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The nutrient intake spectrum: Analyzing the impact of gender and living arrangements in student's diets

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Abstract

Introduction: University students experience critical stages of growth while pursuing higher education, necessitating proper nourishment to support physical, mental, and cognitive health. However, maintaining a healthy diet is challenging due to various factors such as academic pressures, social obligations, financial constraints, and the availability of unhealthy food options. Prior research has often focused on specific aspects of student nutrition, overlooking the complex interplay of factors such as gender and living arrangements that significantly influence dietary choices.

Aim: This study aims to provide a comprehensive understanding of the factors affecting nutrient consumption among university students, considering the roles of gender and living arrangements, to inform targeted interventions for improving students' dietary behaviors.

Methods: A cross-sectional study involving 296 students from a public university in Bangladesh was conducted using stratified random sampling to ensure the representation of different residence types and genders. Data were collected via a semi-structured questionnaire and a validated 24-hour dietary recall. Nutrient intakes were calculated using the standardized food composition table of Bangladesh, and statistical analyses, including independent sample t-tests, were applied to assess the significance of differences in dietary intake.

Results: The study found variations in both macro and micronutrient intake based on living arrangements and gender. Male dormitory residents showed a higher intake of energy, while home-based female students consumed more calcium. Iron and copper intake was highest among male students living at home. Significant differences in nutrient intake were identified, highlighting the complex influence of living arrangements and gender on students' dietary choices.

Conclusion: Gender and living arrangements are pivotal in shaping the nutritional intake of university students. The study's findings emphasize the need for university administrators and policymakers to consider these factors when designing educational programs and meal plans to ensure they meet the diverse nutritional needs of the student population. Such targeted interventions could significantly enhance the dietary habits and overall health of students in university settings

Keywords: Nutrient intake; Students; Gender; Living Arrangements; Bangladesh

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1. Introduction

Students in universities are in a unique stage of life where they are going through significant physical and psychological growth in addition to receiving a higher education (Evans et al., 2009). To maintain the best possible physical, mental, and cognitive health during this period of transition, adequate nourishment is crucial (Ramstetter et al., 2010). A healthy diet can be difficult to maintain in the university setting because of the rigorous academic schedules, social obligations, and even financial limitations (Sogari et al., 2018). Excessive selections for fast food, cafeteria meals, and snack vending machines can further entice students to make unhealthful diet decisions (Mongiello et al., 2015). Although a lot of studies have been done on university students' eating habits, the scope of the studies has frequently been restricted (Kabir et al., 2018). Numerous research studies have focused on the incidence of eating disorders, obesity, or the use of food groups, such as sugary drinks or fast food (Bruening et al., 2014). While these studies offer insightful information, they frequently overlook the variety of factors contributing to student's dietary decisions (Deliens et al., 2014). The impact of variables like gender and living arrangements on food habits and nutritional intake has been extensively studied, yet these aspects have received less attention (Roos et al., 1998). An individual's dietary requirements and preferences are significantly influenced by their gender (Warde et al., 2004). Because of their physiological variations, men, and women have different daily calorie requirements, amounts of protein, and vital vitamins and minerals requirements are also distinguished (Seidler et al., 2013). Changes in hormones can also affect dietary preferences and the absorption of nutrients (Mann & Truswell, 2017). Furthermore, men and women typically must follow distinct eating habits due to social and cultural expectations (wood & Eagly, 2002). Men may choose foods higher in protein to gain muscle, whereas women may choose lower-calorie or "healthier" food options due to social constraints surrounding body appearance (Stibbe, 2004). Despite these variations, very little study has been done to examine how gender affects eating habits among university students thoroughly. Food preferences can also be greatly influenced by housing circumstances throughout one's time in college or university (Peattie, 2010). Students residing in dorms may be limited to the cafeteria food options, which differ greatly in terms of nutrition (Nelson and Story, 2009). Additionally, living in a community may encourage group eating habits that don't necessarily suit a person's tastes or nutritional requirements (Verpy et al., 2003). If a student lives at home, however, they might have better access to well-balanced, home-cooked meals, but they might also be impacted by the family's eating habits, which might or might not be good (Gallegos et al., 2011). Investigating how living circumstances affect university students' nutritional intake is crucial considering these dynamics. While living arrangements and gender both have an impact on food patterns, it's also important to consider how these two factors combine (Deliens et al., 2014). Men who live in dorms, for example, could eat differently from those who live at home because of convenience or peer pressure (Marquis, 2005). Likewise, women residing in residential halls could have unique obstacles such as restricted availability of wholesome food items that fulfill their health requirements (Marquis, 2005). Studies that have already been conducted rarely examine the combined effects of gender and living arrangements on food habits, despite the likely significance of these intersecting factors. Most prior studies have relied on self-reported data, which is susceptible to recall bias, such as food frequency questionnaires. Few studies accurately determine the nutritional health of university students by comprehensive procedures that not only include self-reported information but also direct observation. Furthermore, a large portion of the body of current research ignores the eating habits of students in diverse cultural and socioeconomic contexts in favor of concentrating on Western populations. Considering this, the goal of this study was to offer a thorough understanding of the variables affecting university students' nutrient consumption. The results of this study may have a significant impact on lawmakers, university administrators, medical experts, and even the students themselves. It might lead to the creation of focused educational initiatives to encourage healthy eating habits among student groups, or the refurbishment of university meal plans to accommodate a range of nutritional requirements.

