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Full Length Research

Food consumption patterns among undergraduate students in the University of Uyo, Nigeria

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ABSTRACT: University students often exhibit poor dietary habits that compromise their physical health, cognitive function and overall well-being. This descriptive cross-sectional study adopted a multi-stage sampling technique to select 436 students, aged 22.0±2.8 years, to participate in a study assessing food consumption patterns among undergraduate students of the University of Uyo, Nigeria. A 53-item food frequency questionnaire (FFQ) was employed to assess dietary intake based on five frequency categories: "never," "1–3 times monthly," "≤3 times per week," "4–6 times per week," and "daily." For analytical purposes, "never" and "1–3 times monthly" were grouped as infrequent consumption, while the remaining three categories were grouped as frequent consumption. The average number of times each frequency option occurred under each food group was calculated. The results showed that fish and seafood (115.6±31.7), bread, biscuits and pastries (106.4±24.2), sugars and sugar-sweetened beverages (87.7±19.9), cereals (81.7±4.2), as well as meats and poultry (78.5±21.8) were identified as frequently consumed food groups. In contrast, fruits (139.6±50.1), other vegetables (136.0±46.8), sweets and spreads (119.8±32.2), roots and tubers (116.8±41.6), legumes, nuts and seeds (108.6±42.8), green leafy vegetables (107.7±27.0) and milk/dairy (104.8±0.3) appeared most common as infrequently consumed food groups. Rice, gari/fufu, fish and crayfish, pastries and biscuits, and bread were the most frequently consumed individual food items on a daily basis. Males reported frequent consumption of foods from a wider range of food groups compared to females ($p < 0.05$). In conclusion, students' food preferences were based primarily on protein and carbohydrate foods-especially cereals and refined carbohydrates, but lacked nutrient-dense foods. It was recommended that a nutrition education programme, combined with social media engagements, be used to promote behavioural change towards healthier food choices among students.

Keywords: Food preferences, food groups, fruits, vegetables, fish, seafoods, undergraduate students.

INTRODUCTION

Proper nutrition is essential to support physical growth, cognitive abilities, overall well-being and academic performance in university students. To achieve the focus and memory necessary to attain academic success, students need well-planned diets that are balanced both in energy and essential nutrients (Alfaro-González *et al.,* 2024; Almoraie *et al.,* 2025). However, poor food selection is particularly a problem among students, as they often prioritise sensory appeal, price, convenience and availability over the healthfulness of their diets (Hebden *et al.,* 2015). Consequently, increased consumption of energy-dense meals that are high in sodium, fat, and added sugar, but low in essential nutrients, is common among university students (Bruening and Laska, 2022; Assilian *et al*., 2024). The university setting further exacerbates students' vulnerability to poor dietary practices due to time constraints from tight academic schedules, peer pressure and unhealthy food options (Li *et al.,* 2022).

In Nigeria, studies have identified poor dietary practices among undergraduate students, including irregular meal patterns, meal skipping, fast food consumption and snacking

(Oyekale *et al*., 2024; Sholeye *et al.,* 2024). As such, consumption of nutrient-dense and unprocessed foods, including fruits and vegetables, is rare, whereas refined cereals-especially rice, pasta, pastries, sugar-sweetened beverages (SSBs) and carbonated drinks are frequently consumed by students (Onyeji and Chukwunonso, 2020; Akinbule *et al*., 2024; Nwobi et al., 2024). These consumption patterns are frequently linked to higher intakes of energy, fat and sugar, but low in dietary fibre and essential nutrients, and often lead to overweight, obesity and metabolic disorders among students (Beaudry *et al*., 2019).

Although several studies have reported general dietary practices among undergraduate students in Nigeria (Ikujenlola and Adekoya, 2020; Eze and Ogbu, 2022; Abiona *et al.,* 2024), comprehensive information is lacking on food consumption patterns using frequency-based approaches that reflect regional dietary preferences. Existing studies are often limited in scope, reporting consumption frequency for a limited number of foods (Omage and Omuemu, 2018; Kayode and Alabi, 2020). Despite widespread evidence of poor dietary habits among university students in Nigeria, there is a dearth of information on the region-specific food consumption patterns and preferences among undergraduate students in South-south Nigeria. This gap in information limits the institutions' capacity to design effective nutrition interventions that can promote healthy eating habits and safeguard students' health against nutrition-related problems.

The undergraduate students of the University of Uyo, like their peers in other tertiary institutions, are at a critical developmental age where lifelong eating habits that can impact both short- and long-term health and overall well-being are formed. Identifying which food groups are most or least frequently consumed, as well as the most preferred foods within respective food groups, can reveal existing dietary gaps and inform the development of culturally specific interventions to enhance healthy consumption in the population. This study aimed to report the most frequently consumed food groups and also identify the most preferred items within respective food groups among undergraduate students of the University of Uyo.

METHODOLOGY

Study design

This study adopted a descriptive cross-sectional design to assess food consumption patterns among undergraduate students of the University of Uyo, Akwa Ibom State, Nigeria. The University of Uyo is located in Uyo, the capital city of Akwa Ibom State in southern Nigeria. Operating from four campuses, the University offers undergraduate academic programmes across various faculties in three campuses - the Main Campus located at Nwaniba Road, Town and Annex campuses located at Ikpa Road, all within Uyo. This study included undergraduate students, studying on a full-time basis, but excluded those whose usual food intakes were altered within the last three months due to long-term illnesses, pregnancy and lactation.

