

Food insecurity and financial aid among university students: Pre-Covid-19 scenario of a public university in southeastern Brazil

Insegurança alimentar de estudantes universitários e permanência estudantil: cenário pré-Covid-19 em uma universidade pública no sudeste do Brasil

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ABSTRACT

Objective

To estimate the prevalence of food insecurity among beneficiary and non-beneficiary university students of financial aid and associated factors.

Methods

A cross-sectional study, with a probabilistic sample of 100 university students, was conducted at a federal university located on the coastal city of *São Paulo* in southeastern Brazil. The data made it possible to address sociodemographic aspects, food security and food quality markers. Data analysis involved descriptive statistics, Fisher's exact association test and Mann-Whitney comparisons of means were used to investigate the prevalence of food insecurity between groups and associations with covariables at 5%.

Results

The results revealed significant differences between groups. Receiving financial aid was associated with more vulnerability to facing food insecurity: 94% have some level of food insecurity ($p=0.001$); non-white skin color ($p=0.019$); overseeing

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Support: *Conselho Nacional de Desenvolvimento Científico e Tecnológico* (CNPq) (Edital nº 0012, 2017/2018).

How to cite this article

Angotti AA, Zangirolani LTO. Food insecurity and financial aid among university students: Pre-Covid-19 scenario of a public university in southeastern Brazil. *Rev Nutr.* 2022;35:e220061. <https://doi.org/10.1590/1678-9865202235e220061>

one's own income ($p=0.001$); the amount of money available to stay at the university ($p=0.030$). According to food quality markers, both groups often consumed ultra-processed foods (unhealthy quality marker). In contrast, most (92.3%) were concerned with consuming healthy foods.

Conclusion

The pre-Covid-19 scenario reveals that despite receiving financial aid, a large part of students faced food insecurity in the three months prior to the study. Therefore, food insecurity should be recognized as a public health concern among university students, and adequate resources should be made available to avoid the occurrence of dropouts and assist in breaking the intergenerational cycle of social exclusion and the human right to food.

Keywords: Fellowships and scholarships. Food insecurity. Food security. Students.

RESUMO

Objetivo

Estimar a prevalência de Insegurança Alimentar entre estudantes universitários que recebem ou não Auxílio Permanência Estudantil e fatores associados.

Métodos

Estudo transversal exploratório, conduzido com amostra probabilística de 100 estudantes de uma universidade federal brasileira, situada no litoral paulista, na região sudeste do Brasil. Os dados coletados permitiram abordar aspectos sociodemográficos, de segurança alimentar e marcadores de qualidade alimentar. Conduziu-se análises descritivas, teste de associação Exato de Fisher e comparação de médias Mann-Whitney, para descrever a prevalência de insegurança alimentar entre bolsistas e não bolsistas e fatores associados a 5%.

Resultados

Os resultados mostram que o grupo de estudantes bolsistas é mais vulnerável e significativamente associado ao enfrentamento da insegurança alimentar - 94% dos bolsistas em algum nível de insegurança alimentar ($p=0.001$), à não ser branco ($p=0.019$), ao grau de escolaridade dos pais ($p=0.001$), a ser o principal responsável pela própria renda ($p=0.001$) e ao valor disponível para se manter na universidade ($p=0.030$). Ambos os grupos consomem alimentos ultraprocessados com frequência, por outro lado, a maioria deles (92,3%) se preocupa em consumir alimentos saudáveis.

Conclusão

O cenário pré Covid-19, revela que mesmo recebendo o auxílio, a maioria dos universitários enfrentou insegurança alimentar nos 3 meses anteriores à pesquisa. Portanto, a insegurança alimentar deve ser reconhecida como um problema de saúde pública entre universitários, ganhar espaço na agenda pública brasileira e recursos suficientes para evitar a ocorrência da evasão escolar, promovendo a quebra do ciclo intergeracional de exclusão social e o direito humano à alimentação.

Palavras-chave: Bolsa de estudo. Insegurança alimentar. Segurança alimentar. Estudantes.

