

Research

# Gender difference in nutritional knowledge, dietary pattern and nutritional status of undergraduates in Ado-Ekiti, Southwest Nigeria

Israel O. Dada\*, Kayode Ajayi, Funmilayo W. Adedeji

Department of Human Nutrition and Dietetics, College of Medicine and Health Sciences, Afe Babalola University, Ado-Ekiti, Nigeria

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## Background

Poor nutritional knowledge at an early stage of life suggests developing poor dietary habits that later lead to obesity and attendant complications of non-communicable diseases.

## Objective

This study examined gender differences in nutritional knowledge, dietary pattern and the prevalence of overweight/obesity among students of a private tertiary institution in Ado-Ekiti, Ekiti State, Nigeria.

## Methods

A total of 214 students were recruited to this study from the six colleges of the university. A semi-structured questionnaire was used to collect information on personal and lifestyle characteristics, dietary patterns and physical activity. Weight and height measures were used to calculate Body Mass Index (BMI). Data were analyzed using descriptive statistics and chi square test at 5% level of significance.

## Results

The mean age of the students was  $19 \pm 1.89$  years. Monthly allowance of  $\geq \text{₦}50,000.00$  (\$70) was received by 64%; 80% and 78% of them had fathers and mothers respectively with university degrees. Physical exercise was not done by 40%, 69% took < 3 meals/day and 60% skipped breakfast; 71% and 21% had medium and high dietary diversity scores respectively. The mean BMI was  $24.6 \pm 3.70$ ; 36% had a BMI  $\geq 25$ . Regarding their nutritional knowledge, 16% were high. There were no gender differences in BMI, nutritional knowledge or dietary diversity.

## Conclusions

The study revealed less than ideal nutritional knowledge and dietary diversity and prevalence of overweight/obesity. Great emphasis needs to be given to nutrition education and promotion among university students.

## INTRODUCTION

The adolescent and young adulthood frames of life offer crucial windows of opportunity for health promotion and disease prevention. At this stage, individuals are free from the direct influence of parents and begin to take personal decisions and develop habits on food choices and other lifestyle habits. Some may develop unhealthy eating habits

and have low physical activity level (Nelson et al., 2008). Therefore, university students can be a potential target for the promotion of healthy lifestyles to reduce the risks of lifestyle-related disorders later in life (von Bothmer and Fridlund, 2005). Such lifestyle-related disorders include obesity and non-communicable diseases such as heart disease, atherosclerosis, and stroke (Akseer et al., 2020).

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\* Corresponding author: [iodada@abuad.edu.ng](mailto:iodada@abuad.edu.ng)

Obesity, diabetes and cancer have been found among university students (Nagheer et al., 2017). Lack of skills in selecting healthy foods may have a negative impact on their eating habits and nutritional status.

Overweight and obese students have been observed to have lower academic performance (Magulod Jr. and Capili, 2019; Shehata et al., 2021). Chronic health problems such as hypertension and asthma are more reported among obese students globally (Shehata et al., 2021). More so, overweight and obesity has been established as a risk factor of cardiovascular diseases (Gwarzo, et al., 2020).

Findings from studies in some countries have revealed an increasing prevalence of overweight and obesity among university students. For instance, in Saudi Arabia, 31-52% of university students were overweight and obese (Shehata et al., 2021; Aljefree et al., 2022). In Egypt, 37% were found to be overweight and obese (Ali and Shehata, 2020). In Sudan, 14% were overweight and obese (Mohammed, 2020). In Bahawalpur, 26% were overweight and obese (Rana et al., 2020).

Similarly, previous studies in Nigeria reveal an increasing prevalence of poor dietary habits among university students, with overweight and obesity apparently from 20% in 2018 to 27% in 2021 (Olatona et al., 2018; Omega and Omuemu, 2019; Lano-Maduagu, 2020; Sholeye et al., 2021).

Several factors have been associated with poor dietary patterns and overweight and obesity. These include sedentary lifestyle (Shehata et al., 2021; Aljefree et al., 2022), poor nutritional knowledge and low physical exercise (Okeke et al., 2020; Rana et al., 2020), frequent snacking (Aljefree et al., 2022; Mohammed, 2020), skipping breakfast (Olatona et al., 2018), high monthly allowance (Lano-Maduagu, 2020), high socioeconomic status of parents (Omega and Omuemu, 2019), and gender (Olatona et al., 2018; Sholeye et al., 2021).