Sample size determination

Minimum sample size was obtained using Yamane's formula (Yamane, 1967) for calculating sample size from finite populations. Sample size calculation adopted a desired precision level of 5% (0.005) and a 95% confidence interval. Using the formula:

$[n=N/1+N(e^2)]$

Where: n = required sample size, N = University total population = 41,958 (based on university enrolment data for 2022/2023 session), e = Precision level = 5%

The sample size was therefore calculated as

$$n = \frac{41{,}958}{1 + 41{,}958\ (0.05)^2}$$

n = 396

The minimum sample size calculated was 396. Adjusting to account for a 10% non-response rate, the calculated sample size for the study was 436.

Sampling technique

A multi-stage sampling technique was used to select participants for the study. The included faculties were selected using a simple random sampling. Furthermore, the probability proportionate to size sampling technique was adopted to select departments and determine the required number of students from each selected department. Finally, simple random sampling was used to select and interview students from the respective departments included in the study.

Ethical considerations

Ethical approval for the study was obtained from the Health Research Ethics Committee of the University of Uyo (UU/CHS/IHREC/VOL.1/120). The research was conducted in line with the principles of the Declaration of Helsinki. Participants were duly informed on the purpose, procedures, potential risks and benefits of the study, after which written informed consent was obtained from each participant.

Data collection

Data was collected using a semi-structured questionnaire, comprising two sections to obtain information on demographic characteristics and food consumption frequency. Due to the lack of a validated food frequency questionnaire (FFQ) specifically designed for this demographic in Nigeria, a 53-item FFQ reflecting culturally and regionally relevant foods was developed for the study. The food items were selected based on commonly consumed foods identified from two previously conducted 24-hour dietary recall sessions among the university students. The whole questionnaire was reviewed for reliability by two experts in the field, and feedbacks were used to revise and finalise the tool. Data collection was performed by trained personnel who had received instructions on the study's data collection protocols.

Demographic information

Demographic information obtained included educational level, age, sponsor, marital status and parents' education.

Dietary intake assessment

The 53 items FFQ assessing the intake of twelve food groups was used to assess food consumption frequency over the immediate past three months. Students were asked to report consumption frequency for each food item by choosing the frequency option of which each food is usually consumed. A total of five consumption frequencies were presented: "never", "1-3 times per month", "≤3 times per week", "4-6 times weekly" and "daily". Consumption frequencies used for assessing intakes in the FFQ were further reclassified into two categories. The options, "never" and "1-3 times per month" were reclassified as infrequent consumption, while the remaining three options, "≤3 times per week", "4-6 times weekly" and "daily" were reclassified as frequent consumption. The total frequency of each option for respective food items was noted, and the mean was calculated for each food group. Individual food items that were consumed on a daily basis by at least 30% of the population were regarded as the most frequently consumed foods within the food groups.

Anthropometric measurements

Using the Centres for Disease Control (Centres for Disease Control and Prevention, 2020) procedures, anthropometric measurements of weight and height were taken using a sensitive electronic bathroom scale (Seca 874, Germany) and a fabricated stadiometer, respectively. Information obtained from weight and height measurements was used to compute BMI values, and further classified in line with the World Health Organisation (WHO) classifications (WHO, 2010).

Data analyses

All data were analysed using the IBM-SPSS statistical software package, version 20. Descriptive and inferential statistics were obtained. Results on categorical variables were presented in frequency counts and percentages. Means and standard deviations were derived and reported for continuous variables. Chi-Square test was conducted to report sex differences in consumption frequencies. Statistical significance was determined at $\alpha_{0.05}$.

RESULTS

Demographic characteristics

A total of 436 undergraduate students, aged 22.0 ±2.8 years, and consisting of 65.6% females, participated in the study (Table 1). A majority comprised year one (30.5%) and year two (27.5%) students, and were single (95.6%). Most students were sponsored by parents (82.1%) and came from families where both parents had attained at least secondary education. Most students had normal body weight (64.9%), but the proportion with overweight was considerably high (22.0%).

Food consumption frequencies

Mean consumption frequencies for each food group are presented in Table 2. Fish and seafoods (115.6±31.7), bread, biscuits and pastries (106.4±24.2), sugars and SSBs (87.7±19.9), cereals (81.7±4.2), and meats and poultry (78.5±21.8) appeared more common under frequent consumption. In contrast, fruits (139.6±50.1), other vegetables (136.0±46.8), sweets and spreads (119.8±32.2), roots and tubers (116.8±41.6), legumes, nuts and seeds (108.6±42.8), green leafy vegetables (107.7±27.0) and milk/dairy (104.8±0.3) ranked highest among foods with infrequent consumption.

Consumption frequencies for individual foods within each food group are presented in Figures 1 to 3. Gari/fufu (50.5%), rice-based dishes (47.2%), biscuits (39.7%) and bread (35.3%) were identified in Figure 1 as frequently consumed foods on daily basis. In Figure 2, crayfish (49.5%) and fish (32.1) were consumed most often daily. No food, including fruits, leafy vegetables and other vegetables, was identified to be consumed by up to 30% of the students' population.

Differences in consumption frequencies between males and females

Food consumption frequencies differed significantly between males and females for selected items (Table 3). Compared to males, a higher proportion of females (77.8% females versus 64.7% males, $p = 0.003$) had frequent

Table 1. Demographic characteristics of students.

