# Dietary Patterns, Diversity, and Nutritional Status of Undergraduate Students in Nigeria: Evidence from Bingham University, Karu, Nasarawa State

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**DOI: https://dx.doi.org/10.51244/IJRSI.2025.1210000010**

**Received: 20 September 2025; Accepted: 26 September 2025; Published: 27 October 2025**

## ABSTRACT

Unhealthy dietary habits among university students represent a growing public health concern, contributing to both undernutrition and rising cases of overweight and obesity. This study evaluated the dietary patterns, dietary diversity, and associated factors influencing the nutritional status of undergraduate students in Bingham University, Karu, Nasarawa State, Nigeria. A repeated cross-sectional survey in which data was collected at two different point in time.it was conducted using a structured questionnaire to collect data on food consumption, dietary practices, and socio-demographic factors. Anthropometric measurements were taken to assess nutritional status using Body Mass Index (BMI) classification. Data were analysed using descriptive statistics and inferential methods to establish associations between dietary patterns, diversity, and nutritional outcomes. The findings revealed suboptimal dietary practices, characterized by frequent meal skipping, high consumption of energy-dense foods, and low intake of fruits and vegetables. Dietary diversity scores were generally inadequate, reflecting poor micronutrient-rich food consumption. Prevalence of malnutrition was evident, with significant proportions of students classified as underweight, overweight, or obese, highlighting the double burden of malnutrition within the study population. Socioeconomic factors, lifestyle practices, and food availability were key determinants of dietary behaviour and nutritional outcomes. The study concludes that undergraduate students face significant nutritional challenges arising from poor dietary patterns and limited dietary diversity. It recommends targeted nutrition interventions, awareness programs, and policy measures within tertiary institutions to promote healthier dietary practices and improve the overall nutritional well-being of students.

**Keywords:** Dietary patterns, dietary diversity, nutritional status, undergraduate students, Nigeria, malnutrition

## INTRODUCTION

A healthy diet is a cornerstone of well-being throughout the human life cycle. It supports normal growth and development, promotes healthy body weight, and lowers the risk of chronic diseases. Proper dietary patterns not only enhance immediate health outcomes but also contribute to long-term wellness by preventing non-communicable diseases (NCDs) such as diabetes, cardiovascular diseases, obesity, and certain cancers (WHO, 2020). A dietary pattern, defined as the overall combination of foods and drinks regularly consumed, is recognized as a stronger predictor of health outcomes than individual nutrients (USDA, 2014). Healthy dietary patterns emphasize consumption of fruits, vegetables, legumes, whole grains, and lean proteins, while minimizing processed and high-fat foods. Conversely, poor dietary habits increase susceptibility to malnutrition in all its forms, including undernutrition and overnutrition, with consequences for immunity, productivity, and quality of life (Berthoud, 2017).

Globally, there is growing concern over unhealthy eating habits among young adults, especially university students. This group often faces nutritional challenges due to lifestyle changes, time constraints, peer influence, and limited financial resources. Research across developing countries, including Nigeria, indicates that undergraduates frequently skip meals, consume energy-dense processed foods, and neglect fruits and

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue X October 2025

vegetables, reflecting a shift from traditional, nutrient-dense diets to Westernized dietary patterns (Ochola & Masibo, 2014). This type of practise subjects students to the double burden of malnutrition, in which undernourishment exists alongside overweight and obesity (Wariri, 2020).

Nutrition within the group of undergraduates is predetermined by diet quality and variety that is influenced by the environment, socio-economic and cultural factors. The lack of dietary diversity diminishes the levels of micronutrient consumption, whereas overconsumption of high-energy foods puts students at risk of becoming obese and developing metabolic problems. These nutritional imbalances are especially susceptible to university students who spend most of their time on campus and make food choices on their own, usually, the first time. Unhealthy eating during this age may affect future life, as it may not only lead to slower physical and cognitive growth but also to the risk of developing diet-related diseases later on (Olatona et al., 2023).

In Nigeria, the current trends on the dietary and nutritional status of university students are found to be rather limited, especially in the private ones. Creating context-based knowledge on student eating patterns and their health effects is crucial to creating useful nutrition intervention strategies and institute-level policies.

