Nor. Afr. J. Food Nutr. Res. 2023; 7 (16): 37-45 https://doi.org/10.51745/najfnr.7.16.37-45

https://www.najfnr.com

ORIGINAL ARTICLE

Nutritional status and nutrient adequacy of food consumed by non-academic staff in a Nigerian university

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ABSTRACT

Background: Poor diet among workers accounts for 20 % of productivity loss as adequate nutrition is essential for optimum work productivity. Unfortunately, little attention is paid to the nutritional status to academics in Nigeria. **Objective:** This study assessed the nutritional status and nutrient adequacy of food consumed by non-academic staff in a Nigerian University. **Methods:** This is a cross-sectional descriptive study of 300 randomly selected non-academic staff of the Federal University of Agriculture, Abeokuta. Data were obtained on socio-demographic and socioeconomic characteristics, anthropometric parameters, and nutrient intake using pre-tested self-administered questionnaires, standard procedures, and repeated 24 – hour dietary recall. Categorical data were expressed as mean and standard deviation and inferential statistics such as Pearson Chi-square was used to determine the association between variables. **Results:** The mean age of the respondents was 42 ± 8.0 years with 56 % being female. The anthropometric results showed that 32 % and 20 % were overweight and obese respectively. Protein intake was inadequate among the female (32.7 %) and male (27.3 %) respondents. Vitamin A intake was (32.7 %) and (29.2 %) among the female respondents compared to male respondents with protein (27.3 %) and Vitamin A (27.3%). Male and female respondents' mean intake of vitamin C was of 36.2 and 39.4 mg and was reduced compared to the Recommended Dietary Allowance (RDA). The food habits also revealed that several of the respondents practiced snacking (58 %), skipped meals (62 %), and did not consume fruits and vegetables (30 %). **Conclusions:** This study reveals that half of the respondents were overweight and obese. Inadequate intake of vitamin C and protein was considerably elevated among the respondents in this study. There is, therefore, a need for institution-based health promotion education programs and further studies to assess the dietary diversity of the respondents.

Keywords: malnutrition, nutritional status, micronutrients, food habit, consumption.

ARTICLE INFORMATION

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Received: March 19, 2023
Revised: August **13**, 2023
Accepted: September 09, 2023
Published: September 15, 2023

Article edited by:
- Pr. Meghit Boumediene Khaled

Article reviewed by:
- Dr. Fouzia Tebbani
- Dr. Kingsley K. A. Pereko

Cite this article as: Oladosu, G., S., Olajide, B. R., Oladeji O. E., Akinpelu, T. O., Onabanjo, O., O. (2023). Nutritional status and nutrient adequacy of food consumed by non-academic staff in a Nigerian university. *The North African Journal of Food and Nutrition Research,* 7 (16): 37 – 45. https://doi.org/10.51745/najfnr.7.16.37-45

1 Introduction

The Nutritional status of a nation is an important prerequisite to national development and a nation whose citizens are nutritionally sound will experience increased productivity [1]. In the workplace where the majority spend at least one-third of their daily hours, adopting and maintaining a healthy dietary lifestyle is essential in increasing work output and preserving the health of the staff [2,3].

In Sub-Sahara African countries, there has been a Nutrition transition over the past 30 years which is characterized by over-nutrition (overweight and obesity) in addition to the prevailing under-nutrition and micronutrient deficiencies [4, 5]. According to the World Health Organization (WHO) [6], more than 1.9 billion and 650 million adults 18 years above are overweight and obese respectively. It is believed that globalization has drastically altered food habits over the past decade, which has decreased the prevalence of malnutrition. This change has therefore led to a significant increase in the

prevalence of overweight and obesity [7, 8]. Amoda et al. [9] opined that the food and nutrient intake of white-collar workers who, in the course of their work, are always in a hurry, is influenced by the evolving fast-food culture being convenient, readily available, rapidly served on the go and therefore, promotes the prevalence of overweight, obesity and nutrient deficiencies.

Workplace productivity results from a variety of factors [10] including appropriate nutritional status. Being overweight and obese constitute potential risk factors that increase the likelihood of temporary job loss due to illness and reduction productivity at work [11].

