# Junk Food Consumption and its Association with Anthropometric Indices among undergraduates in Nigeria

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**Abstract:** Junk foods consumption in institutions of higher learning has increasingly become an important part of students' diet in Nigeria. This study was carried out to determine the pattern of junk food consumption among students in higher institutions of learning and the association between the junk food consumption and anthropometric indices measuring body weight status. A total of 900 students comprising 450 male and 450 female volunteers, aged 17 to 33 years were recruited from Akanu Ibiam Federal Polytechnic Unwana, Nigeria for the study. Seventy-nine percent of the students affirmed that the actually enjoy junk food. A total of 33.89% reported eating junk food everyday while 36.44% usually eat it at school during lunch with convenience been stated as the main reason for this consumption pattern by majority (48.44%). Low prevalence of obesity was observed i.e. 1.67% and 2.44% using body mass index (BMI) and waist-hip ratio (WHR), respectively, while majority of the volunteers i.e. 81.33% and 82.78% had normal BMI and WHR, respectively. There was no significant ($P > 0.05$) association between consumption of junk foods, frequency of consumption and body mass index or waist-hip ratio. This study revealed that there is no body weight status danger in junk food consumption pattern among the students. Thus, students may continue in their consumption pattern of this specified junk food if it is convenient and if it may enable them to meet up with their lined-up activities in the campus.

**Keywords:** Junk foods, body weight status, anthropometric indices, eating habits, Students.

## INTRODUCTION

Junk foods are foods or beverages characterized with low nutrients which are designed to be readily available for consumption with little or no consideration of their nutritional potentials. In other words, they provide calories from fat or added sugar with minimal number of micronutrients, essential amino acids and lipids [1, 2]. Increase intake of junk food due to their availability and cheapness is a global phenomenon having a prevalence of around 70% world over [3, 4]. Junk food contains low nutrients and is widely consumed as an alternative to conventional food. This is considered as an emerging major public health challenge among all age groups especially in young adults [3, 5]. The increased consumption of high energy food with low nutritional value (junk food) represents a significant proportion (15-40%) of total daily calorie intake of children and this has been attributed to overweight and obesity that is observed among children and adolescents nowadays [6]. These days, nutritious foods have been largely substituted by junk foods such as chips, biscuit, doughnuts, candies, noodles and aerated drinks such as coke, fanta, sprite etc. This change in pattern of food preferences among children and adolescents in the developed and developing countries of the world have been reported as the cause of increase in obesity and its associated complications around the world [7].

Reports have implicated increase in junk food consumption as a major factor in the etiology of metabolic syndrome [8] which is metabolic abnormalities such as abdominal obesity, hypertriglyceridemia, low high-density lipoprotein-cholesterol concentrations, hypertension, and hyperglycaemia [9]. Metabolic syndrome has been reported to be strongly associated with the development of type 2 diabetes mellitus and cardiovascular morbidity and has been implicated with high mortality in populations [10, 11]. Presently, metabolic syndrome has become a major public heath challenge worldwide due to its prevalence and incidence which are increasing rapidly in children and adults [12].

Changes in lifestyles among people from different age group in society has led to changes in dietary habits which are causing increase in junk foods consumption among them and students in educational institutions are the most affected among the vulnerable population [13]. Different factors such as cheapness, being readily available and convenience have been

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attributed to be the common reasons for increase in the daily intake of junk foods that is experienced nowadays. Students' activities and sedentary lifestyles have been reported to affect their feeding behaviors drastically, most often increasing their chances of junk food intake [14, 15]. This attribute of having poor diet among students has been associated with the health conditions observed among students of various institutions [16].

Reports have shown that nutritious healthy diets combined with the consumption of fruit and vegetables are associated with normal body mass index (BMI) while high consumption of snacks and sugary beverages are associated with increase BMI [17]. The relationship between poor high-calorie diet (energy dense food and drinks) and obesity is well established globally [18]. Individuals on diet comprising food such as low fat milk products, fruits and vegetables, whole grains and high fibers (lower energy intake) are associated with normal body mass index overtime [19, 20]. Reports have shown that nutritious food plays a leading role in the body's development and prevention from diseases [21, 22]. Increased intake of high-calorie junk food positively correlates with familial risk of developing diabetes mellitus, hypertension, obesity and coronary artery disease among others while renal calculi has been associated with individuals consuming phosphates containing soft drinks. Poor eating habits and low nutritional diet cause nutritional deficiencies that when combined with weight gain ultimately leads to metabolic syndrome [23].