Studies in Nigeria and other countries have established gender disparity in dietary habits and nutritional status of university students. For instance, better dietary habits have been observed among male students compare to female students in a university in Nigeria (Omega and Omuemu, 2019), in Egypt (Abo and Shehata, 2020) and in India (Kumar et al., 2020; Namgha, 2021). A greater proportion of male students was found to be overweight and obese in Asia (Magulod and Capili, 2019) and Saudi Arabia (Shehata et al., 2021). However, Sholeye et al. (2021) found that a lower proportion of female students in a public university in Nigeria skipped meals but a greater proportion (75%) of them was overweight or obese. A similar finding was recorded by Omega and Omuemu (2019) among students of a private university in Nigeria. Okeke et al. (2020) found that more female students in a public university in Nigeria had good knowledge of healthy dietary habits compare to male students. All the public and private Nigerian universities mentioned above have facilities for students to prepare their foods.

Hence, this study was designed to assess the gender difference in dietary diversity, nutritional knowledge and body mass index (BMI) among students of a private university in Ado-Ekiti, Nigeria.

## MATERIALS AND METHODS

### STUDY DESIGN

A cross-sectional research design was conducted on a sample of 214 students in Afe Babalola University among the six colleges.

### STUDY SETTING

The study was carried out in Afe Babalola University, Ado-Ekiti, Southwest, Nigeria. The University runs programs both at undergraduate and postgraduate levels. The respondents for this study were undergraduates from the six colleges of the University which are: College of Medicine and Health Sciences, College of Law, College of Sciences, College of Social and Management Sciences, College of Engineering and College of Pharmacy.

### SAMPLE SIZE DETERMINATION

Taking a precision of 0.05 at 95% confidence Interval (Z), the minimum sample size (N) was calculated based on 16% estimated prevalence of overweight among university students (Olatona et al., 2018).

$$N = \frac{Z^2 pq}{D^2}$$

Z<sup>2</sup> = confidence level at 95%

N = minimum sample size

D = Desired precision =0.05

P=16% =0.16

q=1-p=0.84

$$N = \frac{1.96 \times 1.96 \times 0.16 \times 0.84}{0.05^2} = 207$$

Data were collected on 214 participants.

### SAMPLING PROCEDURES

A multistage sampling technique was used. All the six colleges in the university were sampled and the sample size (214) was distributed base on the student population of the colleges as follow: College of Science (28), College of Medicine and Health Sciences (61), College of Law (26), College of Social and Management Sciences (21), College of Engineering (54) and College of Pharmacy (24). Four departments were randomly selected by balloting in each college and an equal number of students was selected from each department by a systematic random sampling technique.

### INSTRUMENTS FOR DATA COLLECTION

A semi-structured self-administered questionnaire was used to collect data. The questionnaire had six (6) sections based on the specific objectives. These included socio-demographic characteristics, life-style, feeding pattern, anthropometry profile, nutrition knowledge and dietary diversity. Socio-demographic data collected include age, gender, education levels of parents, and student's monthly allowance. Anthropometric measurements of the subjects were taken using standard apparatus.

Weight was measured to the nearest 0.1kg with newly purchased portable bathroom scales (Harson bathroom scale, model: H89 DK BLUE FA00333). Respondents stepped on the scale without their shoes and other materials like phone and wrist watch that can add to their weight. Measurements were

taken following standard procedures.

Height was measured to the nearest 0.1m using a stadiometer. Each subject stood upright with arms by the side and without his or her shoes on. Measurement was taken following standard procedures.

BMI was calculated as weight (kg) divided by the square of height (m<sup>2</sup>) and then categorized according to WHO recommendations to define weight as follow: BMI <18.5 (underweight), BMI=18.5-24.9 (normal weight), BMI=25.0-29.9 (overweight) and BMI ≥30 (obesity).

#### DIETARY DIVERSITY

Following the FAO standard guidelines, the dietary diversity of the respondents was obtained from the dietary diversity score (DDS) which is defined as the number of different food groups consumed in the 24 hours preceding the interview (FAO, 2007). The information collected from the 24h dietary recall was used to calculate the DDS of each respondent. In this study, a 9 food-group aggregation was created from the list of food groups created from the 24hr recall. The aggregated 9 food groups (starchy staples, dark green leafy vegetables, other Vitamin A rich fruits and vegetables, other fruits and vegetables, organ meat, meat and fish, eggs, legumes and seeds/nuts, and milk products) were then used to create the diversity scores with each group carrying a score. Respondents with a score less than 3 were regarded as low dietary diversity; those with scores of 4 and 5 had medium dietary diversity while those with a score of 6 and above had high dietary diversity (Leshi and Leshi, 2017).