Variable	Male [150 (34.4%)]	Female [286 (65.6%)]	Total [436 (100.0%)]	Mean±SD
Educational level				
100	51 (34.0)	82 (28.7)	133 (30.5)	
200	38 (25.3)	82 (28.7)	120 (27.5)	
300	25 (16.7)	41 (14.3)	66 (15.1)	
400	20 (13.3)	47 (16.4)	67 (15.4)	
500	16 (10.7)	34 (11.9)	50 (11.5)	
Age				
≤18 years	4 (2.7)	34 (11.9)	38 (8.7)	
19 to 24 years	104 (69.3)	212 (74.1)	316 (72.5)	22.0±2.8
≥25 years	42 (28.0)	40 (14.0)	82 (18.8)	
Sponsor				
Self	31 (20.7)	25 (8.7)	56 (13.0)	
Parent(s)	119 (79.3)	240 (83.8)	359 (82.1)	
Scholarship board	0 (0.0)	7 (2.4)	7 (1.6)	
Workplace	0 (0.0)	5 (1.7)	5 (1.1)	
Spouse	0 (0.0)	9 (3.1)	9 (2.1)	
Father’s education				
None	9 (6.0)	12 (4.2)	21 (4.8)	
Primary	11 (7.3)	24 (8.4)	35 (8.0)	
Secondary	37 (24.7)	70 (24.5)	107 (24.5)	
Tertiary	93 (62.0)	180 (62.9)	273 (62.6)	
Mother’s education				
None	15 (10.0)	21 (7.3)	36 (8.3)	
Primary	15 (10.0)	21 (7.3)	36 (8.3)	
Secondary	42 (28.0)	87 (30.4)	129 (29.6)	
Tertiary	78 (52.0)	157 (54.9)	235 (53.9)	
Marital status				
Single	144 (96.0)	273 (95.5)	417 (95.6)	
Married	6 (4.0)	13 (4.5)	19 (4.4)	
BMI				
Underweight	8 (5.3)	26 (9.1)	34 (7.8)	23.1±4.3
Normal	100 (66.7)	183 (64.0)	283 (64.9)	
Overweight	34 (22.7)	62 (21.7)	96 (22.0)	
Obese	8 (5.3)	15 (5.2)	23 (5.3)	

consumption of pasta/noodles. Conversely, higher proportions of males reported frequent consumption of cereal gruels (52.0% males versus 38.1% females, p = 0.005), maize custard (54.0% males versus 44.1% females, p = 0.048), gari/fufu (94.0% males versus 87.8% females, p = 0.040), editan soup (65.3% males versus 41.3% females, p < 0.001), atama soup (56.7% males versus 34.3% females, p < 0.001), bitter leaf soup (48.7% males versus 34.3% females, p = 0.003), banana (59.3% males, versus 49.3% females, p = 0.046), beans pottage (76.0% males versus 57.3% females, p < 0.001), akara (50.0% males versus 36.0% females, p = 0.005), peanuts (81.3% males, versus 72.4% females, p = 0.039), soy beans (36.0% males, versus 25.5% females, p = 0.022), popcorn (47.3% males, versus 32.0% females, p = 0.002) and fruit flavoured drinks (48.0% males versus 37.1% females, p = 0.027).

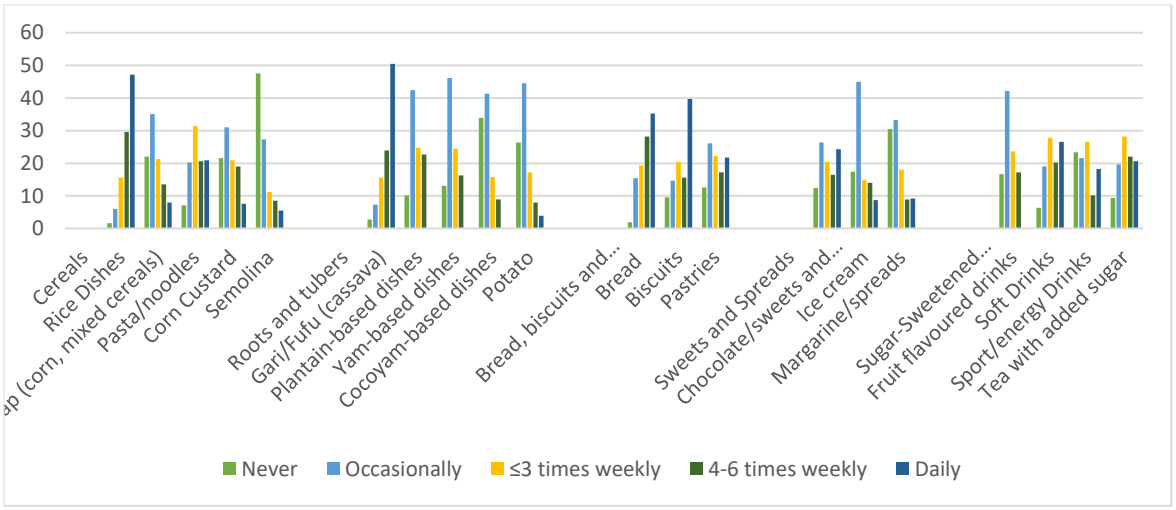

Figure 1. Frequency consumption of carbohydrates.