Overweight and obesity are associated with significant financial, psychological, and social risks [12]. In Nigeria, numerous preventable illnesses and mortality that are prevalent have obesity and overweight as their primary causes [11]. According to the WHO [6], being overweight or obese poses a high risk of developing chronic health conditions and is the sixth risk factor for death worldwide. In addition to the social and psychological burdens of obesity and being overweight, it has been reported to increase the risk of developing type 2 diabetes mellitus, hypertension, coronary heart disease, osteoarthritis, certain types of cancer, and respiratory system issues [13-15].

In a review of energy balance and obesity, Romieu et al. [16] found several factors that contribute to overweight and obesity, such as an energy imbalance, lack of physical activity, low socioeconomic level, etc. Poor eating habits, such as missing breakfast and consuming high quantities of sugar-sweetened beverages, snacks, and sweets, can also contribute to body weight gain [11]. According to Hruby and Hu [17], rapid industrialization, and the adoption of sedentary lifestyles, as economies expand, are the main causes of obesity in low- and middle-income countries (LMIC). In several workplaces, access to nutritious foods is a major challenge; as a result, several workers choose unhealthy snacks or stay hungry until the end of work [18].

Problem statement and justification

The rise in overweight and obesity among working adult has become a global public health concern [11]. These conditions increase the risk of developing type 2 diabetes, coronary heart disease, and stroke, which results in high medical expenses, decreased work productivity, and lost wages due to incapacity[19]. In addition to making up a larger portion of a country's workforce, civilian workers are also more likely to be obese due to their sedentary lifestyles and poor eating habits [20]. Given the important role those civilian workers play in a nation's economy, the high frequency of obesity among them could have a serious impact on their productivity, overall health, and well-being as well as the nation's economy[1]. According to Okondu et al. [10], poor diet is associated with a 66 % increase in productivity loss. Additionally, the nature of an occupation may occasionally result in a sedentary lifestyle with little to no physical activity, thereby increasing the risk of obesity and overweight [21]. The prevalence of obesity among university employees in Nigeria is increasing and may be related to the nature of their profession [22]. Yet, poor eating practices and unhealthy lifestyles are reported among non-academic employees or workers in a Nigerian university setting[23, 24]. This study, therefore, assessed the nutritional status and nutrient intake of nonacademic staff at the Federal University of Agriculture, Abeokuta, in Ogun State, Nigeria. Specifically, the study assessed the sociodemographic and socioeconomic characteristics of the respondents, their nutritional status, their food habits, and the nutritional adequacy of the foods consumed.

2 Subjects and Methods

2.1 Study area and location

The study area was Abeokuta, the state capital of Ogun state in southwest Nigeria. The location of the study was within the Federal University of Agriculture, Abeokuta (FUNAAB), which is one of the three (3) specialized universities of Agriculture in Nigeria established on January 1, 1988, with the mandate of teaching, research, and extension [25]. This institution is one of the oldest specialized institutions of Agriculture in Nigeria with non-academic staff constituting 72.8 % of the total staff in the institution and it is the only university of agriculture in the southwest of the country.

2.2 Study design

A descriptive cross-sectional design was used in this study. This study described the characteristics (sociodemographic and socioeconomic), food habits, and food intake of the respondents. The respondents were visited, and data was obtained at one point in time without the researchers influencing the outcome of the investigation.

2.3 Study population

The study population included non-academic staff of the Federal University of Agriculture, Abeokuta. Reports by Family Services Employee Assistance Programs (FSEAP) and World Health Organization [2, 3] established that the nature of work of most of the non-academic staff is in such that they spend at least one-third of their daily hours on seats compared to academic staff whose nature of work gives room for activeness through lectures and other academic activities. Apart from these sedentary practices, several were perceived to have engaged in poor dietary practices and food habits

which influence their nutritional status and nutrient adequacies.

2.4 Sample size determination

The total number of non-academic staff at the Federal University of Agriculture, Abeokuta stands at 1,833. The sample size was calculated using Andrew Fisher's formula [26] and the estimated sample size was 272 which was increased to 300 in case of possible dropout. Therefore, 300 respondents were recruited for the study.