#### NUTRITION KNOWLEDGE

The nutrition knowledge of the respondents was measured using 15 questions. Correct answers were allocated a score of 1, while incorrect answers were allocated a score of zero. Based on their answers to these questions their scores were added up and graded into good (11-15), fair (6-10) and low (0-5) (Olatona et al., 2020).

#### DATA ANALYSIS

Data entry and analysis was done using statistical package for the social science (SPSS) software version 20. Categorical variables were presented using frequency and percentages. Chi square was done to establish association between variables at 5% level of significance.

#### ETHICAL CONSIDERATION

The details of the study were explained to the students and those students who were willing provided written informed consent. Participation was anonymous with no incentives provided and data were confidential and protected. All measurements were taken during free or break periods so as not to disrupt academic activities. The Health Research Ethical Committee (HREC) of the University gave approval for the study with a Protocol number ABUADHREC/05/05/2022/14.

## RESULTS

### RESPONDENTS' PERSONAL AND LIFESTYLE CHARACTERISTICS

Tables 1 shows the personal characteristics of the respondents with 69% below age 20years and a mean of 19 ±1.89years; 36% received less than ₦50,000.00 (\$70) in a

month, 80% of their fathers and 78.0% of their mothers had university degrees. A greater proportion (84%) of the mothers of the male students than the female students (75%) had a university degree.

**Table 1: Respondents' personal characteristics (N=214)**

	Male Frequency (%)	Female Frequency (%)	Total Frequency (%)
<b>Age (years)</b>			
<20	46 (58.2)	101 (74.8)	147 (68.7)
≥20	33 (41.8)	34 (25.2)	67 (31.3)
<b>Religion</b>			
Christianity	51 (64.6)	99 (73.3)	150 (70.1)
Islam	26 (32.9)	31 (23.0)	57 (26.6)
Others	2 (2.5)	5 (3.7)	7 (3.3)
<b>Ethnicity</b>			
Hausa	10 (12.7)	14 (10.4)	24 (11.2)
Igbo	26 (32.9)	35 (25.9)	61 (28.5)
Yoruba	31 (39.2)	57 (42.2)	88 (41.1)
Others	12 (15.2)	29 (21.5)	41 (19.2)
<b>Level</b>			
100L	3 (3.8)	18 (13.3)	21 (9.8)
200L	23 (29.1)	26 (19.3)	49 (22.9)
300L	27 (34.2)	63 (46.7)	90 (42.1)
400L	18 (22.8)	18 (13.3)	36 (16.8)
500L	8 (10.1)	10 (7.4)	18 (8.4)
<b>Monthly allowance</b>			
<₦50,000.00 (\$70)	28 (35.4)	49 (36.3)	77 (36.0)
≥₦50,000.00 (\$70)	51 (64.6)	86 (63.7)	137 (64.0)
<b>Father's education</b>			
Post-secondary or less	16 (20.3)	27 (20.0)	43 (20.1)
University degree	63 (79.7)	108 (80.0)	171 (79.9)
<b>Mother's education</b>			
Post-secondary or less	13 (16.5)	34 (25.2)	47 (22.0)
University degree	66 (83.5)	101 (74.8)	167 (78.0)

### RESPONDENTS' LIFESTYLE CHARACTERISTICS

Table 2 indicates that 76% of the respondents did not take alcohol and 89% did not smoke but 74% took soft drinks. Only 17% of the respondents carried out physical exercise daily and 40% did not perform any physical exercise in the past week.

**Table 2: Lifestyle characteristics of the respondents (N=214)**

	Male Frequency (%)	Female Frequency (%)	Total Frequency (%)
<b>Taking alcohol</b>			
Yes	46 (58.2)	101 (25.2)	52 (24.3)
No	33 (41.8)	34 (74.8)	162 (75.7)
<b>Smoking</b>			
Yes	24 (30.4)	28 (20.7)	24 (11.2)
No	55 (69.6)	107 (79.3)	190 (88.8)
<b>Taking soft drink</b>			
Yes	59 (74.7)	103 (76.3)	52 (74.3)
No	20 (25.3)	32 (23.7)	61 (25.7)
<b>Physical exercise</b>			
Daily	13 (16.5)	24 (17.8)	37 (17.3)
Occasionally	45 (57.0)	49 (36.3)	94 (43.9)
Rarely	21 (26.5)	62 (45.9)	83 (38.8)
<b>Exercise during the past week</b>			
None	25 (31.6)	61 (45.2)	86 (40.2)
1-3 times	39 (49.4)	56 (41.5)	95 (44.4)
≥4 times	15 (19.0)	18 (13.3)	33 (15.4)
<b>Hour of body exercise/typical day</b>			
<1	40 (50.6)	92 (68.1)	132 (61.7)
≥1	39 (49.4)	43 (31.9)	82 (38.3)