INTRODUCTION

According to the 2020 report from the Food and Agriculture Organization, an estimated 8.9% of the world population suffered from hunger in 2019 [1]. Latin America and the Caribbean are among the most vulnerable regions, where food insecurity rates rose quickly from 22.9% in 2014 to 31.7% in 2019, and are expected to increase another 2.0% by 2030. The main factors related to food insecurity in the region are being female, having many children in the family, low income, and place of residence [2]. Specifically, in Brazil, the Covid-19 pandemic is yet another element that can increase hunger and food insecurity in the country [3].

As stated by Food and Agriculture Organization [1], “[...] a person is food insecure when they do not have regular access to sufficient safe and nutritious food for normal growth and development and an active and healthy life. This could be due to unavailability of food and/or lack of resources to obtain food”. The international literature points to university students as a population highly vulnerable to Food Insecurity (FI). The most comprehensive scoping review in the current literature produced on FI estimated 41% rate among

American university students [4]. This estimate is compatible with that reported in a systematic review, which found 35 to 42% average rates in grey and peer-reviewed literature, respectively [5]. An online cross-sectional study conducted at an Australian university in 2017-2018 found a 48% FI rate [6]. A multicenter study conducted at four universities in the state of Illinois, USA, found a 35% FI rate among students, and a study conducted in the state of North Carolina, USA, found a 46.2% rate among university students [7,8].

Different studies report the following risk factors for FI among university students: limited budget or financial dependence; increase in the cost of a university education; expenditures on housing outside the parental home; increase in dependence on credit cards and loans; ineligibility for federal food assistance programs; and non-development of money management skills [5,6,9]. These studies also report associations between FI and other adverse conditions, such as precarious health and poor academic performance.

In Brazil, education has been recognized as a right regulated by the state since the 1930s. Laws and decrees have since been created to ensure benefits that aid students in situations of vulnerability. With the promulgation of Federal Constitution in 1988, institutions were created to regulate student access to financial aid, and the Brazilian National Student Aid Plan was created only in 2010, which ensures access to higher education to socially vulnerable students in the country [10].

A study conducted at a public university in the state of *São Paulo* revealed that 75.0% of financial aid beneficiaries considered the amount insufficient to stay at the university. The majority (54.1%) required support from the family, others worked at informal "under-the-table" jobs (18.7%) and some received donations (4.1%) or had formal employment (2.4%) [11].

Besides the high prevalence of FI among university students, studies state that FI and its consequences, such as its effect on academic performance, are urgent issues that deserve a more in-depth investigation [4-6,9]. As FI among university students is a public health concern, and considering the scarcity of Brazilian studies on this issue, the present investigation aimed to estimate the prevalence of FI among university students who receive and do not receive financial aid and associated factors in the pre-Covid-19 scenario.

METHODS

A cross-sectional study was conducted at a Brazilian federal university [12], in 2018, in the campus of *Universidade Federal de São Paulo* (Federal University of São Paulo), in the coastal city of *São Paulo* state, southeastern Brazil, which has the third highest gross domestic product in the state and is home to the largest port complex in Latin America [13].

University students, except for freshmen, were included and divided into two groups: those who received financial aid and those who did not receive financial aid.

Sample size was calculated considering the response variable to be FI, a test power higher than 0.8 and a significance level lower than 0.05. A minimum of 30 students was determined for each group.

Three data collection instruments were used to achieve the objectives: a sociodemographic questionnaire; the Brazilian Food Insecurity Scale; and a questionnaire addressing food quality markers [14]. All instruments were made available online so that as many students as possible could fill in the forms.

The sociodemographic questionnaire was used to determine student profile with regard to sex, ethnicity/skin color, age, monthly income available for staying at the university, person in charge of the income, housing situation, having children (yes or no), work (yes or no), parents' education and other information related to receiving financial aid and the undergraduate course.

The Brazilian Food Insecurity Scale (BFIS) was used to investigate students' perception of FI [14]. In a previous study, Gwacela *et al.* [15] used the Household Food Insecurity Access Scale – the questionnaire from which the BFIS was adapted to the Brazilian population – adjusted for use at the individual level, as both the Household Food Insecurity Access Scale and BFIS were designed to investigate FI at the household level. Thus, the BFIS was also adapted to the individual level, followed by a pilot study, the results of which revealed no problems with understanding or erroneous interpretations of the adapted items. The scale presented 8 (for those who do not have underage dependents) or 14 claims (for those who have underage dependents), and the respondent must answer 'yes' or 'no' to the sentence, agreeing or not with that statement. The score can vary from 1 to 8 or 1 to 14, respectively, determining the level of FI [14,16].

