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Ultra-Processed Foods Consumption and General Consumption Pattern as Correlates of Health Status of Undergraduate Students in Ondo City, Nigeria

Isoken IHENSEKHIEN
Department of Vocational and Technical Education, Faculty of Education University of Benin, Benin City.
Email: isoken.ihensekhien@uniben.edu

Feranmi Boluwatife OLUWAGBEMILEKE
Department of Vocational and Technical Education, Faculty of Education University of Benin, Benin City.
Email: lekeferanmi2019@gmail.com

Corresponding author, Email: lekeferanmi2019@gmail.com

ABSTRACT

This study builds on an earlier investigation of the ultra-processed foods (UPF) consumption and general consumption patterns of undergraduate students in Ondo City of Ondo State, Nigeria. It sought to assess the relationship between health statuses. One question and two null hypotheses guided the study. A quantitative survey research design was adopted in the study, and the Adeyemi Federal University of Education was the sampled area for the study in the city. The sample size for the survey comprised 2% of the estimated population (240 respondents). Data was collected from 240 respondents using the Ultra-Processed Foods Consumption Pattern and Effects on Students' Health Questionnaire (UCPESHQ) and analysed statistically (using frequency count, percentage, simple ranking and Pearson Product-Moment Correlation). The significant findings were that the most everyday self-reported ailment, medically diagnosed ailment and worrisome clinical features are sleeping disorder (41.9%), ulcer (11.4%) and dandruff (19.1%), respectively. The students are averagely average in weight (58.5%). It was also found that UPF consumption is significantly associated with self-reported ailments ($r = 0.160$, $\rho = 0.014$) and worrisome clinical features ($r = 0.185$; $\rho = 0.004$). It was recommended that management teams of universities should work with appropriate stakeholders to facilitate sustainable feeding and healthcare programs for undergraduate students.

Keywords: *Ailments, Body Mass Index (BMI), clinical features, consumption pattern, ultra-processed foods (UPFs)*

INTRODUCTION

Since they are in their prime, undergraduate students should have good physical and mental health and nutrition. Nonetheless, a previous study conducted in Ondo City, Nigeria, by Ihensekhien and Oluwagbemile,ke (2023) found concerning rates of consumption of ultra-processed foods (UPF) as well as a concerning general consumption pattern among undergraduate students. According to the survey, packaged snacks—either sweet or savory—are frequently consumed by college students. On the other hand, they typically eat packaged, mass-produced bread and buns, cookies, cakes, pastries, cake mixes, energy drinks, and sports drinks. Regarding the overall consumption pattern, 53% of the students do not eat up to three meals a day, and 70.3% miss breakfast, lunch, and supper, in addition to 66.1% snacking in between. Furthermore, a strong correlation was discovered between the two variables ($r = 0.143$, $\rho = 0.029$). This served as the foundation for the current study's design to determine the association between these two factors and students' health. Other studies have assessed the health status of undergraduate students. For instance, the University of Toronto (2017) reported a National College Health Assessment conducted in 2016. They reported that 74%, 30%, and 20% of students consume alcohol, marijuana, and cigarettes, respectively. They also found that 1% of their students perceived themselves to be underweight, 14% to be slightly underweight, 55% to be about the right weight, 275 to be slightly overweight, and 4% to be very overweight. Also, more than half of the students (55%) exercise to lose weight, while 40% use a diet. In the United States, 14%, 39%, and 33.8% rated their health status to be excellent, very good, and sound, respectively, compared to 10.9% and 2% who reported it to be fair and poor, respectively (Lanza et, al., 2022). The University of Minnesota (2007) surveyed about 10,000 college students from their 14 campuses and reported that 38.5% of students are either overweight or obese. In Nigeria, 11.0% of the students were underweight, 74.0% had average weight, while 12.5% and 2.5% were overweight and obese respectively (Ajuzie et al., 2021). Research has established correlations between the ingestion of ultra-processed foods and potential health hazards. Certain health risks are associated with weight gain (Hall et al., 2019), metabolic syndrome (Steele et al.,

2019), cardiovascular diseases, coronary heart disease, cerebrovascular disease (Srour et al., 2019), asthma and wheezing (Melo et al., 2018), irritable bowel syndrome and functional dyspepsia (Schnabel et al., 2018), depression (Adjibade et al., 2019), and double burden of disease due to eating errors (Rivera et al., 2014; De –Deus-Mendonca et al., 2016).