2.5 Sampling technique and procedure

A simple random sampling technique was utilized to select 300 respondents from the 1,833 registered members of the non-academic staff union (NASU) of the institution. The association register was used as the sampling frame. A random number generator was used to generate 300 numbers from the sampling frame. Selected respondents were contacted. However, those whose consent could not be ascertained were replaced. Data were collected during the association meetings, from different departments, units, and directorates. This method was employed due to the diversity of non-academic staff units, departments, and offices at the institution.

2.6 Inclusion and exclusion criteria

Full-time non-academic staff members of the Non-Academic Staff Union (NASU) of the Federal University of Agriculture, Abeokuta aged 18 years and above, healthy (i.e., not diagnosed with a chronic medical condition, as confirmed through self-reported medical history) and free of obvious disabilities (i.e., no visible impairments or limitations) were included. Academic staff, non-academic staff not working at the Federal University of Agriculture Abeokuta, and pregnant women were not included in the study.

2.7 Data Collection

Socio-demographic and socio-economic data were obtained using a pre-tested semi-structured interviewer-administered questionnaire. Anthropometric data such as body weight, height, waist circumference, and hip circumference of the respondents were assessed using a digital weighing scale, height meter, and metric tape respectively [27, 28]. Anthropometric measurements were performed twice, and average values were used for data analysis. The Body Mass Index (BMI) was estimated as weight in kilograms divided by height square in m^2 and classified using the WHO standard [28]. Respondents' dietary intakes and eating habits were assessed using the 24 – hour dietary recalls method described by [29, 30] and the food habit questionnaire described by Kowalkowska et al. [31] respectively. Respondents were asked about intervals between meals and snacks and quantities of food and drink ingested were estimated using household utensils (measuring cups, serving plates, spoons and cans) and dietary patterns. The average weight of each type of food recorded and their equivalent portion sizes determined using ~~the~~ household utensils were estimated to the nearest gram (9, 29, 30). Food sources of carbohydrates, proteins, fats, calcium, potassium, vitamin A, and vitamin C were analyzed using NutriSurvey (NS) software, West African Food Composition Table [32] and Nigerian nutrient composition database.

2.8 Statistical analysis

Descriptive statistics were performed using statistical package software (SPSS version 20). Food intake data, from 24–hour dietary recall, were analyzed using NutriSurvey (NS) software. Categorical data were summarized using frequency, percentage, mean, and standard deviation. Pearson Chi-square test was utilized to test for a statistically significant difference between the dependent (Nutrient adequacy of food consumed by the respondents) and independent variables (sex of respondents) at $p < 0.05$.

2.9 Ethical consideration

Permission to conduct the study and written informed consent were obtained from the Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta, and the respondents before data collection. The study was approved by the Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta. Each respondent signed a detailed informed consent form prior to the data collection. Respondents' information was kept confidential and used strictly for research purposes.

3 Results

3.1 Sociodemographic and socioeconomic background of the respondents

Table 1 describes the socio-demographic and socio-economic background of the respondents as shown below. More than half (58.0 %) of the respondents were aged 41 – 60 years and the respondents had a mean age distribution of 42 ± 8.0 years. There were more female respondents (56.0 %) and 76.0 % of the respondents were married. The income distribution revealed that only 20 % of the respondents earned more than ₦100, 000 monthly and 42 % had a Bachelor of Science (BSc.) and above as an educational qualification.

Table 1. Socio - demographic and socioeconomic characteristics of the respondents (n=300)

Variable	Frequency	Percentage
Age of the respondents		
- 18 – 40 years	126	42.0
- 41 – 60 years	174	58.0
- Mean age of the respondents (year)		42 ± 8.0
Sex of the respondents		
- Men	132	44.0
- Women	168	56.0
Marital status		
- Single	60	20.0
- Married	228	76.0
- Divorced	12	4.0
Religion of the respondent		
- Islam	54	18.0
- Christianity	240	80.0
- Others	6	2.0
Monthly income of respondents		
- < $118.01	108	36.0
- $118.01 – $ 236.02	132	44.0
- $228.38 – $472.03	48	16.0
- > $472.03	12	4.0
Educational qualification		
- SSCE	36	12.0
- NCE	72	24.0
- OND	66	22.0
- BSc. and above	126	42.0