A questionnaire addressing food quality markers was developed and tested for the qualitative assessment of eating habits. This questionnaire was based on the NOVA classification proposed by Monteiro *et al.* [17]. Volunteers were asked about their cooking habits and food choices. Some examples of foods were grouped according to the NOVA classification. University students should mention how many times they had eaten those foods or similar in the last week; they could also include other usual foods and these were included in the last version, after the pilot test. The Dietary Guide for the Brazilian Population was used as reference to group foods and thus qualify consumption, which recommends giving preferences to whole or minimally processed foods and the moderate processed food consumption, recommending that ultra-processed foods should be avoided as much as possible [18].

The form was publicized on the university's digital platforms of and sent by email to all classes that met the inclusion criteria, which were be over 18 years old, be attending at least the second semester and be enrolled in the last 3 month. Prior to answering the survey, participants needed to agree with the informed consent statement, as the form only opened after completing this step. University students were randomly selected, according to their response to the email expressing availability and interest. To increase participation, emails were sent on two occasions to the academic community, calling attention to both groups of students, from different courses.

Data analysis involved simple descriptive statistics and association tests: Fisher's exact test for categorical variables, Student's *t*-test for continuous variables and Mann-Whitney test for comparison of means, as normality assumption was not satisfied [19]. All analyses were performed with the aid of Core Team™ [20]. The level of significance considered was 5%. The choice of using Fisher's exact test, for categorical variables, was due to the fact that it is an accurate test for all sample sizes and because its *p*-value is conditional on the marginal totals of the table. Therefore, it does not suffer from inaccuracies when the "n" inside the table cells is small [20].

This study was conducted in accordance with current ethical guidelines and received approval from the Institutional Review Board, under Process 1352.0001.11/2017.

RESULTS

Ninety-one students (33 financial aid beneficiaries and 58 non-beneficiaries) participated. Table 1 shows sociodemographic characterization.

The analysis revealed that not having white skin color ($p=0.019$), having parents with fewer years of education ($p=0.001$) and being responsible for their own income ($p=0.001$) are conditions significantly associated with receiving financial aid.

Table 1 – Sociodemographic characterization of *Universidade Federal de São Paulo* (Federal University of São Paulo) students according to financial aid status (n=91). Santos (SP), Brazil, 2018.

Sociodemographic data	With financial aid (n=33)	Without financial aid (n=58)	p-value
Age (group average)	23.18	22.07	0.014*
Ethnicity/skin color (%)			
White	48.5	75.9	0.019*
Black	27.3	6.9	
Brown	21.2	13.8	
Asian descent	3	3.4	
Employment status (%)			
Does not work	78.8	74.1	0.808
Informal work	18.2	22.4	
Housing condition (%)			
Student housing	57.6	37.9	0.121
With family	33.3	31	
Alone	6.1	24.1	
With partner	3	5.2	
Person in charge of income (%)			
Student	42.4	10.3	0.001*
Parents	30.3	79.3	
Others	24.2	6.9	
Father's education (%)			
Basic education	93.8	46.3	0.001*
Higher education	6.3	53.7	
Mother's education (%)			
Basic education	90.9	46.6	0.001*
Higher education	9.1	53.4	
Amount available for maintenance in university			
Average value US\$ in 2018	77	2923	0,030**

Note: *Fisher's exact test; **Mann-Whitney - statistically significant.

Beneficiaries' income emerged from assistance or informal work, whereas non-beneficiaries had their parents as responsible for their income ($p=0.001$).

Parents' education was another factor that differed between the two groups. While the majority of both parents had a higher education in the financial aid non-beneficiary group, less than 10% reached this level of education in the beneficiary group ($p=0.001$).

About the amount available for staying at the university, the average value is greater among financial aid non-beneficiaries ($p=0.001$). Regarding the FI situation among students, the BFSI analysis revealed many students in both groups faced FI in the three months prior to the study, as shown in Table 2.

The level of FI was significantly associated with being a financial aid beneficiary (94%) in some level ($p=0.001$). This finding confirms the fact that beneficiaries are more socially vulnerable and that financial aid is reaching the individuals to whom it is intended.