On a broader scale, the general consumption pattern of undergraduate students has been correlated with their health status. While Ajuzie et al. (2021) discovered that dietary diversity is not significantly different from nutritional status, they also discovered that body mass index has a strong association with the preference for food by students. Study International (2017) reported that less than 20% of British students eat healthily (according to a 2015 study), concurrently with reduced social healthiness regarding physical interaction. However, Otemuyiwa and Adewusi (2012) found that 60%, 85%, and 40% of undergraduate students in southwestern Nigeria did not consume the recommended amount of protein, calcium, and iron, respectively. Arisukwu et al. (2019) documented that 91% of undergraduate students knew that poor nutrition has adverse effects on their health and that skipping meals is responsible for tiredness, stomach pain, dizziness, and restiveness in 37.5%, 22%, 18%, and 9.5% of the students. The observed worrisome feeding habit among undergraduate students in Ondo City indicates the likelihood of poor health. The effects of bad feeding habits are both acute and chronic. Being acute, the consumption of UPFs results in the depletion of students' capacity to resist diseases and infections. An excellent illustration of this is the hike in the number of students who usually get hospitalized for treatment at the College Health Centre during examination periods. In many instances, a few students' slum and are rushed down there, putting pressure on the limited facilities available. It had been assumed all along that this situation may have resulted from students not feeding because of the pressure of preparing for examinations. As touching the chronic effects, students' health may not reflect severe degeneration at an early stage. However, the fact remains that the manifestation of recurring illnesses in later life stems from unchecked habits such as the consumption of ultra-processed foods. Therefore, the purpose of this study was to objectively evaluate the relationship between UPF consumption and overall consumption habits on the one hand and undergraduate students' health in Ondo City, Ondo State, on the other.

Research Objectives

1. The main objective of this study is, to assess the consumption of ultra-processed foods among undergraduate students in the Ondo City of Ondo State and its perceived effects on their health.

The specific objectives were:

2. Document the health status of undergraduate students in Ondo City by ailments, clinical features and anthropometric measures,
3. Determine if the consumption of ultra-processed foods has effects on the health of undergraduate students in Ondo City and
4. Determine if the general consumption pattern of undergraduate students in Ondo City affects their health.

Research Question

The study answered this question.

1. What is the health status of undergraduate students in Ondo City by ailments, clinical features and anthropometric measure?

Research Hypotheses

The following null hypotheses were tested at 0.05 level of significance.

H_{01}: There is no significant relationship between the consumption of ultra-processed foods and the health of undergraduate students in Ondo City.

H_{02}: There is no significant relationship between the general consumption pattern of undergraduate students in Ondo City and their health.

METHODOLOGY

This study gathered data about UPF consumption, undergraduate students' overall consumption patterns, and their health state using a quantitative survey research design. The association between the two independent variables—general consumption pattern and UPF consumption—and undergraduate students' health was then deduced from these data. Ondo City is the location of the study. It is the Ondo West Local Government Area's (Ondo State) headquarters. In the city, three universities grant degrees: Wesley University (private), the University of Medical Sciences (owned by the State), and Adeyemi Federal University of Education (owned by the Federal Government). At the time of the study, the most populous and representative of the other two universities was the Adeyemi Federal University of Education, Ondo, where the investigation was conducted. Students enrolled in the institution's regular Bachelor's Degree programs comprised the study's population. Based on data from the University's Management Information System, the population was anticipated to be 12,000 (MIS, 2021). Two percent of the expected population made up the study's sample size. There were 240 responders in total. The study's respondents were chosen using a multi-stage sampling method. Four of the seven academic faculties that made up the Federal University of Education offering