Studies have shown that availability and accessibility of junk food at various points in the country especially at educational institutions has significantly increased over the years [24, 25]. This has led to the increase in the number of students adopting the consumption of unhealthy junk food instead of nutritious healthy diets [24, 26]. Since studies have revealed that the consumption of junk food causes obesity, which is a primary cause of cardiovascular diseases and other life-threatening diseases [27], there is need for increased research on available junk foods within our institutions of higher learning. Therefore, this study is designed to evaluate junk food consumption and its association with anthropometric indices among undergraduates of Akanu Ibiam Federal Polytechnic Unwana, Nigeria.

## MATERIALS AND METHODS

### Study Area and Population

This study was conducted in Akanu Ibiam Federal Polytechnic Unwana, Ebonyi State, Nigeria. The study population comprised of 900 students made up of 450 males and 450 females.

### Type of Study

The study is a descriptive cross-sectional cluster sampling study conducted among 900 undergraduates to assess their pattern of junk food consumption and its association with anthropometric parameters (Body Mass Index, BMI and Waist-Hip Ratio, WHR). This population size was selected to adequately represent the entire population of the students since the number of males or females did not exceed one hundred thousand [28, 29].

### Data Collection

The research data was collected using the technique of interviewing by questionnaire and was conducted in classrooms, polytechnic hostels, polytechnic library, canteens and various departmental blocks. The questionnaire form consisted of three sections i.e. socioeconomic information, anthropometric measurement and dietary information.

a. Socioeconomic information: The socioeconomic information or social demography comprised of age and living status.

b. Anthropometric measurement:

i). Body weight, height and body mass index were measured using the outlined procedure of measurement [30, 31]. Body weight was measured to the nearest 0.1kg by standard scale in light cloths with emptied pockets and without shoes while height was measured to the nearest 1cm by meter in condition of standing position near to the wall, paired feet, without shoes and four contacted points of the body (Shoulder, hip, heel and head) to wall. Body Mass Index (BMI) was calculated by dividing the body weight in kg by the square of height in $m^2$. BMI of < 18.5, 18.5- 24.9, 25-29.9 and >30 were classified as underweight, normal, overweight and obese, respectively [30, 31].

ii). Waist and hip circumferences and waist-hip ratios were measured using the outlined procedure of measurement [32]. Waist circumference was measured using a measuring tape over abdomen, with measurements made halfway between the lower border of ribs and the highest point of the iliac crest (at the umbilicus level) in a standing position. Hip circumference

was measured over light clothing at the widest part point, over the buttocks when viewed from the side. Waist-hip ratio was obtained by dividing the waist circumference by the hip circumference. Males who fall within WHR category <0.90, 0.90-0.95 and > 0.95 were classified as normal, overweight and obese, respectively, while females with WHR<0.80, 0.80- 0.84 and >0.85 were classified as normal, overweight and obese, respectively [32].

c. Dietary information: Information on junk food consumption and behavior was collected from the population sample using structured questionnaire. The information comprised of individual's behavior towards junk food, frequency of consumption, time of consumption, cost of consumption, reason for consumption and most preferred junk food and drinks consumed.

**Data Analysis**

Descriptive statistics including mean, standard deviation and frequencies were calculated. The relationship between the various variables of junk food consumption under consideration and anthropometric indices (BMI and WHR) was determined by Chi square ($X^2$) test correlation analysis with SPSS version 22.

## RESULTS

A total of 900 students' population participated in the present study with a mean age of 22.85± 1.07. The socio-demographic characteristics and food consumption pattern of students in the studied population is shown in Table **1**. The results reveal that majority of the population fell within 18-25years (79.11%) followed by 26-30 years (18.00%), then < 18 years (1.78%) and > 30 years (1.11%). Most of the students in the study population live in hostels (67.44%) and majority of the students stated that they enjoy consumption of junk food (79.00%). The results reveal that the students consume junk food averagely in the order: once a week (42.44%) > everyday (33.89%) > several times a week (23.67%), usual time of junk food consumption in the order: whenever available (43.33%) > at school during lunch (36.44%) > after school (12.56%) > before school as breakfast (7.67%) and average expenditure on junk food as: N60 – N100 (46.00%) > N30 – N50 (26.44%) > more than N100 (23.11%) > less than N30 (4.44%). Also, the results show that the reasons for junk food consumption are in order: convenient (48.44%) > too busy to cook (24.89%) > inexpensive (22.78%) > lack of cooking skills (3.89%), most consumed junk food is in the order: biscuit (39.11%) > fish roll (31.22%) > doughnut (20.78%) > chips (8.89%) and commonly consumed aerated drinks as: coke (43.56%) > fanta (24.11%) > sprite (20.33%) > pepsi (12.00%).