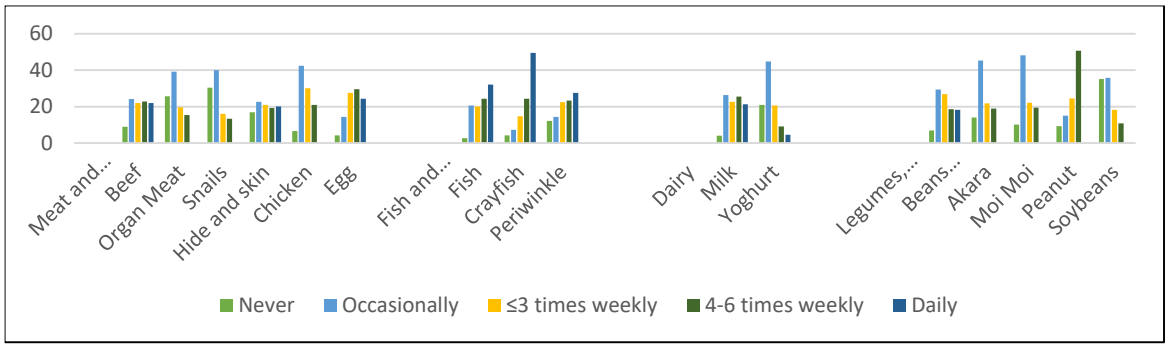

Figure 2. Frequency consumption of meats and proteins

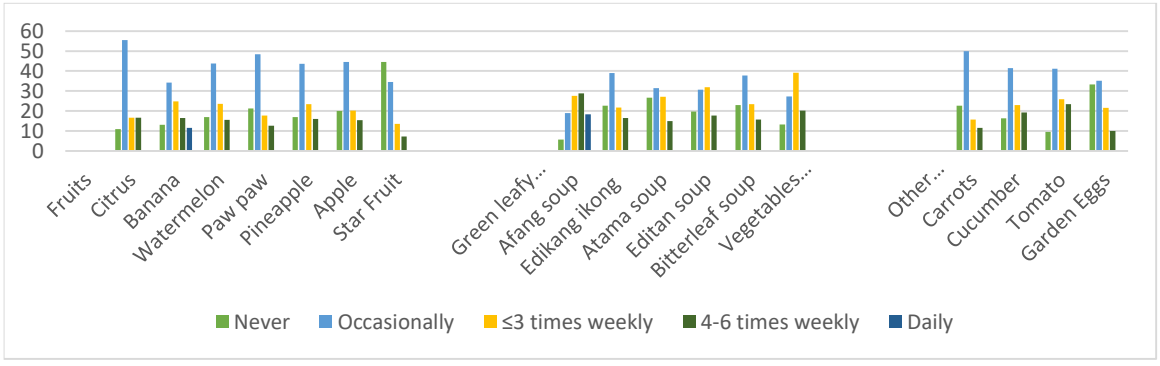

Figure 3. Frequency consumption of fruits and vegetables.

DISCUSSION

This study provided information on the frequency of consumption of major food groups among undergraduate students at the University of Uyo, Nigeria. Students had higher consumption frequencies for fish and other seafoods; bread; biscuits and pastries; sugars and SSBs; cereals; as well as meats and poultry. Specifically, fruits, other vegetables, sweets and spreads; roots and tubers; legumes, nuts and seeds; green leafy vegetables and

Table 2. Mean food group consumption frequencies among university students.

Food group	Infrequent consumption			Frequent consumption			
	Never	Occasionally	Total	≤3 times weekly	4-6 times weekly	Daily	Total
Cereals	86.8±69.5	104.2±44.6	95.5±8.7	87.6±29.5	79.6±31.0	77.8±68.3	81.7±4.2
Roots and tubers	75.2±49.4	158.4±63.6	116.8±41.6	85.4±18.2	69.6±28.9	47.4±86.6	67.5±15.6
Bread, biscuits and pastries	35.0±19.8	81.7±22.9	58.3±23.3	90.0±5.4	88.7±24.4	140.7±33.2	106.4±24.2
Sweets and spreads	87.7±33.3	152.0±33.4	119.8±32.2	77.7±9.8	57.3±13.7	61.3±31.6	65.4±8.8
Sugars and SSBs	61.0±28.8	112.0±42.3	86.5±25.5	115.8±7.8	75.8±19.8	71.5±43.3	87.7±19.9
Meats and poultry	67.5±43.0	133.0±46.1	100.3±32.8	99.0±20.6	88.2±23.1	48.3±48.6	78.5±21.8
Fish and seafood	27.7±18.1	61.7±23.7	44.7±17.0	83.3±14.3	104.7±1.9	158.7±41.4	115.6±31.7
Milk/dairy	54.5±36.5	155.0±40.0	104.8±0.3	94.5±4.5	75.5±35.5	56.5±36.5	75.5±15.5
Legumes, nuts and seeds	65.8±44.7	151.4±51.7	108.6±42.8	99.2±12.4	103.6±60.8	16.0±32.0	72.9±40.3
Fruits	89.6±45.0	189.7±30.2	139.6±50.1	87.1±16.9	62.4±13.6	7.1±17.5	52.2±33.0
Green leafy vegetables	80.7±30.5	134.7±29.1	107.7±27.0	124.2±25.2	82.8±20.6	13.3±29.8	73.4±45.7
Other vegetables	89.3±38.0	182.8±23.2	136.0±46.8	94.0±16.0	70.0±24.0	0.0±0.0	54.7±39.9

milk/dairy were identified as the most infrequently consumed groups.