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complete degrees were chosen randomly at the time of the study. From each faculty, an equal number of male and female students were chosen using the purposeful sampling technique. Data for the study were gathered using the Ultra-Processed Foods Consumption Pattern and Effects on Students' Health Questionnaire (UCPESHQ), a systematic, extensively tested, and trustworthy questionnaire. The NOVA Food Classification System proposed by the Centre for Epidemiological Studies in Health and Nutrition (2016) and the Diet and Behaviour Score (DABS) proposed by Richards and Smith (2015) served as the foundation for the development of the instrument. It comprised seven sections, 'A' through 'G'. Section A elicited demographic information from the respondents such as faculty, gender and level. Section B measured the frequency of consumption of the 20 most common UPFs among undergraduate students on a 5-point rating scale. Section C contained six "Yes" or "No" items that measured the general consumption pattern of the respondents. Section D asks 15 "Ye`s" or "No" items about their self-reported ailments (SRA) and medically diagnosed ailments (MDA). Section E contained four items to record the clinical features of undergraduate students (skin, eyes, hair, and mouth). Section F contained two items to measure the anthropometry of the respondents by range (weight and height). The last section contained seven four-point Likert-scale question items on the strategies used to minimize the consumption of ultra-processed foods.

One nutrition specialist, two food science and technology experts, and two home economics education experts validated the instrument to gather the data face-to-face and on its content. They examined the items for relevance and sufficiency in responding to the study objectives, as well as for clarity and suitable phrasing. The Split-half approach assessed this instrument's reliability (internal consistency and accuracy level). Students at the university of study who chose not to participate in the final study were given eighteen copies of the questionnaire. They divided their questionnaire responses into two groups and used Pearson Product-Moment Correlation (PPMC) to correlate the results. The results of the analysis showed that the instrument had a high level of reliability ($0.61 \leq r \geq 0.80$) based on the correlation coefficient (r-value) of 0.708 and an alpha value of 0.01, indicating that the reliability is very significant at the 0.05 level of significance. Six (6) research assistants (RAs), who were hired and given extensive training through a structured virtual cooperation environment (a Whatsapp group chat called UPFs and UnderG), assisted in producing and distributing two hundred and forty (240) copies of the questionnaire. A physical briefing on the objective and core values of the study and training in taking body measurements were conducted by the researcher on Sunday, January 8, 2023. The RAs assisted with the collection of data by administering the instrument to the respondents, guiding them to fill the self-response sections, monitoring the filling of the clinical features, and taking their anthropometric measures. The language of instruction was English. Only 98.3% of the administered instruments were retrieved. The responses collected from the study were analysed statistically. Research question one was answered using frequency count, percentage, and simple ranking; while the two null hypotheses were tested with Pearson Product-Moment Correlation (PPMC) at 0.05 level of significance. The decision rule about the magnitude and direction of the correlation was based on statistical real limit as shown in Table 1.

Table 1: Statistical Real Limits of Responses to Research Questions Two and Three

Ranges of Correlation Coefficient	Decision
± 0.80-1.00	Very High
± 0.60-0.79	High
± 0.40-0.59	Moderate
± 0.20-0.39	Low
± 0.00-0.19	Very Low

FINDINGS

Research Question: *What is the health status of undergraduate students in Ondo City by ailments, clinical features and anthropometric measure?*

Table 2: Description of the Health Status of Undergraduate Students in Ondo City

SN	Item	F	%	Ranks
	Self-Reported Ailments			
1	Weight gain	90	38.1	2
2	Hypertension	4	1.7	8
3	Asthma	6	2.5	7
4	Wheezing (sound in the chest when breathing)	26	11.0	6

