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Prevalence and correlates of food insecurity among Lebanese University students of Hadath Campus

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ABSTRACT

Objectives: The purpose of this study was to estimate the prevalence of food insecurity among Lebanese University (Hadath Campus) students and examine its association with demographic characteristics, academic performance, body mass index (BMI), and household monthly income.

Methods: A total of 755 participants that studied at Hadath Campus of Lebanese University were recruited for this study. The prevalence of food insecurity was assessed using a validated scale of 7 items: Arabic Family Food Security Scale (AFFSS).

Findings: Responses to the AFFSS indicated that 8.9% of students were food insecure, among which 7.5% and 1.4% were respectively moderately and severely food insecure. Also, 91.1% were food secure. Food security status was significantly associated with age ($p=0.001$), family monthly allowance ($p<0.001$), weight ($p=0.023$), faculty ($p=0.009$) and BMI ($p=0.04$).

Conclusion: The prevalence of food-insecure students was approximately 9% in the sample. Further studies are needed to measure food insecurity among Lebanese University students across the rest of the campuses in order to have enough evidence regarding the food insecurity level. Moreover, policies and programs must address food insecurity levels among students to ensure that all the resources are available for these students to succeed.

KEYWORDS: Food Insecurity; University Students; Food Security Scale.

1. INTRODUCTION

The United States Department of Agriculture (USDA) defines food insecurity by limited access to both safe and nutritious food intake [1]. Food insecurity is becoming a global concern affecting both physical and mental health [2]. Worldwide, from 800 million to 1.2 billion people have been both

hungry and malnourished over the last 40 years. Indeed, more than 10 million people die of hunger and hunger-related disease every year [3]. Furthermore, in 2018, more than 700 million people in the world had reached the severe level of food insecurity and about 1.3 billion people had been moderately food insecure [4]. The numbers escalated in 2019, with about 2 billion people having a moderate to severe food insecurity level, which affects their nutrition status and health [5].

Moreover, previous research show that food insecurity, especially in the Middle East, is a real challenge across the region. Food insecurity becomes a more threatening issue in Lebanon due to its political precariousness and various economic system disturbances [6]. This, in turn, will lead to market access disruption and product prices elevation, which will eventually result in food insecurity, being a cycle in which each factor affects each other [7].

Food insecurity has several negative consequences on the human body at all ages. Some studies have found that food insecurity is related to birth defect, poor child growth, micro-nutrient deficiency, obesity, anxiety and other problems [8]. Furthermore, food insecure women have shown to have higher rates of gestational diabetes, type 2 diabetes, obesity and cardiovascular problems [9]. On the other hand, food insecure children have a higher probability of developing anemia, behavioral problems, aggressiveness and oral health problems [10]. Several studies supported that food insecurity may lead to the substitution of nutritious food options by unhealthy ones, which leads to a decrease in diet diversity, variety and healthy eating index scores [11]. Besides, previous literature has shown that preschool children who have low Healthy Eating Index (HEI) scores are more likely to experience dental caries leading to infections, nutritional deficiencies and education and speech problems [12].

Therefore, the objective of the present study was to estimate the prevalence of food insecurity among Lebanese University students of Hadath Campus and to examine the association between food insecurity, demographic characteristics, academic performance (Grade Point Average: GPA), body mass index (BMI) and household monthly income.

2. METHODS

2.1. Sample size

A random sample of 755 students, providing 95 % confidence interval around food security prevalence, met the inclusion criteria, being representative of Lebanese university students of Hadath Campus, based on the statistical software for epidemiology Epi Info (Population size 19900, design effect 1, confidence interval 95%, absolute precision 3.5%).