There is limited information on food group consumption frequencies among university students in Nigeria. This makes it difficult to compare our findings with others. The few studies available often limit such information to few food items. A study conducted on food choice and meal consumption pattern among undergraduate students in two universities in Southwestern Nigeria revealed cereals as the most frequently consumed food group among students, followed by other carbohydrates and meat; whereas, fruits, vegetables and milk were consumed on the least frequent basis (Otemuyiwa and Adewusi, 2014). Oladoyinbo *et al.* (2019) in their study noted that white rice, pasta, bread and carbonated soft drinks were the most frequently consumed foods among undergraduate students in Ogun State, Nigeria. Conversely, the authors noted low consumption frequencies for fruits and vegetables, with only 17% and 13.1% reporting daily consumption, respectively. A study on dietary intake habits among undergraduate students of Lagos State University revealed that while snacks and processed foods were frequently consumed, the least consumed food group on daily basis was the legumes and nut group, followed by roots and tubers (Arisa *et al.*, 2020). Another study found high consumption frequency for pastry products, moderate consumption of meat, rice, but low consumption of milk and fish; and only 2% reported daily intakes of fruits and vegetables among undergraduate students in a Nigerian University (Olatona *et al.,* 2018).

These findings suggest that the dietary intakes of undergraduate university students are primarily based on processed foods such as pastries, bread, and other snacks, while fruits, vegetables, milk, and legumes contribute minimally to their daily diet. These are in line with findings from the present study, particularly in respect to frequent consumption of cereals, bread/pastries and infrequent intakes of fruits, vegetables and legumes/nuts. Oladoyinbo *et al.* (2019) also reported frequent intakes of carbonated drinks, which align with frequent intakes of sugars and SSBs in our study. In line with reports from Arisa *et al.* (2020), students in the present study consumed roots and tubers on less frequent basis. Contrary to the finding on low consumption of fish among university students in a similar study (Olatona *et al.,* 2018), our study recorded higher consumption frequency for fish and crayfish among students at the University of Uyo. The observed differences in fish consumption between the present study and others may be attributed to cultural influences in dietary practices within the region. Akwa Ibom State is located in a coastal region, where many riverine residents engage in fishing as a major

Table 3. Differences in consumption frequencies between males and females.

Food	Infrequent			Frequent			X_2	p-value
	Male	Female	Total	Male	Female	Total		
Cereal and products								
Rice	14 (9.3)	19 (6.6)	33 (7.6)	136 (90.7)	267 (93.4)	403 (92.4)	1.018	0.313
Cereal gruels	72 (48.0)	177 (61.9)	249 (57.1)	78 (52.0)	109 (38.1)	187 (42.9)	7.748	0.005*
Maize custard	69 (46.0)	160 (55.9)	229 (52.5)	81 (54.0)	126 (44.1)	207 (47.5)	3.902	0.048*
Semolina	109 (72.7)	217 (75.9)	326 (74.8)	41 (27.3)	69 (24.1)	110 (25.2)	0.537	0.464
Pasta/Noodles	53 (35.3)	63 (22.2)	116 (26.7)	97 (64.7)	221 (77.8)	318 (73.3)	8.667	0.003*
Starchy Roots/tubers								
Gari/fufu	9 (6.0)	35 (12.2)	44 (10.1)	141 (94.0)	251 (87.8)	392 (89.9)	4.220	0.040*
Yam-based dishes	82 (54.7)	176 (61.5)	258 (59.2)	68 (45.3)	110 (38.5)	178 (40.8)	1.923	0.165
Plantain-based dishes	111 (74.0)	200 (69.9)	311 (71.3)	39 (26.0)	86 (30.1)	125 (28.7)	0.797	0.372
Potato	101 (67.3)	208 (72.7)	309 (70.9)	49 (32.7)	78 (27.3)	127 (29.1)	1.387	0.230
Cocoyam-based dishes	112 (74.7)	216 (75.5)	328 (75.2)	38 (25.3)	70 (24.5)	108 (24.8)	0.039	0.844
Bread, biscuit and pastries								
Bread	21 (14.0)	52 (18.3)	73 (16.8)	129 (86.0)	232 (81.7)	361 (83.2)	1.303	0.254
Biscuit	63 (42.0)	106 (37.1)	169 (38.8)	87 (58.0)	180 (62.9)	267 (61.2)	1.010	0.315
Pastries	37 (24.7)	69 (24.1)	106 (24.3)	113 (75.3)	217 (75.9)	330 (75.7)	0.016	0.900
Sweets and spread								
Chocolate/sweets	63 (37.3)	106 (62.7)	169 (38.8)	87 (58.0)	180 (62.9)	267 (61.2)	1.010	0.183
Ice cream	94 (62.7)	178 (62.2)	272 (62.4)	56 (37.3)	108 (37.8)	164 (37.6)	0.008	0.508
Margarine/spread	103 (68.7)	175 (61.2)	278 (63.8)	47 (31.3)	111 (38.8)	158 (36.2)	2.381	0.075
Sugar and SSBs								
Fruit flavoured drinks	78 (52.0)	180 (62.9)	258 (59.2)	72 (48.0)	106 (37.1)	178 (40.8)	4.872	0.027*
Soft Drinks	40 (26.7)	71 (24.8)	111 (25.5)	110 (73.3)	215 (75.2)	325 (74.5)	0.176	0.675
Sport/Energy Drinks	54 (36.0)	142 (49.7)	196 (45.0)	96 (64.0)	144 (50.3)	240 (55.0)	7.409	0.006
Tea with added sugar	41 (27.3)	86 (30.1)	127 (29.1)	109 (72.7)	200 (69.9)	309 (70.9)	0.357	0.550
Milk/dairy								
Milk	50 (33.3)	83 (29.0)	133 (30.5)	100 (66.7)	203 (71.0)	303 (69.5)	0.863	0.353
Yoghurt	97 (64.7)	189 (66.1)	286 (65.6)	53 (35.3)	97 (33.9)	150 (34.4)	0.088	0.767
Fruits								
Orange	99 (66.0)	191 (66.8)	290 (66.5)	51 (34.0)	95 (33.2)	146 (33.5)	0.027	0.869
Pawpaw	98 (65.3)	206 (72.0)	304 (69.7)	52 (34.7)	80 (28.0)	132 (30.2)	2.089	0.148
Apple	91 (60.7)	190 (66.4)	281 (64.4)	59 (39.3)	96 (33.6)	155 (35.6)	1.428	0.232
Pineapple	100 (66.7)	164 (57.3)	264 (60.6)	50 (33.3)	122 (42.7)	172 (39.4)	3.581	0.058
Watermelon	96 (64.0)	169 (59.1)	265 (60.8)	54 (36.0)	117 (40.9)	171 (39.2)	0.995	0.319
Banana	61 (40.7)	145 (50.7)	206 (47.2)	89 (59.3)	141 (49.3)	230 (52.8)	3.974	0.046*
Starfruit	124 (82.7)	221 (77.3)	345 (79.1)	26 (17.3)	65 (22.7)	91 (20.9)	1.733	0.188
Green leafy vegetables								
Edikang ikong	89 (59.3)	180 (62.9)	269 (61.7)	61 (40.7)	106 (37.1)	167 (38.3)	0.541	0.462
Afang soup	39 (26.0)	69 (24.3)	108 (24.9)	111 (74.0)	215 (75.7)	329 (75.1)	0.153	0.696
Editan Soup	52 (34.7)	168 (58.7)	220 (50.5)	98 (65.3)	118 (41.3)	216 (49.5)	22.813	<0.001*
Atama Soup	65 (43.3)	188 (65.7)	253 (58.0)	85 (56.7)	98 (34.3)	183 (42.0)	20.272	<0.001*
Bitterleaf Soup	77 (51.3)	188 (65.7)	265 (60.8)	73 (48.7)	98 (34.3)	171 (39.2)	8.560	0.003*
Vegetable with okro Soup	58 (38.7)	119 (41.6)	177 (40.6)	92 (61.3)	167 (58.4)	259 (59.4)	0.353	0.552