United State Dollar equivalent of 423.7 to 1Naira in 2022

Table 2. Anthropometric Characteristics of the Respondent (n=300)

Variable	Minimum	Maximum	Mean ± SD
Height (m)	1.49	1.90	1.67 ± 0.10
Weight (kg)	48.00	106.00	72.70 ± 12.6
BMI (kg/m^2)	19.57	38.45	26.06 ± 4.54
HC (cm)	72	118	92.62 ± 10.41
WC (cm)	69	112	87.40 ± 11.07
WHR (cm)	0.94	1.31	0.90 ± 0.1

BMI: Body mass index; HC: hip circumference; WC: waist circumference; WHR: waist to hip ratio.

3.2 Anthropometric characteristics of the respondents

The anthropometric characteristics of the respondents are described in Table 2. The mean height, weight, and BMI of the respondents were 1.67 ± 0.10 m, 72.70 ± 12.6 cm, and 26.06 ± 4.54 kg respectively while the mean hip circumference (HC) and waist circumference (WC) were 92.62 ± 10.41 cm and 87.40 ± 11.07 cm respectively.

3.3 Nutritional status of the respondents

As shown in Figures 1 and 2, the nutritional status of the respondents shows that 48.0 % of the respondents were of normal weight while 52 % were overweight and obese. The result further revealed that a large percentage (84.0 %) of the respondents were at risk of abdominal obesity, while only 16.0 % showed no risk of abdominal obesity.

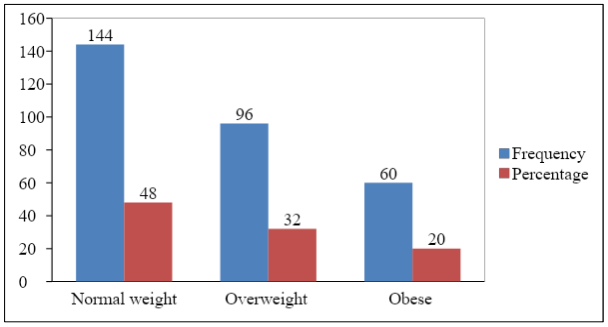
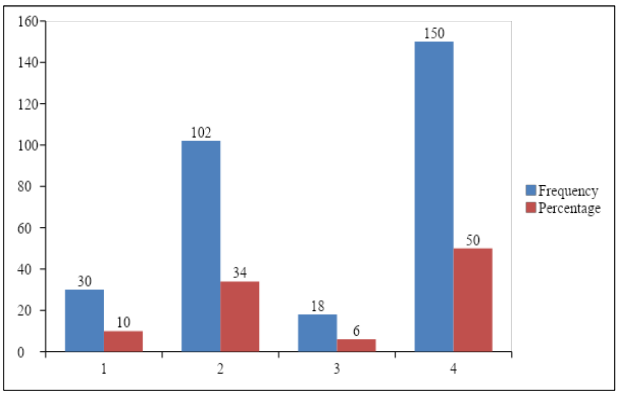


Figure 1. Nutritional status of the respondents (Body Mass Index)



WHR for men is 0.9 and for women is 0.8.

Figure 2. Nutritional status of the respondents (Waist-Hip Ratio)

Table 3. Nutrient intake and adequacy of respondents (n=300)

Variable	Median	RDA	NAR (%)	Inadequate Intake (< 60 %)	Adequate Intake (60 – 80 %)	Excess Intake (80 – 100 %)
Energy (kcal)*						
- Men	1763.25	2500	70.53	17 (12.9)	111 (84.1)	4 (3.0)
- Women	1223.21	2000	61.6	25 (14.9)	143 (85.1)	0
Carbohydrate (g)						
- Men	266.22	200	133.11	8 (6.1)	123 (93.2)	1 (0.8)
- Women	254.07	200	127.04	15 (8.9)	153 (91.9)	0
Protein (g)*						
- Men	43.27	46	94.07	36 (27.3)	86 (65.2)	10 (7.6)
- Women	44.21	46	96.11	55 (32.7)	105 (62.5)	8 (4.8)
Fat (g)						
- Men	12.33	30	41.10	13 (9.8)	108 (81.8)	11 (8.3)
- Women	19.28	30	64.27	22 (13.1)	137 (81.5)	9 (5.4)
Calcium (mg)						
- Men	1011.32	1100	91.94	17 (12.9)	111 (84.1)	4 (3.0)
- Women	1111.11	1200	9.26	29 (17.3)	135 (80.4)	4 (1.8)
Potassium (mg)						
- Men	1622.27	1800	90.13	8 (6.1)	123 (93.2)	1 (0.8)
- Women	1669.23	1800	92.74	13 (7.7)	153 (91.1)	2 (1.2)
Vitamin A (mg)*						
- Men	785.66	700	112.24	36 (27.3)	86 (65.2)	10 (7.6)
- Women	765.86	700	109.41	49 (29.2)	107 (63.7)	12 (7.1)
Vitamin C (mg)*						
- Men	36.21	75	48.28	13 (9.8)	108 (81.8)	11 (8.3)
- Women	39.44	75	52.59	25 (14.9)	132 (78.6)	11 (6.6)