2. Methodology

This was a cross-sectional study aimed at investigating the daily per capita intake of both macro and micronutrients among students living in dormitories and at home. Additionally, the study sought to examine how these nutritional intakes varied by gender. The study included a sample of 296 students from various academic disciplines of a selected public university in Bangladesh. Participants were selected using a stratified random sampling technique to ensure equal representation from both residence types—dormitories and homes. Out of the selected participants, 178 (60.3%) lived in dormitories, and 118 (39.7%) lived at home. The sample consisted of 169 males (57.0%) and 127 females (43.0%). Data was collected using a semi-structured questionnaire which included sections on demographic characteristics and a detailed 24-hour dietary recall. The 24-hour dietary recall was validated by expert dietitians and pre-tested before the study. Both macro and micronutrient intakes were calculated using the standardized food composition table of Bangladesh. Energy, protein, fat, carbohydrate, calcium, iron, copper, phosphorus, and various vitamins were among the assessed nutrients. Data were entered into a statistical software package for analysis. Descriptive statistics such as means and standard deviations were calculated for continuous variables. Independent

sample t-tests were performed to compare nutrient intake between different groups, and a p-value of less than 0.05 was considered statistically significant. The level of significance for each nutrient was categorized into either "significant" (S) or "not significant" (NS) based on the calculated p-value.

3. Results

Table 1 presents the background characteristics of 296 students, focusing on 'Residence' and 'Gender.' Most of the students live in dormitories (n=178, 60.3%), while 39.7% (n=118) live at home. In terms of gender, the sample includes more males (n=169, 57.0%) than females (n=127, 43.0%).

Table 1 Background characteristics of the students (n=296)

Characteristics	Frequency	Percentage
Residence		
Dormitories	178	60.3
Home	118	39.7
Gender		
Male	169	57.0
Female	127	43.0

Table 2 delves into the daily per capita intake of macronutrients among students, segmented by residence and gender. For dormitory residents, males have an average energy intake of 1826.9 ± 165.05 Kcal, while females have 1812.3 ± 204.26 Kcal; for home residents, males consume 1909.8 ± 105.81 Kcal and females 1777.0 ± 152.93 Kcal. In terms of carbohydrates, dormitory males and females consume an average of 275.40 ± 22.74 grams and 270.22 ± 22.51 grams, respectively, while home males have the highest at 299.79 ± 24.13 grams and home females the lowest at 251.14 ± 26.10 grams. Protein intake is consistent across groups: dormitory males at 56.42 ± 6.97 grams, dormitory females at 56.26 ± 9.05 grams, home males at 58.40 ± 7.69 grams, and home females at 58.69 ± 6.85 grams. For fat intake, dormitory females consume the most at 57.31 ± 16.52 grams, while home females are close behind at 59.47 ± 7.15 grams, and males from both residences consume less, with dormitory males at 55.26 ± 9.79 grams and home males at 52.71 ± 7.79 grams.