Table 3. Contd.

Food	Infrequent			Frequent			X_2	p-value
	Male	Female	Total	Male	Female	Total		
Non leafy vegetables								
Garden Egg	106 (70.7)	192 (67.1)	298 (68.3)	44 (29.3)	94 (32.9)	138 (31.7)	0.568	0451
Tomato	74 (49.3)	147 (51.4)	221 (50.7)	76 (50.7)	139 (48.6)	215 (49.3)	0.168	0.682
Cucumber	91 (60.7)	161 (56.3)	252 (57.8)	59 (39.3)	125 (43.7)	184 (42.2)	0.771	0.380
Carrot	100 (66.7)	217 (75.9)	317 (72.7)	50 (33.3)	69 (24.1)	119 (27.3)	4.204	0.040
Meat and poultry								
Beef	49 (32.7)	95 (33.2)	144 (33.0)	101 (67.3)	191 (66.8)	292 (67.0)	0.013	0.908
Organ meat	97 (64.7)	186 (65.0)	283 (64.9)	53 (35.3)	100 (35.0)	153 (35.1)	0.006	0.939
Snail	104 (69.3)	204 (71.3)	308 (70.6)	46 (30.7)	82 (28.7)	128 (29.4)	0.189	0.664
Hide/skin	56 (37.3)	115 (40.5)	171 (39.4)	94 (62.7)	169 (59.5)	263 (60.6)	0.410	0.522
Chicken	83 (55.3)	131 (45.8)	214 (49.1)	67 (44.7)	155 (54.2)	222 (50.9)	3.575	0.059
Egg	25 (16.9)	54 (18.9)	79 (18.2)	123 (83.1)	232 (81.1)	355 (81.8)	0.259	0.611
Fish/seafoods								
Fish	35 (23.3)	67 (23.4)	102 (23.4)	115 (76.7)	219 (76.6)	334 (76.6)	0.000	0.983
Crayfish	22 (14.7)	26 (9.2)	48 (11.1)	128 (85.3)	258 (90.8)	386 (88.9)	3.031	0.082
Periwinkle	26 (17.3)	90 (31.5)	116 (26.6)	124 (82.7)	196 (68.5)	320 (73.4)	10.068	0.002*
Legumes/Nuts/Seeds								
Beans	36 (24.0)	122 (42.7)	158 (36.2)	114 (76.0)	164 (57.3)	278 (63.8)	14.823	<0.001*
Akara	75 (50.0)	183 (64.0)	258 (59.2)	75 (50.0)	103 (36.0)	178 (40.8)	7.967	0.005*
Moi-moi	86 (57.3)	168 (58.7)	254 (58.3)	64 (42.7)	118 (41.3)	182 (41.7)	0.080	0.777
Peanut	28 (18.7)	79 (27.6)	107 (24.5)	122 (81.3)	207 (72.4)	329 (75.5)	4.262	0.039*
Soy beans	96 (64.0)	213 (74.5)	309 (70.9)	54 (36.0)	73 (25.5)	127 (29.1)	5.230	0.022*

*Differences between groups are statistically significant at p<0.05.

economic activity, making the consumption of assorted seafoods a prominent feature of dietary practices within the State (Ekpo and Essien-Ibok, 2013).