2.2. Study and questionnaire design

The study is a cross-sectional study carried out on 755 students of the Lebanese university Hadath Campus. The students recruited were only Lebanese students aged ≥ 17 years old and were studying in the Lebanese University Hadath Campus. The data was collected using the Arabic Family Food Security Scale (AFFSS), a previously validated food security questionnaire on Lebanese population [13]. The questionnaire included 2 sections: a socio-demographic one and a food security level evaluation. It needed only 10 minutes to be completed. The socio-demographic characteristics included in this analysis were: sex, age, place of birth, current living address (living on or off campus), family income, faculty, domain, height, weight and academic performance. Food security level was assessed using the validated 7 item AFFSS, which has good internal validity and reliability with item in-fits from 0.73 to 1.16 [13]. The questionnaire was scored from 0 to 7 based on the specific coding (Table 1) and Food security status score was assigned as follows: Score 0-2—High food security; Score 3-5—Low food security; Score 6-7—Very low food security.

Table 1. Arabic Family Food Security Scale

	Question	Response	Points
1-	Which of these statements best describes the food eaten in your household in the last 12 months?	• Enough of the kinds of food we want to eat • Enough but not always the kinds of food we want • Sometimes not enough to eat • Often not enough to eat • DK or Refused	• 0 • 1 • 1 • 1 • 0
2-	In the last 12 months "I worried whether my food would run out before I got money to buy more".	• Yes* • No	• 1 • 0
3-	In the last 12 months "The food that I bought just didn't last, and I didn't have money to get more."	• Yes* • No	• 1 • 0
4-	In the last 12 months "I couldn't afford to eat balanced meals."	• Yes* • No	• 1 • 0
5-	In the last 12 months did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?	• Yes* • No	• 1 • 0
6-	In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?	• Yes* • No	• 1 • 0
7-	In the last 12 months, did (you/you or other adults in your household) ever not eat for a whole day because there wasn't enough money for food?	• Yes* • No	• 1 • 0

Yes includes 'yes, almost every month', 'yes, in some months but not every month', 'yes, only in 1 or 2 months , "often" or "sometimes"*

2.3. Data collection

The questionnaires were self-administered and the weight was measured for each student using a calibrated scale by two researchers (dietitians) in each faculty of the Hadath Campus, from the first of December 2019 till the middle of February 2020. Before administration, the objectives of the study were briefly explained to the students and oral consent was taken. However, due to COVID-19 pandemic and the closure of the universities, the questionnaires had to be filled online, from the beginning of March 2020 till the end of April 2020, and the weight was self-reported during that period in order to reach the sample size required. Whereas, height and GPA were self-reported from the beginning.

2.4. Statistical analyses

The data were analyzed using SPSS software (Statistical Package for the Social Sciences, version 22.0). Descriptive statistics, Chi-Square analyses, and t-tests were used for data analysis. Binary logistic regression was used to identify factors that were mostly associated with food insecurity. Knowing that, only the previously identified significant factors were entered to the model. The statistical significance was set at a P-value of <0.05.

3. RESULTS

3.1. Participants' characteristics

A total of 755 students from all the 9 faculties of the Lebanese university Hadath Campus completed the survey. The majority of the students were females (73.50%) with an average age of 20.64 ± 2.52 years. The sample average height was 167.25 ± 91.31 cm and the average weight 63.78 ± 15.26 kg. Most of the participants were living off-campus (74.70%) and had a family monthly allowance ≥ 1,000,000 LBP (65.20%). Around 69% had a normal body weight based on USDA BMI classification [14]. The students' average academic performance (GPA) was 63.99 ± 17.69 % and most of them (62.9%) were majoring in non-medical specialties like law and politics, general science, management and administration, engineering and fine art) (Table 2).

