equate to a better quality diet but the range of foods from which one can choose should increase

(Provencher and Jacob), [15]. Meal skipping is the omission or failure to consume one or more main meal (breakfast, lunch or dinner) throughout the day (American National Health and Nutrition Examination Survey (NHANES), [2]. Data from the NHANES, [2] suggests that 33% of adolescents do not consume breakfast on any given day. While, findings from the Nationally, representative Australian Health Survey, [12], showed that 39% of Australian adolescents ate breakfast less than 5 days per week. Despite the health implications of meal skipping and its increased prevalence among the populations, limited research has explored the correlates of this eating behavior (NHANES), [2].

Frequently skipping meals, particularly the breakfast meal, is associated with a number of nutrition related outcomes. These include poor diet quality, lower intakes of vitamins

and minerals, lower total energy intake, and chronic disease risk factors such as central adiposity, markers of insulin resistance and cardio metabolic risk factors (Australian Bureau of Statistics, Australian Health Survey), [3].

Adolescence is a nutritionally vulnerable time period as poor eating habits formed during adolescence can lead to obesity and diet-related diseases in later years (McNaughton), [11]. In addition, the high incidence of dieting behaviors can contribute to nutritional inadequacies and to the development of eating disorders (McNaughton), [11]. Various factors that affect the respondent's food choices and eating habits include the following, family's income, family's activities, food availability and accessibility, while most (21%) of the respondents indicated that the above factors affects the purchase of the desired food stuffs. According to Boesveldt and Graaf, [6], there are other range of factors associated with the adolescents' food choices such as personal factors e.g. food preferences, taste, appearance of food, convenience, time constraints and cost.

The correlation of the adolescent's food choices and eating habits is -0.120 and the mean score of the male adolescents on their food choices was 3.12 and 3.17 for the female adolescents respectively. This shows that the variety of foods eaten by the respondents influenced their nutritional status.

Neumark-Sztainer, Story, Hannan and Croll [13], study observed that there are three meals that should be consumed on a daily basis (breakfast, Lunch and Dinner), in which lunch is the main meal.

The 24 hour dietary recall of the adolescents was conducted which revealed that 11% of the respondents consumed cereals, 20% of the respondents ate roots and tubers and 17% ate vegetables/fruits.

Vegetables and fruits are good sources of vitamins and minerals and are essential in an adequate diet for good health; they are necessary to maintain healthy tissues for cell respiration, fruits and vegetables are essential in the absorption of nutrients, promotion of growth and help boost immunity. Eating variety of fruits and vegetables of different colours every day and with every meal is beneficial to health, (Wang, Ouyang, LiuJ, Zhu, Zhao and Bao), [21]. Also, 30.8% of the respondents ate meat and poultry within the last 24hours, 31.6% ate fish and sea foods which are good sources of protein, vitamins and minerals. It is essential to consume 2 to 3 servings of protein rich foods daily for the growth and repair of body cells to provide energy in the absence of carbohydrates and when eaten in excess is converted to fat (Neumark-Sztainer, *et, al.,) [13]*.

Milk and milk products and eggs are excellent sources of protein and are rich in vitamins and minerals, and the Food Guide Pyramid suggests 2 to 3 servings daily (USDA's MyPlate), [20], lack of protein in the diet can slow growth, reduce muscle mass, lower immunity, retarded growth, poor wound healing and reduced energy. The study revealed that, few, 15% of the respondents ate milk/milk products and 10.8% ate eggs in the past 24 hours. Variety of foods eaten may also influence the nutritional status of the adolescents, (Fitzgerald, *et. al.,*), [8]. Therefore, increasing the amount of dairy foods, eaten by adolescents, to three servings a day boosts their

nutrient intake as well as other essential nutrients for healthy growth and bones, according to (Neumark-Sztainer, *et, al.,),* [13].

Malnutrition is still prevalent globally with the coexistence of both overnutrition and undernutrition in developing countries affecting people of all ages, (Christian and Smith), [7]. Adolescents are particularly at risk of malnutrition due to rapid growth and development and changes in dietary habits that may have influenced their nutrient intake. The most prevalent micronutrient deficiency among adolescents worldwide is iron (Christian and Smith), [7]. In this study the nutritional status of the respondents showed that 87% of the respondents were of normal weight, 11.4% were under weight, 0.8% were overweight, while 0.4% were obese.

Anthropometric indices in this study showed the male and female adolescent's mean heights and weights, the mean BMI were $19.90\pm3.40kg/m^2$ for males and females respectively. And the results of the mean anthropometric indices of the subjects indicate that males were a bit taller $(1.68\pm0.86m)$ and heavier $(55.90\pm7.60kg)$ than the females $1.64\pm0.82m$ and $(54.60\pm7.10kg)$, respectively. Thus, is similar to the report of (Bhattarai and Bhusal), [5].

According to World Health Organization [25] the disease burden from overweight and obesity has continued to increase globally and that overweight and obese persons nearly tripled. From the 2008 Nigerian demographic and health survey, (Kandala and Stranges), [10] reported striking variations in the prevalence of overweight and obesity across Nigeria ranging from 10.5% in Yobe (North-east Nigeria) to 50.2% in Lagos (South-west Nigeria). (Ubesie, Okoli, and Uwaezuoke), [18], reported that obesity is a major public health issue in Enugu, South-east, Nigeria, with this possibly reflecting in adolescence, young adults and the overall population over time. Underweight and overweight are associated with medical condition of prognostic importance. Apparently, some well individuals may appear underweight; it is also observed that some obese, overweight or normal subjects may become underweight by virtue of pathologic condition like malignancies, (Sola, Steven and Kayode), [17].

The 24 hour dietary recall which reveals that most of the respondents ate five food groups and more in a day and that eating food from more food groups provides an adequate diet and is necessary for proper growth, development in the life of the adolescents. The significant difference (P>0.05) of food choices indicates that the mean scores of the male and female adolescents on their eating habits do not differ significantly, P<0.05 differs significantly.

5. Conclusion

The study revealed an inverse relationship between the adolescent's food choices and eating habits which shows that there is very low relationship between their food choices and eating habits. The five food groups and more consumed in a day by the adolescents influenced their nutritional status as 87% of them were of normal weight, while few of them (13%) were of varying abnormal weights of 11.4% underweight, 0.8%

overweight and 0.4% obese. Healthy growth and development essentially need an adequate diet which includes a variety of foods from different food groups.

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