The present study also revealed specific food items that were consumed more frequently daily. Students' preferences for rice, gari/fufu, fish and crayfish, as well as bread and pastries have implications for dietary diversity and undermines the recent opinion that, daily intakes should not only be based on representation of each food group, but should also consider variety of items within major food groups, as well as the nutritional quality of the foods consumed (Bolo *et al.,* 2024). Moreover, the result suggests a diet that is based primarily on carbohydrates and lacking in food sources of dietary fibre and micronutrients. Increased consumptions of bread and pastries often lead to higher intakes of sugar and fats, which in turn predisposes to increased risk of obesity. Although the prevalence of obesity in the present study is relatively low, the high rate of overweight indicates a concerning trend that may lead to increased obesity rates in the future. If sustained, these dietary practices could contribute to a growing burden of obesity and other chronic diseases in the population.

Female students had higher daily consumption frequency for pasta and noodles, whereas males consumed foods across various food groups, including cereal gruel, maize custard, gari/fufu, along with the vegetable soups, banana, beans, akara, soy, peanuts, and fruit-flavoured drinks more frequently than females. Again, it is difficult to compare these findings with others due to limited data on sex differences in food consumption frequencies among undergraduate students in Nigeria. However, a study reported higher consumption of cereals, meat, fruits and vegetables and milk among female students when compared to their male counterparts (Otemuyiwa and Adewusi, 2014). Another study reported higher consumption of carbonated drinks but lesser intake of fruit juice among males than females (Afolabi *et al.,* 2013). These reports differ considerably from the present findings, although the previous studies did not present any statistical differences in their conclusions. Regardless, it is important to investigate and provide explanations for the observed differences in food choices between male and female students in the present study. These observations may be peculiar to the setting and may also guide effective policies to correct inadequate dietary intakes among

students.

The findings in this study have public health implications. Frequent consumption of seafood, meat, and poultry, if taken in moderation, offers protective benefits to consumers' health. For instance, fish and seafood provide high-quality protein in the diet and are protective against cardiovascular diseases, especially when consumed in moderation and within the context of an overall healthy diet (Kakkoura *et al.,* 2021). However, it is important to note that these nutritional benefits may be undermined by unhealthy food preferences, leading to long-term risk of chronic diseases in the population. Frequent intakes of bread and pastries, sugars and SSBs, as well as cereal products, alongside low consumption of fruits and vegetables, suggest high energy-dense diets that are high in both sugar and fat, but low in dietary fibre. Such intakes can lead to excess weight gain resulting in overweight and obesity, in addition to other chronic diseases such as cardiovascular events, diabetes, stroke, etc (Cohen *et al.,* 2010; Zhang *et al.,* 2024). To address the problem and prevent long-term adverse health effects from the present-day food choices, intervention policies that seek increased consumption of fruits and vegetables while reducing unhealthy intakes need to be considered.

On limitations, the use of FFQ to capture information on food intake over an extended period may have led to misreporting of food intakes due to memory bias that is often associated with dietary recalls. Moreover, the food list in the FFQ may not have captured all foods eaten by individual participants, leading to possible misclassifications of consumption frequency.

Conclusion

Specifically, this study provided information on the consumption frequencies of food groups among undergraduate students of the University of Uyo. Selected food groups, including fish and other seafoods, bread, biscuits and pastries, sugars and SSBs, cereals, as well as meats and poultry, were consumed on a more frequent basis than others. Students particularly preferred consumption of rice, gari/fufu, fish and crayfish, pastries/biscuits, and bread daily. Nutrition education, combined with social media engagements, is recommended to promote behavioural change towards healthier food choices among students.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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Appendix

Appendix 1. Consumption frequencies of individual foods.