### Research Problem

Avoidable dieting habits in the undergraduates can impair the immunity, increase the vulnerability to illnesses and diminish mental and bodily performance. The unhealthy diets are attributed to nutritional deficiency disorders like anaemia, scurvy, and night blindness and overindulgence diseases like obesity, diabetes, cardiovascular disease and metabolic syndrome. Such health risks are enhanced by lifestyle disorders like stress, poor dieting habits, and lack of physical exercise.

Although in Nigeria instances of overweight and obesity have been on the rise, under-nutrition is still widespread among the undergraduates which is indicative of the two-pronged menace of malnutrition. This fact explains why there is a dire need to conduct research to investigate the dietary patterns, dietary diversity, and nutritional status of university students. Therefore, this study investigates these issues among undergraduates in Bingham University, Karu, Nasarawa State, Nigeria. Specifically, it aims to:

Assess the dietary patterns of undergraduate students.

Evaluate their dietary diversity.

Determine the prevalence of underweight, overweight, and obesity among the students.

Identify factors influencing dietary patterns and dietary diversity.

Examine the association between dietary behaviour and nutritional status.

## METHODOLOGY

### Research Design

The descriptive repeated cross-sectional survey research design was used for this study. This design was considered appropriate because it enables the collection of information from a representative sample of respondents at two different point in time during the semester (at the beginning and at the end of the semester). The design was adopted because it allows for the description and interpretation of dietary patterns, dietary diversity, and nutritional status as expressed by undergraduate students of Bingham University.

### Area of the Study

The study was carried out in Bingham University, which is located in Karu Local Government Area of Nasarawa State, Nigeria. The University is a private tertiary institution established by the Evangelical Church Winning All (ECWA). It is made up of several faculties, including Sciences, Social and Management Sciences, Law, Education, Basic Medical Sciences, Environmental Sciences, Arts, and Clinical Sciences. The diverse

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue X October 2025

student population, drawn from different socio-economic and cultural backgrounds across Nigeria, makes the University a suitable study area.

**Population of the Study**

The population of the study consisted of all undergraduate students enrolled in Bingham University, Karu, Nasarawa State. At the time of the study, the undergraduate population was approximately 7000 undergraduate students. This group was considered appropriate for the study because undergraduates are nutritionally vulnerable due to changes in lifestyle and food choices.

**Sample Size and Sampling Techniques**

The sample size of the study was three hundred and forty-eight (348). This figure was determined using Cochran's formula for sample size calculation in cross-sectional studies and adjusted to account for attrition and non-response. Multi-stage sampling was employed for this study. In the first stage, eight faculties were selected. In the second stage, proportionate sampling was used to allocate the sample across the faculties. Finally, simple random sampling was used to select respondents within each faculty until the desired sample size was achieved.

**Instrument for Data Collection**

A semi-structured, interviewer-administered questionnaire was used for data collection. The questionnaire was divided into five sections. Section A captured demographic and socio-economic information such as age, sex, level of study, parental background, and pocket money. Section B focused on anthropometric measurements including weight, height, and waist–hip circumference. Section C covered biochemical parameters such as haemoglobin levels and fasting blood sugar. Section D was a food frequency questionnaire (FFQ) designed to collect information on the frequency of consumption of commonly available foods. Section E was a dietary diversity questionnaire (DDQ) adapted from the Food and Agriculture Organization (FAO) guidelines to generate individual dietary diversity scores.

To minimize recall bias, dietary questions were restricted to a 7-day reference period rather than relying on "usual intake." In addition, a 24-hour dietary recall was administered to cross-validate responses obtained from the FFQ.

**Validation of Instrument**

The questionnaire underwent both content and face validation. It was reviewed by the researcher's supervisor and two other experts in the Department of Biochemistry, Bingham University. Their observations, suggestions, and corrections were carefully incorporated to refine the final version of the instrument, ensuring clarity, relevance, and appropriateness for the target population.

**Reliability of Instrument**

To test the reliability of the instrument, a pilot study was conducted among 20 students outside the study area. The test–retest method was used, and the responses were analyzed using Cronbach's Alpha reliability coefficient. The result produced a reliability index of which confirmed that the instrument was reliable for the main study.