*Statistically significant ($p < 0.05$)

3.4 Nutritional status of the respondent

As shown in Table 3, the majority (84.1 %, 85.1 %) of men and women respondents respectively had adequate intake of energy, inadequate intake of protein is higher in women respondents (32.7 %) than in male respondents (27.3 %). The micronutrient intake of the respondents revealed that 84.1 %, 93.2 %, and 81.8 % of the male respondents had adequate intakes of calcium, potassium, and vitamin C and 80.4 %, 91.1 % and 78.6 % of women also had adequate intake of calcium, potassium, and vitamin C. Vitamin A adequacy among the respondents is low as 29.2 and 27.3 % of women and men respectively had inadequate vitamin A intake. There was a significant difference between sex and nutrient adequacies of the respondents ($p < 0.05$).

3.5 Nutritional status of the respondent

Table 4 summarizes the food habits of the respondents. The result showed that more than half (58.0 %) practiced snacking. Half (50.0 %) of those surveyed respondents consumed three meals a day and 46 % consumed twice a day. More than half (62 %) skipped meals, and breakfast was the most skipped meal (32.0 %) by the respondents. The majority of respondents (78.0 %) do not consume lots of pastry foods while 30 % of the respondents do not consume fruit and vegetables.

Table 4. Food habits of the respondents (n=300)

Variable	Frequency	Percentage
Do you snack?		
- Yes	114	38.0
- No	174	58.0
- I don't know	12	4.0
How many times do you eat in a day?		
- Once	6	2.0
- Twice	138	46.0
- Thrice	150	50.0
- More than thrice	6	2.0
Do you skip meals?		
- Yes	186	62.0
- No	114	38.0

Table 4. (continued)

If "Yes" which of the meals, do you often skip?		
- Breakfast	96	32.0
- Lunch	66	22.0
- Dinner	24	8.0
- **Total**	**186**	**62.0**
Do you consume fruits and vegetables?		
- Yes	204	68.0
- No	90	30.0
- I don't know	6	2.0
Do you eat a lot of pastries?		
- Yes	66	22.0
- No	234	78.0

4 Discussion

The present study assessed the nutritional status and nutrient adequacy of foods consumed by non-academic staff in a Nigerian University. The anthropometric evaluation showed that several respondents were overweight and obese and intake of protein and vitamin A was insufficient among females compared to males. Eating habits also revealed that many respondents engaged in snacking, skipping meals, and not consuming fruits and vegetables. This suggests that there are poor eating habits and practices among non-academic staff in the Nigerian institution as evidenced by the considerable prevalence of overweight, obesity, and some nutrient deficiencies.

The mean age of men and women was 42 ± 8.0 years and 76.0 % of respondents were married. This implies that the majority of non-academic staff in the study population were females. This suggests that improved female labor force participation can significantly contribute to women's empowerment and economic development. This is consistent with the study of non-academic employees in Sri Lanka, where the average age of the males and females was 40 ± 9.8 years and 37 ± 9.8 years and 78.5 % were married [33]. However, Statista Research Department [34] reported that there are more male non-academic personnel in Nigerian Universities.