Table 2. Descriptive characteristics of the Lebanese University students of Hadath Campus (n=755)

Categories	Subcategories	n (%)	Mean ± SD	Min - Max
Gender	Males	200 (26.5)		
	Females	555 (73.5)		
Age (years)			20.64 ± 2.52	17-40
Place of residence	On campus	190 (25.2)		
	Off campus	564 (74.7)		
Monthly allowance (LBP)	< 500,000	42 (5.6)		
	500,000-999,000	212 (28.1)		
	≥ 1,000,000	492 (65.2)		
Height (cm)			167.25 ± 91.31	140-200
Weight (kg)			63.78 ± 15.26	36-180
BMI (Kg/m^2)	Underweight	70 (9.3)		
	Normal	520 (69.0)		
	Overweight	120 (15.9)		
	Obese	44 (5.8)		
Faculty	Medical	280 (37.1)		
	Non-medical	475 (62.9)		
GPA			63.99 ± 17.69	1-100
Birth Governorate	Beirut	200 (26.6)		
	Mount Lebanon	257 (34.2)		
	North	33 (4.4)		
	South	96 (12.8)		
	Bekaa	43 (5.7)		
	Nabatiyeh	48 (6.4)		
	Baalbeck-Hermel	57 (7.6)		
	Akkar	18 (2.4)		

*BMI: Body Mass Index. GPA: Grade Point Average (academic performance). * p<0.05*

3.2. Prevalence of food insecurity

Responses to the AFFSS indicated that 67 students (8.9%) were food insecure whereas 688 (91.1%) were food secure. Among the food insecure students, 57 (7.5%) were moderately food insecure and 10 (1.4%) were severely food insecure (Figure 1).

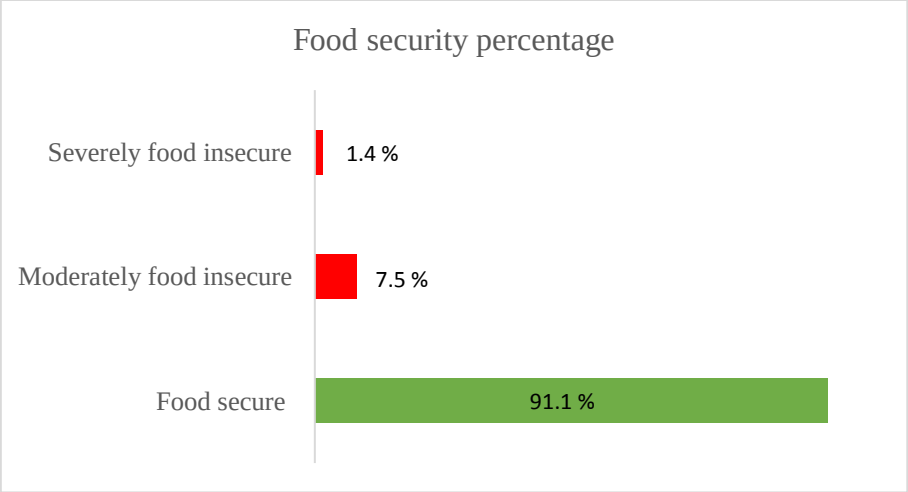

Figure 1. Prevalence of food insecurity among the Lebanese University students of Hadath Campus

3.3. Associations between students socio-demographic characteristics and food security status

Descriptive characteristics of the sample by food security status and the association between food security status and socio-demographic characteristics are reported in Tables 3 and 4. Using the chi-square test and t-tests for categorical and continuous variables respectively, food security status was significantly associated with age (p=0.001), family monthly allowance (p<0.001), weight (p=0.023), faculty (p=0.009) and BMI (p=0.04). However, it was not associated with gender (p=0.128), residency (living on or off campus) (p= 0.578), height (p=0.182), GPA (p=0.75) and place of birth (p=0.316) (Table 3).