### MEAL PATTERNS OF THE RESPONDENTS

Table 3 shows that 31% took three or more meals in a day

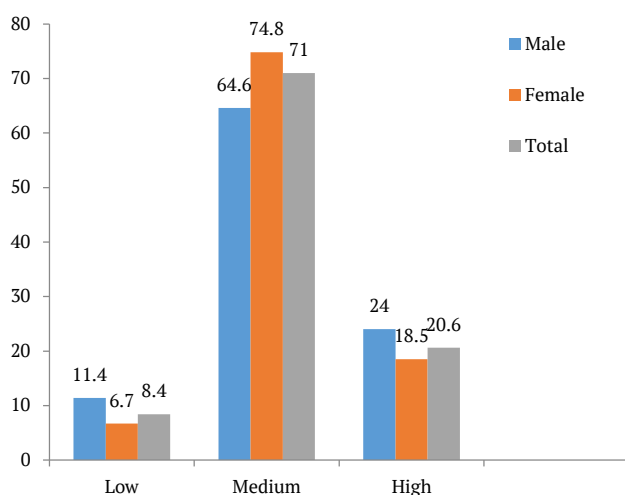
and 72% skipped at least one meal. The major meal skipped was breakfast (60%) which 65% took ≤3 times in a week. Female students took more meals than male students.

**Table 3: Meal patterns of the respondents (N=214)**

	Male Frequency (%)	Female Frequency (%)	Total Frequency (%)
<b>Number of meals/day</b>			
<3	57 (72.2)	91 (67.4)	148 (69.2)
3	17 (21.5)	19 (14.1)	36 (16.8)
>3	5 (6.3)	25 (18.5)	30 (14.0)
<b>Skipping meals</b>			
Yes	55 (69.6)	99 (73.3)	154 (72.0)
No	24 (30.4)	36 (26.7)	60 (28.0)
<b>Meal skipped</b>			
Breakfast	53 (67.1)	75 (55.6)	128 (59.8)
Lunch	24 (30.4)	51 (37.8)	75 (35.0)
Dinner	2 (2.5)	9 (6.6)	11 (5.2)
<b>Breakfast/week</b>			
≤3	54 (68.4)	84 (62.2)	138 (64.5)
4-5	17 (21.5)	38 (28.1)	55 (25.7)
6-7	8 (10.1)	13 (9.7)	21 (9.8)

#### DIETARY DIVERSITY OF THE RESPONDENTS

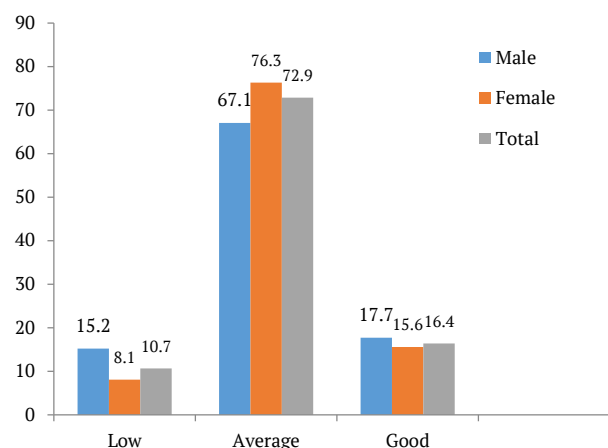
Figure 1 shows the dietary diversity of the respondents with 71% having medium dietary diversity. There were more females (75%) than males (65%) with medium dietary diversity. Only 8% had low dietary diversity.



**Figure 1. Dietary diversity of respondents**

#### Nutritional knowledge of the respondents

Figure 2 shows that 16% of the respondents had good knowledge while 73% had fair knowledge and only 11% had low knowledge.