Table **2** shows the results of body mass index (BMI) of students' population in the study. The results show that majority of the student (81.33%) have BMI that falls between 18.5 and 24.9 (normal weight) followed by students (11.11%) with BMI from 25-29.9 (overweight) and then students (5.89%) with BMI less than 18.5 (underweight). The results also reveal that very few students (1.67%) were obese with BMI greater than 30.

The association of junk food consumption with Body Mass Index (BMI) is shown in Table **3**. The results show that students enjoying junk food consumption is significantly associated with BMI (p value 0.000) and there is no significant association between average time junk food is consumed ((p value 0.790), most usual time junk food is consumed ((p value 0.085), average money spent on junk food ((p value 0.139), reason why junk food is consumed (p value 0.462) and common junk food consumed ((p value 0.209) and aerated drinks consumed ((p value 0.246) with BMI.

The results of waist-hip ratio (WHR) of students' population in the study are shown in Table **4**. The results show that majority of the students (82.78%) have WHR below 0.90 (normal) and 0.80 (normal) for male and female, respectively, followed by students (14.78%) with WHR ranging from 0.90 – 0.95 (overweight, male) and 0.80 – 0.85 (overweight, female). The results also indicate that very few students (2.44%) are obese with WHR greater than 0.95 and 0.85 for males and females, respectively.

The association of junk food consumption with Waist Hip Ratio (WHR) is shown in Table **4**. The results show that students enjoying junk food consumption is significantly associated with WHR with (p value 0.018), reason why junk food is consumed (p value 0.000) and common junk food consumed (p value 0.021). There is no significant association between average time junk food is consumed (p value 0.318), most usual time junk food is consumed (p value 0.183), average money spent on junk food (p value 0.615) and aerated drinks consumed (p value 0.052) with WHR.

## DISCUSSION

The contributions of diets to healthy living and its association with numerous pathologies have been

**Table 1: Socio-Demographic Characteristics and Food Consumption Pattern of Students**

| S/No | Variables | Frequency | Percentage (%) |
|---|---|---|---|
| 1 | Age Range | | |
| | Below 18 | 16 | 1.78 |
| | 18 – 25 | 712 | 79.11 |
| | 26 – 30 | 162 | 18.00 |
| | > 30 | 10 | 1.11 |
| 2 | Living Status | | |
| | Off Campus | 293 | 32.56 |
| | Hostel | 607 | 67.44 |
| 3 | Do you enjoy junk food | | |
| | Yes | 711 | 79.00 |
| | No | 189 | 21.00 |
| 4 | How many times on the average do you consume junk food | | |
| | Everyday | 305 | 33.89 |
| | Once a week | 382 | 42.44 |
| | Several time a week | 213 | 23.67 |
| 5 | What is the most usual time you consume junk food | | |
| | Before school as breakfast | 69 | 7.67 |
| | At school during lunch | 328 | 36.44 |
| | After school | 113 | 12.56 |
| | Whenever available | 390 | 43.33 |
| 6 | On the average how much do you expect to pay for junk food at a time | | |
| | < ₦30 | 40 | 4.44 |
| | ₦30 - ₦50 | 238 | 26.44 |
| | ₦60 - ₦100 | 414 | 46.00 |
| | > ₦100 | 208 | 23.11 |
| 7 | Why do you eat junk food | | |
| | They are inexpensive | 205 | 22.78 |
| | They are convenient | 436 | 48.44 |
| | I am too busy to cook | 224 | 24.89 |
| | I lack cooking skills | 35 | 3.89 |
| 8 | What is the common junk food you consume (Street food) | | |
| | Biscuit | 352 | 39.11 |
| | Fish roll | 281 | 31.22 |
| | Chips | 80 | 8.89 |
| | Doughnut | 187 | 20.78 |
| 9 | What is the common junk food you consume (Aerated Drinks) | | |
| | Coke | 392 | 43.56 |
| | Fanta | 217 | 24.11 |
| | Sprite | 183 | 20.33 |
| | Pepsi | 108 | 12.00 |

**Table 2: Body Mass Index (BMI)**

| BMI (Body Mass Index) | Frequency | Percentage (%) |
|---|---|---|
| <18.5 (underweight) | 53 | 5.89 |
| 18.5 – 24.9 (Normal weight) | 732 | 81.33 |
| 25 – 29.9 (overweight) | 100 | 11.11 |
| >30 (Obese) | 15 | 1.67 |