Table 3. Association between sociodemographic characteristics and food insecurity among the Lebanese University students of Hadath Campus (n=755)

		Food secure students (n=688) [a]	**Food insecure students (n=67) [b]**	**p value**
Gender	Male	177 (25.7)	23 (34.3)	0.128
	Female	511 (74.3)	44 (65.7)	
Age (years)		20.54 ± 2.48	21.61 ± 2.73	0.001*
Place of residence	On campus	175 (25.5)	15 (22.4)	0.578
	Off campus	12 (74.5)	52 (77.6)	
Family monthly income (LBP)	< 500,000	29 (4.3)	13 (19.4)	<0.001*
	500,000-999,000	186 (27.4)	26 (38.8)	
	≥ 1,000,000	464 (68.2)	28 (41.8)	
Height		167.11 ± 9.09	168.7 ± 11.3	0.182
Weight (kg)		63.39 ± 14.97	67.83 ± 17.6	0.023*
Faculty	Medical	265 (38.5)	15 (22.4)	0.009*
	Non-medical	423 (61.5)	52 (77.6)	

GPA		64.05 ± 17.62	63.33 ±18.45	0.75
BMI (Kg/m^2)	Underweight	65 (9.5)	5 (7.5)	0.04*
	Normal weight	475 (69.1)	45 (67.2)	
	Overweight	112 (16.3)	8 (11.9)	
	Obese	35 (5.1)	9 (13.4)	
Birth Governorate	Beirut	179 (26.1)	21 (31.3)	0.316
	Mount Lebanon	241 (35.2)	16 (23.9)	
	North	28 (4.1)	5 (7.5)	
	South	86 (12.6)	10 (14.9)	
	Bekaa	39 (5.7)	4 (6.0)	
	Nabatiyeh	46 (6.7)	2 (3.0)	
	Baalbeck-Hermel	49 (7.2)	8 (11.9)	
	Akkar	17 (2.5)	1 (1.5)	

[a] High food security, score from 0 to 2. [b] Low & very low food security, score from 3 to 7.
*Values are n (%) or mean ± SD. * p<0.05. BMI: Body Mass Index. GPA: Grade Point Average (academic performance).*

Factors associated with food insecurity are reported in Table 4. Logistic regression shows that only age and family monthly income are still significant. The model showed that as age (years) increases by 1 unit, food insecurity status increases by 0.873 (OR=O.873; CI 0.800-0.954; p=0.003). Furthermore, university students who had family allowance ≤500,000 LBP and between 500,000-900,000 LBP had higher odds of food insecurity (OR=0.118; 95% CI 0.053-0.263; p=<0.001, OR=0.401; 95% CI 0.223-0.720; p<0.002) than students with family allowance ≥1,000,000 LBP. Associations of food insecurity with weight, BMI, and faculty were not significant.

Table 4. Factors associated with food insecurity among Lebanese University students of Hadath Campus

		OR	**95% CI**	**p value**
Age		0.873	0.800-0.954	0.003*
Family monthly allowance (LBP) (ref.= ≥ 1,000,000)	≤ 500,000	0.118	0.053-0.263	<0.001*
	500,000-900,000	0.401	0.223-0.720	<0.002*
Weight		0.991	0.967-1.016	0.495
BMI (ref.=Obese)	Underweight	2.394	0.384-14.93	0.350
	Normal	1.913	0.502-7.301	0.342
	Overweight	2.761	0.794-9.599	0.110
Faculty (ref.= Medical)	Non-medical	0.556	0.298-1.038	0.065

*Ref: reference. * p<0.05*

4. DISCUSSION

In this study, 8.9% of the students were found to be food insecure. In comparison with previous studies carried out on university students, the prevalence of food insecurity among our sample was

lower. Indeed, studies done by McArthur et al, Breuning et al, and Raskind et al, on Appalachia, Georgia and US public university students respectively, found that food insecurity was more prevalent than in the present study (46.2%, 32% and 29%) [15,16,17]. Our results are similar to the studies of El Zein et al. [18] and Payne-Sturges [2], carried out on university students of the US, in which there was a prevalence of food insecurity of 15% and 19% respectively. These results contrast with the high percentages of food insecurity found among university students of Nigeria (80.7%) and Australia (48%), in which most students were severely food insecure [19,20].