**Method of Data Collection**

Data were collected in two phases at the beginning of the semester (baseline) and at the end of the semester (endline) using different set of respondents. The researcher, with the assistance of trained aides, administered the questionnaires to respondents and took anthropometric and biochemical measurements using standardized procedures. The questionnaires were retrieved immediately after completion to minimize loss.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue X October 2025

**Methods of Data Analysis**

The data collected were coded, entered, and analyzed using the Statistical Package for Social Sciences (SPSS). Descriptive statistics such as mean, frequency, and percentages were used to summarize socio-demographic data, dietary patterns, and nutritional status. Chi-square tests were used to examine associations between dietary patterns, dietary diversity, and nutritional outcomes. The level of significance was set at $p < 0.05$.

**Ethical consideration, inform consent and confidentiality**

Ethical clearance was obtained from the Health Research Ethics Committee of the university with number NHREC/21/05/2005/01372. The participants were enlightened on the purpose of the study, and their consent was required before data collection commence. Data collected were kept confidential and participants' identities will be kept anonymous in final report

## RESULTS AND DISCUSSION

**Research Objective 1: Assess the dietary patterns of undergraduate students**

Table 1: Feeding and Snacking Patterns of Respondents

| Variable | Baseline (%) | End line (%) |
|---|---|---|
| **Meals per day** | | |
| Once | 13.6 | 7.6 |
| Twice | 35.6 | 41.2 |
| Thrice | 30.9 | 33.6 |
| ≥ Four times | 19.9 | 17.6 |
| **Meal skipping** (Yes) | 79.7 | 76.3 |
| – Breakfast | 54.1 | 59.7 |
| – Lunch | 36.8 | 33.5 |
| – Dinner | 9.1 | 6.8 |
| **Snacking habit** (Yes) | 85.1 | 82.9 |
| Common snacks | Biscuits, chin-chin, soft drinks | Biscuits, chin-chin, soft drinks |
| Fruits as snacks | 1.9 | 5.7 |

Source: Authors Compilation.

Results revealed irregular eating habits among respondents. A majority consumed two to three meals per day, with a high prevalence of meal skipping, particularly breakfast. Snacking was widespread, but choices were dominated by energy-dense, nutrient-poor foods, with very limited fruit consumption. This suggests a dietary pattern characterized by sub-optimal balance and poor nutritional quality.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue X October 2025

**Research Objective 2: Evaluate dietary diversity of undergraduate students**

Table 2: Dietary Diversity Score of Respondents

| Dietary Diversity Category | Baseline (%) | End line (%) |
|---|---|---|
| Low (≤ 3 food groups) | 13.6 | 27.0 |
| Moderate (4–5 food groups) | 61.4 | 61.6 |
| High (≥ 6 food groups) | 25.0 | 11.4 |

Source: Authors Compilation.

Most respondents reported moderate dietary diversity at both baseline and end line. However, the proportion of students with high dietary diversity dropped by more than half, while those with low diversity doubled. This indicates declining dietary quality during the semester, with diets largely dominated by grains and animal protein, and inadequate intake of fruits, vegetables, and dairy.

**Research Objective 3: Determine the prevalence of underweight, overweight, and obesity among students**

Figure 1: Nutritional Status of Respondents (BMI Classification)

| Category | Baseline (%) | End line (%) |
|---|---|---|
| Underweight | 6.7 | 20.9 |
| Normal | 54.4 | 48.8 |
| Overweight | 22.2 | 19.0 |
| Obese | 16.8 | 11.4 |

Source: Authors Compilation.

The proportion of underweight students increased significantly across the study period, while overweight and obesity declined slightly. This suggests a rising risk of undernutrition among students, possibly linked to meal skipping, low dietary diversity, and financial constraints.