Food Items	Infrequent Consumption		Frequent consumption		
	Never	Occasionally	≤3 times weekly	4-6 times weekly	Daily
Cereals					
Rice Dishes	7 (1.6)	26 (6.0)	68 (15.6)	129 (29.6)	206 (47.2)
Ogi/Pap	96 (22.0)	153 (35.1)	93 (21.3)	59 (13.5)	35 (8.0)
Corn Custard	94 (21.6)	135 (31.0)	91 (20.9)	83 (19.0)	33 (7.6)
Semovita	207 (47.5)	119 (27.3)	49 (11.2)	37 (8.5)	24 (5.5)
Pasta/noodles	30 (6.9)	88 (20.2)	137 (31.4)	90 (20.6)	91 (20.9)
Roots and tubers					
Gari/Fufu	12 (2.8)	32 (7.3)	68 (15.6)	104 (23.9)	220 (50.5)
Yam-based dishes	57 (13.1)	201 (46.1)	107 (24.5)	71 (16.3)	0 (0.0)
Plantain-based dishes	44 (10.1)	185 (42.4)	108 (24.8)	99 (22.7)	0 (0.0)
Potato	115 (26.4)	194 (44.5)	75 (17.2)	35 (8.0)	17 (3.9)
Cocoyam-based dishes	148 (33.9)	180 (41.3)	69 (15.8)	39 (8.9)	0 (0.0)
Bread, biscuits and pastries					
Bread	8 (1.9)	67 (15.4)	84 (19.3)	123 (28.2)	154 (35.3)
Biscuit	55 (12.6)	114 (26.1)	97 (22.2)	75 (17.2)	95 (21.8)
Pastries	42 (9.6)	64 (14.7)	89 (20.4)	68 (15.6)	173 (39.7)
Sweets and spread					
Chocolate/sweets and candies	54 (12.4)	115 (26.4)	89 (20.4)	72 (16.5)	106 (24.3)
Ice cream	76 (17.4)	196 (45.0)	65 (14.9)	61 (14.0)	38 (8.7)
Margarine/spreads	133 (30.5)	145 (33.3)	79 (18.1)	39 (8.9)	40 (9.2)
Sugar and SSBs					
Fruit flavoured drinks	73 (16.7)	185 (42.2)	103 (23.6)	75 (17.2)	0 (0.0)
Soft Drinks	28 (6.4)	83 (19.0)	121 (27.8)	88 (20.2)	116 (26.6)
Sport/Energy Drinks	102 (23.4)	94 (21.6)	116 (26.6)	44 (10.1)	80 (18.3)
Tea with added sugar	41 (9.4)	86 (19.7)	123 (28.2)	96 (22.0)	90 (20.6)
Meats and poultry					
Beef	39 (8.9)	105 (24.1)	96 (22.0)	100 (22.9)	96 (22.0)
Organ Meat	112 (25.7)	171 (39.2)	86 (19.7)	67 (15.4)	0 (0.0)
Snails	133 (30.5)	175 (40.1)	70 (16.1)	58 (13.3)	0 (0.0)
Hide and skin	74 (17.0)	99 (22.7)	91 (20.9)	84 (19.3)	88 (20.2)
Chicken	29 (6.7)	185 (42.4)	131 (30.0)	91 (20.9)	0 (0.0)
Egg	18 (4.2)	63 (14.4)	120 (27.5)	129 (29.6)	106 (24.3)
Fish and seafoods					
Fish	12 (2.8)	90 (20.6)	88 (20.2)	106 (24.3)	140 (32.1)
Crayfish	18 (4.2)	32 (7.3)	64 (14.7)	106 (24.3)	216 (49.5)
Periwinkle	53 (12.2)	63 (14.4)	98 (22.5)	102 (23.4)	120 (27.5)
Milk and dairy					
Milk	18 (4.1)	115 (26.4)	99 (22.7)	111 (25.5)	93 (21.3)
Yoghurt	91 (20.9)	195 (44.7)	90 (20.6)	40 (9.2)	20 (4.6)

Appendix 1. Consumption frequencies of individual foods.

Food Items	Infrequent Consumption		Frequent consumption		
	Never	Occasionally	≤3 times weekly	4-6 times weekly	Daily
Legume, nuts/seeds					
Beans pottage/boiled	30 (6.9)	128 (29.4)	117 (26.8)	81 (18.6)	80 (18.3)
Akara	61 (14.0)	197 (45.2)	95 (21.8)	83 (19.0)	0 (0.0)
Moi moi	44 (10.1)	210 (48.2)	97 (22.2)	85 (19.5)	0 (0.0)
Peanut	41 (9.4)	66 (15.1)	107 (24.5)	222 (50.6)	0 (0.0)
Soybeans	153 (35.1)	156 (35.8)	80 (18.3)	47 (10.8)	0 (0.0)
Fruits					
Citrus	48 (11.0)	242 (55.5)	73 (16.7)	73 (16.7)	0 (0.0)
Paw paw	93 (21.3)	211 (48.4)	77 (17.7)	55 (12.6)	0 (0.0)
Apple	87 (20.0)	194 (44.5)	88 (20.2)	67 (15.4)	0 (0.0)
Pineapple	74 (17.0)	190 (43.6)	102 (23.4)	70 (16.1)	0 (0.0)
Watermelon	74 (17.0)	191 (43.8)	103 (23.6)	68 (15.6)	0 (0.0)
Banana	57 (13.1)	149 (34.2)	108 (24.8)	72 (16.5)	50 (11.5)
Star Fruit	194 (44.5)	151 (34.6)	59 (13.5)	32 (7.3)	0 (0.0)
Green leafy vegetables					
Edikang Ikong	99 (22.7)	170 (39.0)	95 (21.8)	72 (16.5)	0 (0.0)
Afang	25 (5.7)	83 (19.0)	120 (27.6)	126 (28.9)	80 (18.3)
Editan Soup	86 (19.7)	134 (30.7)	139 (31.9)	77 (17.7)	0 (0.0)
Atama Soup	116 (26.6)	137 (31.4)	118 (27.1)	65 (14.9)	0 (0.0)
Bitterleaf Soup	100 (22.9)	165 (37.8)	102 (23.4)	69 (15.8)	0 (0.0)
Vegetable with okro Soup	58 (13.3)	119 (27.3)	171 (39.2)	88 (20.2)	0 (0.0)
Other vegetable					
Garden Eggs	145 (33.3)	153 (35.1)	94 (21.6)	44 (10.1)	0 (0.0)
Tomatoe	42 (9.6)	179 (41.1)	113 (25.9)	102 (23.4)	0 (0.0)
Cucumber	71 (16.3)	181 (41.5)	100 (22.9)	84 (19.3)	0 (0.0)
Carrots	99 (22.7)	218 (50.0)	69 (15.8)	50 (11.5)	0 (0.0)