5	Dyspepsia (indigestion) and constipation	31	13.1	5
6	Depression	61	25.8	3
7	Sleeping disorder (too much or too little)	99	41.9	1
8	Gluttony (eating too much)	45	19.1	4
	Medically Diagnosed Ailments			
1	Ulcer	27	11.4	1
2	Irritable Bowel Syndrome (IBS)	10	4.2	2
3	Cardiovascular diseases	4	1.7	3.5
4	Coronary heart diseases risk	3	1.3	5.5
5	Cerebro-vascular diseases risk	3	1.3	5.5
6	Metabolic syndrome (High blood pressure, high blood sugar)	4	1.7	3.5
7	Cancers	2	.8	7
	Clinical Features			
1	Rashes	23	9.7	2
2	Red spots	8	3.4	6
3	Eczema	19	8.1	3
4	Scale	7	3.0	7
5	Conjunctivitis (Lining on the eye)	13	5.5	4.5
6	Jaundice (Yellow eyeball)	6	2.5	9
7	Pallor (Pale or yellow face)	2	.8	12.5
8	Ringworm	6	2.5	9
9	Dandruff	45	19.1	1
10	Unkempt	4	1.7	11
11	Foamy saliva	13	5.5	4.5
12	Angular stomatitis (swelling at the side of the mouth)	6	2.5	9
13	Halitosis (Mouth odour)	2	.8	12.5

SN	Item	F	%	Ranks
	Body Mass Index			
0	Missing	7	3.0	6
1	Abnormally Low/Wasting	8	3.4	5
2	Underweight	64	27.1	2
3	Normal	138	58.5	1
4	Overweight	10	4.2	3
5	Abnormally high/Obese	9	3.8	4

Keys: F = Frequency; % = Percentage; $\overline{x}$ = Mean; SD = Standard Deviation

The measurement of the health status of undergraduate students used for this study was done by analysing data about their ailments (SRA and MDA), clinical features, and anthropometric measurements (body mass index), as shown in Table 2 above. The three most recurring SRA are sleeping disorder, weight gain, and depression; while the two most reported MDA are ulcer and irritable bowel syndrome (IBS). The three topmost worrisome clinical features of the respondents are dandruff, rashes, and eczema. Finally, while 58.5% of the respondents were found to have normal BMI, 27.1% of them are underweight, while 4.1% of them are overweight. The mean of the categorical responses shows that average, undergraduate students in Ondo City have low self-reported and medically diagnosed ailments as well as low indications of worrisome clinical features; and that, on average, the body mass index of the student's falls under the 'normal' category. The standard deviations of the four categories of health measures range from 0.156 to 0.861, indicating that the responses did not widely deviate from the central tendencies.

Research Hypothesis 1: There is no significant relationship between the consumption of ultra-processed foods and the health of undergraduate students in Ondo City.

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Table 3: PPMC of the Relationship between UPFs Consumption and the Health of Undergraduate Students in Ondo City

	General Consumption Pattern	r	ρ	Decision
Health	Self-Reported Ailments	.160*	.014	Positive, significant, but very low correlation
	Medically Diagnosed Ailments	.022	.740	Positive but very low and insignificant correlation
	Clinical Features	.185*	.004	Positive, significant and very low correlation
	Body Mass Index	-.028	.664	Negative, very low and insignificant correlation

Keys: r = correlation coefficient, **ρ** = Significance of correlation (2-tailed)

Table 3 above shows that UPFs consumption has a positive, significant but very low correlation with SRA, while it has a positive but very low and insignificant correlation with MDA. Its correlation with clinical features is positive, significant and very low, while it has a negative, very low and insignificant correlation with the BMI of undergraduate students.

Research Hypothesis 2: There is no significant relationship between the general consumption pattern of undergraduate students in Ondo City and their health.

Table 4: PPMC of the Relationship between the General Consumption Pattern and the Health of Undergraduate Students in Ondo City

	General Consumption Pattern	r	ρ	Decision
Health	Self-Reported Ailments	.111	.089	Positive but very low and insignificant correlation
	Medically Diagnosed Ailments	.055	.397	Positive but very low and insignificant correlation
	Clinical Features	.091	.163	Positive but very low and insignificant correlation
	Body Mass Index	.074	.255	Positive but very low and insignificant correlation

Source: Researchers (2023)

Keys: r = correlation coefficient, **ρ** = Significance of correlation (2-tailed)

Table 4 above shows that the general consumption pattern of undergraduate students in Ondo City of Ondo State has a positive but very low and insignificant correlation with all the parameters used for measuring their health status.