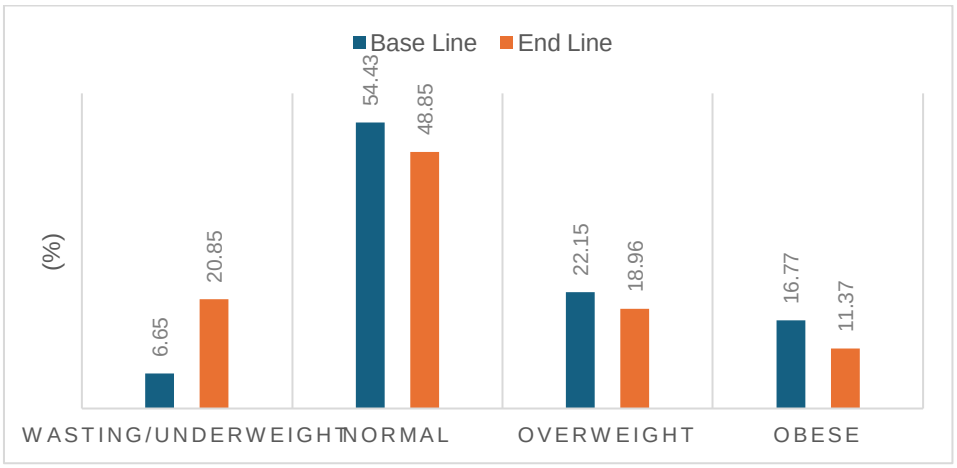


**Figure 1: BMI prevalence changes**

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue X October 2025

Source: Authors Plot

**Research Objective 4: Identify factors influencing dietary patterns and dietary diversity**

Table 3: Factors Associated with Dietary Behaviour

| Predictor | Significant Outcome | p-value |
|---|---|---|
| Food expenditure | BMI, Hemoglobin | < 0.001 |
| Dietary habit score | Waist-to-Hip Ratio (WHR) | < 0.05 |
| Academic workload | Reported influence on meal skipping | N/A |
| Peer influence & social media | Reported influence on food choice | N/A |

Source: Authors Compilation.

Economic constraints (food expenditure) and behavioural factors (dietary habits, peer influence, academic stress) were identified as major determinants of dietary behaviour and nutritional outcomes. Limited allowances and preference for convenience foods particularly contributed to low dietary diversity and irregular eating patterns.

**Research Objective 5: Examine the association between dietary behaviour and nutritional status**

Table 4: Regression Models of Key Predictors of Nutritional Status

| Outcome Variable | Significant Predictor(s) | Adjusted $R^2$ | p-value |
|---|---|---|---|
| BMI | Food expenditure | 0.25 | <0.001 |
| WHR | Dietary habit score | – | <0.05 |
| FBS | Dietary pattern | – | 0.049 |
| Haemoglobin | Food expenditure | – | 0.001 |

Source: Authors Compilation.

Regression results confirm that dietary behaviour strongly influences nutritional outcomes. Food expenditure was the strongest predictor of BMI and hemoglobin, while dietary habits significantly affected WHR. Fasting blood sugar showed only a weak association with dietary pattern. Overall, the results indicate that both economic and behavioural factors directly impact students' nutritional status.

## DISCUSSION OF FINDINGS

Research question one revealed that most of the respondents consumed between two and three main meals daily. However, a high proportion admitted to skipping meals, with breakfast being the most frequently skipped. This is consistent with the findings of Achinihu (2009), who confirmed that meal skipping, especially breakfast, is common among undergraduates due to time pressure or intentional weight management. In this study, many students attributed breakfast skipping to rushing for classes or to body image concerns, which is more prevalent among females. Carmel and Camilleri (2011) similarly observed that female undergraduates are more conscious of body appearance and dietary choices. The implication of frequent meal skipping is that it predisposes students to poor nutritional status and reduced concentration during academic activities.

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Research question two revealed that snacking was highly prevalent among the respondents, with most of them consuming snacks in between meals to cope with academic stress and daily energy needs. The common snacks taken included soft drinks, biscuits, and other refined foods, while fruits were consumed less frequently. This finding aligns with FAO (2021), which reported that energy-dense, nutrient-poor snack consumption is common among youths and contributes to rising overweight and obesity rates. The low intake of fruits and vegetables observed in this study also corroborates Afolabi et al. (2019), who reported that Nigerian adolescents rarely consume sufficient micronutrient-rich foods. Continuous reliance on unhealthy snacks can compromise dietary diversity and lead to nutritional deficiencies.