According to our study, more than half of the respondents were overweight and obese. This suggests that there is poor practice of healthy lifestyle and consumption patterns among non-academic staff in Nigerian institutions. Amoda et al. [9] study supports this claim that unhealthy dietary practices contribute to the prevalence of overweight and obesity among white-collar workers. An identical survey of staff at the Nigerian University of Calabar found that 55.1 % of respondents were overweight and obese [35]. Anoshirike et al. [11] in a study conducted in Enugu state also reported that 43.7 % of university staff were overweight and obese. The prevalence was higher among tertiary workers in southwestern Nigeria where 69.7 % were overweight and obese [36] but was lower among respondents in Ghana, where 43.4 % of non-academic staff were overweight and obese [1].

Adequate nutrition is essential for human development and promotes full lifelong learning capacities and adult productivity [37]. The result of this study revealed that although the majority of respondents consumed sufficient carbohydrates, fat, potassium, and calcium, there is still a considerable insufficient intake of protein, vitamin A, and vitamin C among the respondents. In a study conducted by Amoda et al. [9] among civil servants in Ogun State, majority of respondents were not meeting the requirement of vitamin A, vitamin C, calcium, and other essential micronutrients. This suggests that the majority of respondents consumed more high calorie foods and snacks and did not find time to select nutritious foods, fruits, and vegetables rich in micronutrients.

This study further reveals that both men and women surveyed and had adequate intake of energy (kcal), carbohydrate, and fat. A similar study among adults in Sri Lanka reported that the energy intake and carbohydrate intake were ~~found to be~~ adequate in both men and women [33]. There is a significant difference between these nutrient intakes and the sex of the respondents ($p < 0.05$). In addition, a study among older adults in rural communities in Ogun state reported inadequate energy and carbohydrate intake [38]. This may suggest that rural residents consume less energy and carbohydrate-dense foods than urban residents and university staff.

The high prevalence of overweight and obesity as well as the deficiencies in protein, vitamin C and vitamin A could be associated with the eating habits of the respondents, who revealed that several of them practiced snacking, skipped meals, and did not consume fruits and vegetables. Lima et al. [39] reported that 92.8 % of employees of the university of Porto preferred to have meals at their workplace resulting in high sugar intake and low intake of nutritious foods.

5 Conclusion

Findings from this study have shown that there is a high prevalence of overweight and obesity in addition to poor eating habits such as skipping meals, snacking, and low consumption of fruits and vegetables. Although more than half have adequate intake of energy, carbohydrates, protein, fat, and micronutrients, intake of protein, vitamins A and C

is considerably low compared to other nutrients and the RDA. It is therefore recommended that non-academic staff be made aware of the need for adequate nutrition as a prerequisite for achieving productivity. Institutions should put in place measures to improve their staff's access to nutritious meals in the workplace and also provide free access to periodic nutritional checks.

Strengths and Limitations of the Study

This descriptive cross-sectional study provided data on the nutritional status and nutrient adequacy of foods consumed by non-academic staff, an essential component of the nation's workforce. The results of this study could contribute to improving productivity at household, institutional and national levels by developing interventions aiming at improving food and nutrient intake, modifying nutrition-related lifestyle factors, and, therefore, improving the nutritional status of the population group.

However, when interpreting the study results, it is important to note that the adequacy of the macronutrients and some selected micronutrients, considered abundant and readily available in foods, were assessed. Furthermore, the study was conducted among the non-academic staff of a Nigerian university, and therefore, the results cannot be generalized to the entire university staff.

Funding: This research was self-funded by the authors. There was no grant or other form of external funding received for the purpose of this research.

Acknowledgements: The authors express gratitude to Management, staff and students of Federal University of Agriculture, Abeokuta for their support throughout the research.

Authors' Contribution: Study concept and design: OGS, ATO, OBR, and OOO; acquisition of data: All the authors participated in data acquisition; statistical analysis and interpretation of data: OGS, ATO, OOO, OBR, and OOE; drafting of the manuscript: OGS, OBR, OOE, ATO, and OOO; manuscript editing: OGS, OBR, OOE, ATO, and OOO; critical revision of the manuscript: OOO, OGS, OBR, and OOE; obtained funding: No external funding obtained, research is funded by the Authors; administrative, technical, or material support: OOO, OGS, OBR, OOE, and ATO

Conflicts of Interest: The authors declare that there is no competing interest.

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