Table 2 Daily per capita intake of macronutrients among the students (Dormitories and Home residents)

Variables	Mean ± SD			
	Dormitory		Home	
	Male	Female	Male	Female
Average energy intake Kcal/ person/ day	1826.9 ± 165.05	1812.3 ± 204.26	1909.8 ± 105.81	1777.0 ± 152.93
Average carbohydrate intake gram/ person/ day	275.40 ± 22.74	270.22 ± 22.51	299.79 ± 24.13	251.14 ± 26.10
Average protein intake gram/ person/ day	56.42 ± 6.97	56.26 ± 9.05	58.40 ± 7.69	58.69 ± 6.85
Average fat intake gram/ person/ day	55.26 ± 9.79	57.31 ± 16.52	52.71 ± 7.79	59.47 ± 7.15

Table 3 provides an in-depth analysis of the daily per capita intake of various micronutrients among students, categorized by both residence and gender. Starting with calcium, dormitory-residing males report the highest average daily intake at 348.48 ± 134.53 mg, which contrasts sharply with dormitory-residing females who consume significantly less at 272.74 ± 147.05 mg. Interestingly, females living at home show the highest calcium intake, averaging 376.08 ± 134.67 mg, while their male counterparts average 293.93 ± 93.25 mg. When it comes to iron, dormitory-residing males lead with an average intake of 13.99 ± 4.29 mg per day, with all other groups averaging between 10.55 to 12.30 mg. For copper intake, males living at home consume the most at 5473.3 ± 943.97 mg, significantly higher than the 3433.1 ± 1384.67 mg consumed by dormitory-residing females, who have the lowest average. Phosphorus levels are relatively

balanced across the groups, with dormitory-residing females slightly leading at 728.39 ± 194.53 mg. In the category of Vitamin C, females have a noticeably higher intake, with dormitory-residing females averaging 39.38 ± 25.25 mg. Thiamin, Riboflavin, and Niacin intakes show minimal variances but are generally slightly higher among males, particularly those living in dormitories.

Table 3 Daily per capita intake of micronutrients among the students (Dormitories and Home residents)

Variables	Mean ± SD			
	Dormitory		Home	
	Male	Female	Male	Female
Average calcium intake mg/ person/ day	348.48 ± 134.53	272.74 ± 147.05	293.93 ± 93.25	376.08 ± 134.67
Average iron intake mg/ person/ day	13.99 ± 4.29	10.55 ± 2.96	12.05 ± 4.80	12.30 ± 5.24
Average copper intake mg/ person/ day	5209.4 ± 1269.29	3433.1 ± 1384.67	5473.3 ± 943.97	4587.4 ± 1229.73
Average phosphorus intake mg/ person/ day	593.71 ± 87.32	728.39 ± 194.53	669.62 ± 93.12	709.22 ± 99.44
Average Vit- C intake mg/ person/ day	22.74 ± 10.81	39.38 ± 25.25	22.76 ± 10.82	35.46 ± 12.63
Average Thiamin intake mg/ person/ day	0.8645 ± 0.114	0.8113 ± 0.133	0.8296 ± 0.058	0.8153 ± 0.126
Average Riboflavin intake mg/ person/ day	0.7036 ± 0.144	0.6051 ± 0.120	0.7822 ± 0.169	0.6695 ± 0.179
Average Niacin intake mg/ person/ day	13.44 ± 2.34	11.91 ± 1.91	13.15 ± 1.78	12.92 ± 2.47

Table 4 delves into a comparison of 24-hour calorie and macronutrient intake based on a recall from the day before the observation day, categorizing data by students' living arrangements—either dormitory or home. For energy intake in Kcal, there is minimal difference between the two groups: dormitory residents consume an average of 1820.9 Kcal while home residents consume slightly more at 1848.4 Kcal, with a p-value of 0.084 indicating no significant difference (NS). However, when it comes to carbohydrates, there is a strikingly significant difference between the two groups, evidenced by a p-value of 0.000 and denoted as significant (S). Dormitory residents consume an average of 273.2 grams, while those living at home consume 277.3 grams. Protein intake shows no significant difference between the two groups, with dormitory and home residents consuming 56.35 grams and 58.54 grams, respectively, supported by a p-value of 0.098 (NS). Interestingly, fat intake, while appearing similar at 56.10 grams for dormitory residents and 55.83 grams for home residents, is statistically significant with a p-value of 0.004 (S).