Research question three revealed that dietary diversity among respondents was generally moderate, with a significant proportion falling into the low diversity category. The dietary pattern was dominated by cereals and animal proteins, with low consumption of vegetables, fruits, and dairy products. This finding is in line with earlier studies which reported that undergraduates in Nigeria have monotonous diets characterized by insufficient intake of nutrient-rich foods (Afolabi et al., 2019). The decline in dietary diversity at the end line of this study suggests worsening food insecurity or economic pressures such as inflation, which may reduce students' access to balanced meals. This supports Spear (2016), who emphasized that socioeconomic conditions strongly influence the quantity and quality of diets among adolescents.

Research question four revealed changes in nutritional status of respondents. At baseline, most students had normal BMI, but underweight prevalence increased from 6.65% at baseline to 20.85% at end line. At the same time, overweight and obesity rates declined. This finding contrasts with Ebead-Mohammed (2020), who reported higher rates of overweight among undergraduates, but is partially consistent with Omage and Omuema (2018), who found lower underweight prevalence. The rising underweight observed in this study could be attributed to increased meal skipping and reduced dietary diversity. Poor eating habits, such as replacing meals with snacks, may also contribute to this outcome. The implication is worrisome as undernutrition affects cognitive performance and academic achievement.

Furthermore, waist-to-hip ratio and waist circumference results indicated that most respondents were within the normal range, implying low risk of abdominal obesity. This agrees with Ahmed (2017), who reported similar findings among young adults. However, the presence of overweight and obesity among those with medium dietary diversity underscores the health risk of consuming energy-dense but nutrient-poor foods, as also noted by Berg et al. (2013).

Other associated factors identified in this study include limited availability of healthy foods, academic stress, peer group influence, family background, and exposure to social media. These factors negatively affect food choices and dietary patterns among undergraduates. Neumark-Sztainer, Story, and Blum (2016) emphasized that psychosocial influences such as body image, weight dissatisfaction, and peer pressure play major roles in shaping adolescents' diets. Similarly, Dinger and Waigandt (2017) observed gender differences in dietary patterns, with females consuming more fruits and vegetables than males, but also being more prone to restrictive eating practices.

## CONCLUSION

The study revealed that a large proportion of the undergraduates maintained normal nutritional status; however, some categories were malnourished as shown by the rising cases of underweight and the presence of overweight and obesity among respondents. Meal skipping, particularly breakfast, and reliance on energy-dense snacks such as soft drinks and biscuits were common dietary practices. Although the majority of students demonstrated moderate dietary diversity, there was still evidence of low intake of fruits, vegetables, and dairy products, which negatively affected their overall nutrition. Furthermore, while most undergraduates possessed adequate knowledge of nutrition, this was not always reflected in their dietary habits or nutritional outcomes, indicating a gap between knowledge and practice.

## RECOMMENDATIONS

Based on the findings made and the conclusion drawn, the following recommendations were made: Strengthen campus food policies: The university should establish clear nutrition-focused policies that regulate the types of foods sold within the campus environment, discourage the dominance of energy-dense snacks, and ensure that cafeterias and vendors consistently provide affordable, nutrient-rich meals.

Forge strategic partnerships with food vendors: Collaboration between the university and on-campus food vendors is essential to guarantee a steady supply of diverse and healthy food options, including fruits, vegetables, whole grains, and dairy products, at student-friendly prices.

Integrate digital nutrition tools: The adoption of mobile applications or digital diet-tracking platforms should be encouraged to help students monitor their daily food intake, make informed dietary decisions, and cultivate healthier eating habits.

Expand nutrition education initiatives: Regular health campaigns, workshops, and awareness programs should be introduced to bridge the gap between students' nutritional knowledge and their dietary practices, thereby fostering sustainable behavioural change.

Promote active lifestyles: The university should invest in recreational and fitness facilities while integrating physical activity into campus life. Encouraging regular exercise will complement healthy dietary practices and help students maintain optimal body weight and overall well-being.

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