DISCUSSION OF FINDINGS

In answering the first question, it was found that sleeping disorders, weight gain, and depression as well as ulcers and IBS, are the topmost prevalent ailments in the population – self-reported and medically diagnosed, respectively (Saifuddin & Ezzi, 2024). Dandruff, rashes, and eczema also rank the first three among worrisome clinical features; while the students have an averagely normal BMI. Also, the health status of the students did not widely deviate from the central tendencies and role of parents and teachers (Jabeen, Ali, & Ahmad, 2023; Naeem, Ali, & Ahmed, 2022; Akram, Khan & Ahmad, 2022). This is supported by the findings of the University of Minnesota (2007) that only about 38.5% of students are either overweight or obese and that of Ajuzie et al. (2021) who documented that about 74.0% of undergraduate students had normal weight.

Regarding the second research question, it was discovered that there was a fragile but positive association between UPF intake and self-reported illnesses (SRA). Scholars like Adjibade et al. (2019; depression) and Hall et al. (2019; weight increase) have found similar correlations. Similar findings were made about the relationship between UPF consumption and medically diagnosed diseases (MDA), albeit the relationship is not statistically significant (Ahmad et al., 2023; Ali et al., 2023). Concurrently, similar correlations were shown between metabolic syndrome and cardiovascular/cerebrovascular illnesses by Steele et al. (2019) and Srour et al. (2019). Additionally, no research in the literature supports or refutes the positive, significant, and shallow link between UPF intake and clinical characteristics (Ahmad et al., 2023; Ahmad, Thomas, & Hamid, 2020). Ultimately, a negative, negligible, and insignificant association was discovered between undergraduate students' BMI and UPF intake, suggesting that the more UPFs they drink, the less probable it is that their BMI would rise and that their behavior will alter (Imran, Muddasir, Sattar, 2023). This can be compared with the results of Silva et al. (2018) and Da Costa-Louzada et al. (2015), who discovered a correlation between UPF intake and obesity, overweight, and both.

Meanwhile, it was discovered that all the criteria utilized to assess the general consumption pattern of undergraduate students in Ondo City, Ondo State, had a positive, albeit negligible, association with it (Abdussalam et al., 2023). Similar to Arisukwu et al. (2019), who reported that 91% of undergraduate students believed that poor nutrition had a negative impact on their health and ability to learn, Ajuzie et al. (2021) suggested that students' food preferences are strongly correlated with their body mass index (Afroz & Muzaffar, 2023; Hamidani & Muzaffar, 2023; Ali et al., 2022).

CONCLUSION

This study concluded that the health status of undergraduate students in Ondo City of Ondo State is far from perfect, though many of their ailments and worrisome clinical features are probably under-reported. Also, a reasonable association was found between UPFs consumption and the general consumption pattern of undergraduate students on one hand, and their health on the other hand.

RECOMMENDATIONS

The study's conclusions led to the following recommendations being made:

1. It is recommended that university management teams collaborate with relevant stakeholders to enable undergraduate students to participate in sustainable food and healthcare programs.
2. Public sensitization campaigns should be held regularly by counselling units and nutrition or dietetics departments to inform undergraduate students about the health hazards of consuming highly processed foods and adopting an unhealthy consumption pattern.
3. It is the personal obligation of undergraduate students to monitor their diet and care for their health

SUGGESTION FOR FURTHER STUDIES

Researchers can investigate this study's results further in several ways, including the following.

1. Evaluation of the effects of demographic data on the dependent variables of the current study, including gender, level, discipline, age, parental upbringing, social activity, religious participation, and socioeconomic status.
2. Conducting the current study's dependent variable measurements among Ondo State undergraduate students not enrolled in Ondo City.
3. Measuring the dependent variables of this study in Ondo City, Ondo State, among different student categories besides undergraduates.
4. Measuring the dependent variables of the current study among state students in categories other than undergraduates.

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