**Figure 2: Nutritional knowledge of respondents**

#### WEIGHT PERCEPTION AND BODY MASS INDEX OF THE RESPONDENTS

Respondents' weight perception and BMI are shown in Table 4; 74% believed that they had normal weight, 78% were satisfied with their weight and 37% were trying to lose weight. Based on BMI, 37% of the respondents were overweight/obese and 6% were underweight. Overall, participants greatly underestimated their weights, that is, they assumed they were in a lower category than was the case. This was especially the case among female students.

**Table 4. Weight perception and BMI of respondents**

	Male Frequency (%)	Female Frequency (%)	Total Frequency (%)
<b>Weight perception</b>			
Underweight	11 (13.9)	21 (15.6)	32 (15.0)
Normal weight	59 (74.7)	99 (73.3)	158 (73.8)
Overweight	6 (7.6)	15 (11.1)	21 (9.8)
Obesity	3 (3.8)	0 (0.0)	3 (1.4)
<b>Satisfied with current weight</b>			
Very satisfied	19 (24.1)	31 (23.0)	50 (23.4)
Satisfied	40 (50.5)	76 (56.3)	116 (54.2)
Dissatisfied	10 (12.7)	23 (17.0)	33 (15.4)
Very dissatisfied	10 (12.7)	5 (3.7)	15 (7.0)
<b>Tried to lose weight in the last 12 months</b>			
Yes	23 (29.1)	57 (42.2)	80 (37.4)
No	56 (70.9)	78 (57.8)	134 (62.6)
<b>BMI</b>			
Underweight (<18.5)	5 (6.3)	8 (5.9)	13 (6.1)
Normal weight (18.5-24.99)	46 (58.2)	77 (57.0)	123 (57.5)
Overweight (25.0-29.99)	19 (24.1)	25 (18.5)	44 (20.6)
Obesity (≥30)	9 (11.4)	25 (18.5)	34 (15.9)

#### GENDER DIFFERENCES

Table 5 shows the gender differences in dietary diversity, nutritional knowledge and BMI of the respondents. There were no statistically significant gender differences in dietary diversity, nutritional knowledge or BMI of the respondents.

**Table 5. Dietary diversity, nutritional knowledge and BMI by gender of respondents**

	Gender		Total N	Chi-square	P-value
	Male N (%)	Female N (%)			
<b>Dietary diversity</b>					
Low (<3)	9 (50.0)	9 (50.0)	18	2.803	0.246
Medium (3-5)	51 (33.6)	101 (66.4)	152		
Good (6-7)	19 (43.2)	25 (56.8)	44		
<b>Knowledge</b>					
Low (0-5)	12 (52.2)	11 (47.8)	23	3.022	0.221
Fair (6-10)	53 (34.0)	103 (66.0)	156		
Good (11-15)	14 (40.0)	21 (60.0)	35		
<b>BMI</b>					
<18.5	5 (38.5)	8 (61.5)	13	2.360	0.501
18.5-24.99	46 (37.4)	77 (62.6)	123		
25.0-29.99	19 (43.2)	25 (56.8)	44		
≥30.0	9 (26.5)	25 (73.5)	34		

## DISCUSSION

The study sample was adolescents and young adults attending a private university whose parents mainly had a high socio-economic status. As in a study done in Igbinedion University in Nigeria (Omage and Omuemu, 2019), most parents had a tertiary education. The students in the present study had a sedentary lifestyle. Their physical activity level was similar to that among Saudi Arabia university students (Shehata et al., 2021) but a higher proportion of the sample performed physical exercise per week compared to the students at the University of Nigeria, Nsukka (Okeke et al., 2020) and Pakistanian University students in Bahawalpur (Rana et al., 2020).

A high monthly allowance and level of education of parents has been associated with the dietary habits and nutritional status of students in Nigeria (Omage and Omuemu, 2019) and Asia (Magulod and Capili, 2019). Students in these studies frequently consume energy-laden snacks, which is a risk factor of overweight and obesity. The present study found a high intake of soft drinks, many likely to be high in sugar.

Nearly one-third of the students took three or more meals in a day. More than two-thirds skipped meals and nearly two-thirds skipped breakfast. There was no gender difference in meal skipping. This level of breakfast consumption was higher than in some similar Nigerian studies (Dada et al., 2020; Ikujenlola and Adekoya, 2020; Dada and Igbe 2020; Ogundele et al., 2023) but slightly lower than Sholeye et al. finding (2021) and among Indian students (Kumar et al., 2020). Meal skipping is similar to that of Olatona et al. (2018) among university students in Lagos State Nigeria and higher than the findings of Lano-Maduagu (2020), which was 52%. It is however lower than the 92% found among students in Sagamu Nigeria (Sholeye et al., 2021). Dahal et al. (2022) was also found no gender difference in meal skipping.