**Table 3: Association between Junk Food Consumption and Body Mass Index (BMI)**

| S/No | Variables | Body Mass Index (BMI | | | | Statistics | |
|---|---|---|---|---|---|---|---|
| | | < 18.5 | 18.5 – 24.9 | 25 – 29.9 | > 30 | $X^2$ | P- value |
| 1 | Do you enjoy junk food | | | | | | |
| | Yes | 39 | 586 | 71 | 15 | 161.811 | 0.000* |
| | No | 6 | 153 | 30 | 0 | | |
| 2 | How many times on the average do you consume junk food | | | | | | |
| | Everyday | 11 | 254 | 35 | 5 | 3.149 | 0.790 |
| | Once a week | 22 | 311 | 44 | 5 | | |
| | Several time a week | 12 | 174 | 22 | 5 | | |
| 3 | What is the most usual time you consume junk food | | | | | | |
| | Before school as breakfast | 3 | 62 | 3 | 1 | 15.213 | 0.085 |
| | At school during lunch | 24 | 252 | 25 | 4 | | |
| | After school | 6 | 111 | 18 | 1 | | |
| | Whenever available | 14 | 326 | 40 | 10 | | |
| 4 | On the average how much do you expect to pay for junk food at a time | | | | | | |
| | < ₦30 | 1 | 36 | 3 | 0 | 13.562 | 0.139 |
| | ₦30 - ₦50 | 13 | 198 | 21 | 6 | | |
| | ₦60 - ₦100 | 15 | 338 | 57 | 4 | | |
| | > ₦100 | 16 | 166 | 21 | 5 | | |
| 5 | Why do you eat junk food | | | | | | |
| | They are inexpensive | 8 | 177 | 17 | 3 | 8.740 | 0.462 |
| | They are convenient | 19 | 357 | 50 | 10 | | |
| | I am too busy to cook | 16 | 176 | 30 | 2 | | |
| | I lack cooking skills | 2 | 29 | 4 | 0 | | |
| 6 | What is the common junk food you consume (Street food) | | | | | | |
| | Biscuit | 21 | 286 | 37 | 8 | 12.079 | 0.209 |
| | Fish roll | 9 | 243 | 25 | 4 | | |
| | Chips | 4 | 65 | 11 | 0 | | |
| | Doughnut | 11 | 143 | 30 | 3 | | |
| 7 | What is the common junk food you consume (Aerated Drinks) | | | | | | |
| | Coke | 16 | 323 | 47 | 6 | 11.450 | 0.246 |
| | Fanta | 9 | 175 | 27 | 6 | | |
| | Sprite | 14 | 153 | 14 | 2 | | |
| | Pepsi | 6 | 92 | 9 | 1 | | |

*Significant level at P < 0.05.

**Table 4: Waist-Hip Ratio (WHR)**

| WHR | Frequency | | Percentage |
|---|---|---|---|
| <0.90 (Normal, Male) | 425 | 745 | 82.78 |
| < 0.80 (Normal, Female) | 320 | | |
| 0.90-0.95 (overweight, Male) | 23 | 133 | 14.78 |
| 0.08 -0.85 (Overweight, Female) | 110 | | |
| >0.95 (Obese, Male) | 2 | 22 | 2.44 |
| >0.85 (Obese, Female) | 20 | | |

**Table 5: Association between Junk Food Consumption and Waist-Hip Ratio (WHR)**

| S/No | Variables | Waist-hip ratio (WHR) | | | Statistics | |
|---|---|---|---|---|---|---|
| | | <0.90/ < 0.80 | 0.90-0.95/ 0.08 -0.84 | >0.95/ >0.85 | $X^2$ | P- value |
| 1 | Do you enjoy junk food | | | | | |
| | Yes | 597 | 95 | 19 | 7.997 | 0.018* |
| | No | 149 | 27 | 13 | | |
| 2 | How many times on the average do you consume junk food | | | | | |
| | Everyday | 252 | 46 | 7 | 4.710 | 0.318 |
| | Once a week | 310 | 61 | 11 | | |
| | Several time a week | 186 | 21 | 6 | | |
| 3 | What is the most usual time you consume junk food | | | | | |
| | Before school as breakfast | 53 | 13 | 3 | 8.832 | 0.183 |
| | At school during lunch | 271 | 47 | 10 | | |
| | After school | 87 | 20 | 8 | | |
| | Whenever available | 330 | 46 | 12 | | |
| 4 | On the average how much do you expect to pay for junk food at a time | | | | | |
| | < ₦30 | 30 | 10 | 0 | 4.457 | 0.615 |
| | ₦30 - ₦50 | 198 | 36 | 4 | | |
| | ₦60 - ₦100 | 342 | 61 | 11 | | |
| | > ₦100 | 169 | 34 | 5 | | |
| 5 | Why do you eat junk food | | | | | |
| | They are inexpensive | 162 | 38 | 0 | 31.018 | 0.000* |
| | They are convenient | 364 | 57 | 6 | | |
| | I am too busy to cook | 187 | 33 | 14 | | |
| | I lack cooking skills | 32 | 3 | 4 | | |
| 6 | What is the common junk food you consume (Street food) | | | | | |
| | Biscuit | 309 | 47 | 11 | 14.856 | 0.021* |
| | Fish roll | 239 | 45 | 7 | | |
| | Chips | 70 | 17 | 3 | | |
| | Doughnut | 107 | 39 | 6 | | |
| 7 | What is the common junk food you consume (Aerated Drinks) | | | | | |
| | Coke | 329 | 53 | 10 | 12.469 | 0.052 |
| | Fanta | 164 | 44 | 9 | | |
| | Sprite | 159 | 22 | 2 | | |
| | Pepsi | 92 | 12 | 4 | | |