The findings of this study show that food insecurity is significantly associated with age, family monthly allowance (income), faculty, weight, and BMI. Contrary to our study, in studies done on Georgia and Southeast Nigeria university students age was not associated with food insecurity [16,19]. Regarding monthly income, our results are similar to other studies carried out in Nigeria and US, which indicated that students with lower monthly income had higher odds of food insecurity [19,21]. Similar to our study, many other authors showed that there is a significant association between body weight, BMI, and food insecurity, indicating that food insecure students have a higher percentage of obesity and a higher average body weight than food secure ones [6,7,15,19,21-23]. In contrast, other studies found that neither body weight nor BMI were associated with food security status [17,24,25].

Moreover, our study shows that food insecurity is not associated with GPA, gender, height, place of birth and place of residence. In contrast, in other studies, GPA and food insecurity are significantly negatively associated, with food-insecure students having lower reported GPA, attention rate in class and understanding of lessons concepts. This could be due to the beneficial effect of nutritious food on memory and concentration [15,18,26]. Also, McArthur et al [13] found that food insecurity is higher in male students than in female students ($p<0.001$). Nonetheless, Gregório et al [17] show that the percentage of food insecurity is higher in females. Concerning place of residence, in our study there was no association with food insecurity, but some previous studies found that living on campus is associated with food insecurity. In other words, most of the food insecure students are those that live on campus and far away from their families [20]. However, there are also some studies that have reported higher food insecurity in students living off-campus ($p=0.0269$) [26].

Finally, this study found that family monthly allowance and age are the most important factors regarding food insecurity. Students who had lower monthly allowance had higher odds of food insecurity. These results are similar to other studies that were conducted in Nigeria and US [19,21]. This association could be explained by the fact that the students who have lower monthly allowance have lower food choices and lower ability to pay for nutritious food.

The main strength of this study is the fact that it is the first study that have documented food insecurity levels and its correlates among university students in Lebanon. Besides, this study is based on a diverse and representative sample (n=755) of the Lebanese University students of Hadath Campus.

However, the results of the present study should be interpreted in light of its limitations. First, this is a cross-sectional study, which limits the ability to conclude the causes and effects of food insecurity. Second, height and weight were self-reported in the questionnaires that were filled online (477 of the students were weighed using a calibrated scale but, due to the presence of corona-virus disease, the rest of the students self-reported their weight through an online questionnaire). Therefore, the BMI of the students who self-reported weight and height might be underestimated or overestimated. Third, the GPA was self-reported by the students and this might affect its significance regarding food security status. Fourth, this study is only representative of the Lebanese University students of the Hadath Campus and not of all the Lebanese University students. Fifth, the questionnaire used for food insecurity is for a 12-month reference period and this could have led to recall bias. Finally, the low prevalence of food insecurity might be due to the cultural shame associated with low economic status and poor nutrition intake.

5. CONCLUSIONS

The prevalence of food insecurity among Lebanese university students of Hadath Campus is approximately 9%, with 1.4% of students being severely food insecure. Food insecurity is significantly associated with age, family monthly allowance (income), faculty, weight and BMI. These results indicate that food insecurity is multidimensional. In consequence, it is necessary that governments consider these results to develop adequate strategies to reduce food insecurity and to prevent foodborne illnesses [27]. Some possible strategies would be to improve and sustain the agricultural sector, to reduce food wastage, to apply food and nutrition policies, to encourage education and to support refugees. Also, maintaining gender equality and empowering women will positively affect household food and nutrition security level. Further studies are needed to measure food insecurity among Lebanese University students of all the other campuses in order to have enough evidence regarding their food insecurity level. In addition, a longitudinal study should be conducted to examine the impact and causes of food insecurity among the students.

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AUTHOR CONTRIBUTIONS

KF and DB collected the data, analyzed the data and drafted the manuscript. MAH and MH revised and corrected the manuscript.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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