Table 4 Comparison of 24 hours calorie and macronutrient intake (Recall of the day before observation day)

Nutrients	24 hours mean intake			
	Dormitory	Home	p-value	Level of significance
Energy (Kcal)	1820.9	1848.4	0.084	NS
Carbohydrate(g)	273.2	277.3	0.000	S
Protein(g)	56.35	58.54	0.098	NS
Fat(g)	56.10	55.83	0.004	S

Table 5 offers a comprehensive analysis of the 24-hour mean intake of various micronutrients among students, as recalled from the day before the observation, segmented by their living arrangements—dormitory or home. For calcium, there is a statistically significant difference, indicated by a p-value of 0.000, with home residents consuming an average of 331.9 mg as compared to 317.5 mg in dormitory residents. Iron intake also shows statistical significance with a p-value of 0.018; however, the intake levels are closely matched at 12.5 mg for dormitory residents and 12.1 mg for home residents. A notable disparity is observed in copper intake, where home residents consume substantially more at 5000.1 mg, compared to 4400.6 mg among dormitory residents, with a p-value of 0.002. Phosphorus intake also shows a significant difference, with home residents consuming more at 687.9 mg compared to 648.7 mg for dormitory residents, corroborated by a p-value of 0.001. Vitamin C intake is statistically significant but practically similar, with dormitory residents consuming 29.5 mg and home residents 28.6 mg, backed by a p-value of 0.003. Thiamine and Riboflavin intakes are both statistically significant with p-values of 0.017 and 0.021, respectively, although the actual differences are subtle. Niacin is the only nutrient showing no statistical significance, with a p-value of 0.078 and intakes of 12.8 mg for dormitory residents and 13 mg for home residents.

Table 5 Comparison of micronutrient intake (Recall of the day before observation day)

Nutrients	**24 hours mean intake**			
	Dormitory	**Home**	**p-value**	**Level of significance**
Calcium(mg)	317.5	331.9	0.000	S
Iron(mg)	12.5	12.1	0.018	S
Copper(mg)	4400.6	5000.1	0.002	S
Phosphorus(mg)	648.7	687.9	0.001	S
Vitamin- C(mg)	29.5	28.6	0.003	S
Thiamine(mg)	0.84	0.82	0.017	S
Riboflavin(mg)	0.66	0.73	0.021	S
Niacin(mg)	12.8	13	0.078	NS

4. Discussion

The study findings show that most of the students in the sample reside in dormitories (60.3%) and are male (57%). A study conducted by Dizaj et al. (2022) also found that most university students prefer dormitory living, but their study had a more balanced gender distribution. The predominance of males in this study could be a variable to consider in future research.

In this study, energy intake was higher among home-residing males compared to dormitory males and females, which resonates with the findings of Li and O'Connell (2012) who reported a tendency for higher caloric intake in domestic settings due to increased availability of high-calorie foods. Carbohydrate intake was also found to be significantly higher among home residents, which could be related to home-cooked meals, supporting the findings of Kremmyda et al. (2008). Notably, protein intake across groups was consistent, suggesting a common dietary pattern among students irrespective of gender or residence, a finding also supported by El Ansari et al. (2012). In terms of micronutrients, this study revealed interesting variations. For calcium, females living at home reported the highest intake levels, while dormitory-residing females reported the lowest, a pattern that contrasts with Alves & Boog (2007) who found higher calcium intake among dormitory residents due to milk-based cafeteria options. Iron intake was highest among dormitory-residing males, aligning with Sprake et al. (2018) who related this trend to higher consumption of red meat in male students. Copper intake was significantly higher among males living at home, which could be attributed to specific dietary habits or food availability. These variations emphasize the need for customized nutritional interventions based on both gender and residential status. The p-values reported for differences in macronutrients and micronutrients between dormitory and home residents show that carbohydrates, fat, calcium, iron, copper, and phosphorus intakes are significantly different. This statistical evidence is crucial for designing targeted nutritional interventions. However, it's important to remember that statistical significance does not always equate to clinical significance. This study is limited by its cross-sectional design and the 24-hour recall method, which may not capture habitual intake. Future studies could utilize larger sample sizes and multiple dietary recalls for better accuracy.

5. Conclusion

In conclusion, this study offers valuable insights into the differing nutritional patterns among students based on residence and gender. Home-based students consume more carbohydrates, whereas dorm-based students lack essential micronutrients like calcium and iron. These variances aren't merely academic; they highlight areas for targeted nutritional interventions and have broad implications for public health and educational policy. While the current study focuses on quantitative data, future research should explore the qualitative factors behind these differences, such as food availability and peer influence. This foundational research opens avenues for more context-specific dietary guidelines and serves as a cornerstone for stakeholders aiming to foster healthier lifestyles among students.

Compliance with ethical standards

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Consent for publication

All authors have given their consent to publish this article.

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