This dietary habit of skipping meals, especially breakfast is a risk for accumulation of weight and cardiovascular problems (Kolobari'c et al., 2020). Skipping meals has also been associated with obesity (Niba et al., 2017; Aljefree et al., 2022). Few students in the present study of either gender had low dietary diversity. Some Indian students have been found to have lower dietary diversity (Kumar et al., 2020) and others higher (Nani, 2016). However, in the latter study, male/female had lower

dietary diversity. Poor dietary diversity has been associated with overweight (Kumar et al., 2020) and, also among private university students in Nigeria, with obesity (Okondu et al., 2020).

Students in the present study had less nutrition knowledge than those in public institutions in Nigeria which had between 52% and 75% students with good knowledge (Dada et al., 2020; Okeke et al., 2020).

More than one-third of the students were overweight and obese. This prevalence is lower in comparison with the students at the University of Uyo, Nigeria with 42% prevalence (Opara et al., 2020) and university students in Saudi Arabia where the prevalence was 52% (Shehata et al., 2021). However, it is similar to the findings of Aljefree et al. (2022) among Saudi Arabian university students in 2022 and Egyptian students with 37% prevalence in 2020 (Ali and Shehata, 2020) and higher than Indian students of 26% (Rana et al., 2020) and Sudanese students of 14% (Mohammed, 2020) and other Nigerian students which were about one-quarter (Olatona et al., 2018; Lano-Maduagu, 2020; Sholeye et al., 2021).

A greater proportion of the females were overweight but this was not significant. This is similar to the finding of Riggs (2017) among American students and the students of University of Uyo, Nigeria (Opara et al., 2020). The observed low physical activity, high monthly income and skipping of meals among the studied students might be responsible for the high prevalence of overweight recorded in this study, though, high income ought to be an advantage to access a higher quality diet if the students have good knowledge of nutrition.

One-tenth of the sampled students perceived that they were overweight and obese. This is lower compared to American college students with 26% (Riggs, 2017). About one quarter of the students were not satisfied with their current weight. This contrasts with 50% among American students. Those who desired weight loss were less than the 65% found among some American students (Riggs, 2017). There is a wide gap between the proportion of students that were overweight and obese in relation to those that perceived that they were overweight and obese. This implies that a good proportion of the students lacked knowledge of their weight status or suffered from having a distorted body image.

It was observed that there was no significant gender difference in the dietary diversity, nutritional knowledge, or BMI. There are studies whose findings are contrary to the

findings of this current study. Samuel et al. (2022) showed that girls had a significantly higher BMI among secondary school adolescents in Owo LGA, Nigeria. Sholeye et al. (2021) also found that more female students were overweight and obesity. But, Magulod Jr. and Capili (2019) and Alkazemi (2019) found male students having higher BMI.

Higher BMI was found among males than females among university students in Asia country in 2019 (Magulod Jr. and Capili, 2019). Male students were more obese in Saudi Arabia (Shehata et al., 2021). Females were more obese among university students of Health and Allied Sciences in Sagamu, Nigeria (Sholeye et al., 2021). Dietary diversity score was higher in males than females among students in Karnataka, India (Namgha, 2021). Significant gender difference in dietary diversity score was also observed by Kumar et al. (2020) among Indian students where a higher mean Dietary Diversity Score was observed in males. A study among students at the University of Nigeria, Nsukka, found females to have significantly better nutrition knowledge (Okeke et al., 2020).

The outcome of this current study on gender difference in some ways contrasts to other studies in Nigeria and other countries. This might be due to the common ground of both genders in respect of high socio-economic background and high monthly allowance, exposure to the same dietary diversity and similar rates of skipping breakfast and other meals.

#### CONCLUSION

This study revealed no gender differences in weight, nutritional knowledge and dietary diversity among students

in a private Nigerian university. Overall, participants greatly underestimated their weights, that is, they assumed they were in a lower BMI category than was the case. This was especially the case among female students.

#### AUTHOR CONTRIBUTIONS

The first author was involved in the design, methodology, data analysis, literature review, supervision and writing original draft. The second author was involved in providing critical suggestions for design of the study and interpretation of data. The third author was involved in the methodology and data collection. The final manuscript has been approved by all the authors.

#### CONFLICT OF INTEREST

We declare no conflict of interest.

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