*Significant level at P < 0.05.

reported over the years [30]. Numerous studies have implicated consumption of junk foods as substitutes to nutritious healthy diets as causes of overweight and obesity [25, 26]. Overweight and obesity are risk factors for many diseases and the increase in its incidence among the young adults' population is worrisome [24, 33]. In Nigeria, junk food is commonly consumed among students because of its availability and accessibility. The results of this study (Table **1**) showed that 79% of students in the study population enjoyed junk food consumption. This result, which is variably associated with body mass index (BMI) and waist-hip ratio (WHR), is similar to that reported by Poudel [24] for school adolescents in Birgunj sub metropolitan, Parsa district of Nepal. However, the results of those who consumed junk food once a week or everyday (42.44%, Table **1**) were similar to (41.3%) those reported by Khalaf *et al*. [34], higher than 19.2 for university students in United State [35, 36] and 25.5% among students in King Sau University [26] but lower than the 66.5% reported by Aboul and Elebiary [37] among students in Saudi Arabi. The results (Table **1**) showed higher frequency of junk food consumption (33.89% everyday) and this could mean higher daily energy intake from saturated fatty acid, trans-fatty acid and poor diet quality which has been reported earlier to be associated with greater weight gain [38].

In this study, majority of the students in the study population (81.33%) had normal BMI (Table **2**). This is in contrast to the majority (50.5%) having BMI less than normal as reported for school adolescents by Poudel [24] but similar to the findings of a study done in Saudi Arabia that reported a normal BMI of the majority i.e. 57.2% of the population [25]. In this study, obesity and overweight is 1.67% and 11.11%, respectively (Table **2**). This result is similar to that reported by Poudel [24] but in contrast with 29.7% obesity in adolescents consuming junk food [25].

This study showed that there is no significant association between the average time junk food is consumed, most usual time the junk food is consumed, average money spent on the junk food, reason why junk food is consumed and the common junk food consumed and as well as aerated drinks consumed with body mass index (BMI). This finding is in contrast to the reports of Trushna *et al.* [39] and Poudel [24] who found significant association of high BMI with evening and night time junk food consumption and expenses of money on junk food consumption, respectively. The differences observed in this study may be attributed to lifestyle pattern of the students and differences in contents of these junk foods in Nigeria compared to those in Saudi Arabia and other countries in context [40, 41].

The pattern of classification of the students using waist-hip ratio (Table **4**) into normal weight, overweight and obese and the association of the study junk food variables with waist-hip ratio (Table **5**) is similar to the observations made using body mass index in this study. The results validated the use of waist hip ratio as an alternative anthropometric measurement for assessment of obesity [42]. In general, this study showed that fast food consumption of the students in Akanu Ibiam Federal Polytechnic Unwana, Nigeria is not a risk factor of obesity for the students unlike the study among European students [43] which established that fast food consumption was a risk factor for obesity among the students. The differences could be attributed to the differences in the ingredients and materials used for making the fasts foods and aerated drinks in Nigeria compared to that in the Europe.

## CONCLUSION

The findings of this study revealed that there is no significant association between consumption of junk foods, frequency of consumption and body mass index or waist-hip ratio. The study discovered that the frequency of junk food consumption among the students was high and mostly at school during lunch and that the reason was mainly due to the fact that junk food consumption is convenient for them. Schedule of activities in school may have influenced the choice of the junk food consumption pattern of these students and since there was no established health danger based on the observations of this study, the eating pattern of the students should not be discouraged as the convenience and availability of the junk food may have positive contributions in the students managing their school activities with time schedule. However, it is important to note that this recommendation is based on the junk food studied and may not apply to other junk foods with different nutritional composition.

## CONFLICT OF INTEREST

Authors declare no conflict of interest

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