Regarding dietary quality-related issues, university students were asked about their habit of cooking and whether they considered themselves to be skilled in the kitchen (Table 3). Thus, we investigated how students were feeding themselves and whether they had cooking knowledge that helped them make decisions. However, no significant difference was found between them ($p=0.575$).

Table 2 – Food (in)security status of *Universidade Federal de São Paulo* (Federal University of São Paulo) students according to financial aid status (n=91). Santos (SP), Brazil, 2018.

Level of food (in)security	With financial aid		Without financial aid		p-value
	n	%	n	%	
Food security	2	6.1	31	53.4	0.001*
Mild food insecurity	10	30.3	20	34.5	
Moderate food insecurity	12	36.4	4	6.9	
Severe food insecurity	9	27.3	3	5.2	

Note: *Fisher's exact test – statistically significant.

Table 3 – Cooking habits and skills among *Universidade Federal de São Paulo* (Federal University of São Paulo) students according to financial aid status (n=91). Santos (SP), Brazil, 2018.

Do you have cooking skills and/or the habit of cooking?	With financial aid		Without financial aid		p-value
	n	%	n	%	
Has skill and habit	19	57.6	36	62.1	0.575
Has skill but does not have habit	6	18.2	8	13.8	
Does not have skill but has habit	5	15.2	12	20.7	
Does not have skill or habit	3	9.1	2	3.4	

Note: Fisher's exact test.

Most of them (92.3%) reported being concerned with the choice of healthy foods. This proportion was higher among non-beneficiaries (96.6%). Regarding ultra-processed food consumption, 31.9% reported not consuming such products every day, whereas 47.3% consumed one to two ultra-processed products per day, and a smaller proportion (20.8%) reported consuming three or more per day. Ultra-processed food consumption was not statistically associated with receiving financial aid ($p=0.066$).

DISCUSSION

Non-beneficiaries' ethnicity/skin color is similar to the general profile of students at federal universities in southeastern Brazil: mostly white students (53.5%), followed by brown students (30.2%), a smaller number of black students (9.16%) and of Asian descent (2%) and finally indigenous students (0.35%) [21]. Regarding the ethnicity/skin color of the nearly 3,000 students all university campuses in 2019, 30.5% were black, brown or indigenous, whereas the vast majority was white (69.5%) [22]. However, the percentage of black people in the financial aid beneficiary group (27.3%) was higher than that found in the financial aid non-beneficiary group (6.9%) and even higher than the average for the Southeast region of the country (9.16%). This fact demonstrates the need to consider this social vulnerability marker in the Brazilian National Student Aid Plan aiming at reducing ethnic-racial inequality and contributing to an anti-racist policy in universities and, consequently, in the country.

Regarding parents' education, general data for southeastern Brazil indicate that approximately 30 to 40% of parents have a higher education, which is closer to the figure found among the non-beneficiaries [21].

Analyzing the other sociodemographic differences between the groups, from the perspective of FI, and the significant difference in the FI condition found between the groups, the results presented are similar to data described by Chaparro *et al.* [23], in a study conducted in Hawaii, that found that students who live in student housing face FI more than those who live with their parents. Students in university dormitories

are generally those with less purchasing power, which was the case of those in the present study who lived in residences shared with other students, as the university campus does not have a dormitory policy.

These results are similar to data described by Dubick *et al.* [24] on food security among university students in the USA, who found that those who are the first generation of university students in the family are more likely to face FI. These results underscore the importance of financial aid as a social policy for breaking the intergenerational cycle of social vulnerability, as most financial aid beneficiaries are the first generation of their families to attend higher education.

The results revealed that 63.8% of students faced some degree of FI, which is higher than the Brazilian national average (36.7%) [16]. Similar findings were reported by several American universities (41 to 48%), while the national average was 14% [4,24]. The authors also point out that other studies report rates that can reach four times the national average [24]. A study conducted at a rural university in Canada reported a 37.2% rate of FI among students [25]. These figures underscore the need for further studies on FI among university students [26].

The number of students who faced FI was higher among financial aid beneficiaries. Micevski *et al.* [27] found a similar situation at an Australian university, where financial aid beneficiaries were two or more times more likely to go hungry than non-beneficiaries. In the present study, the proportion of students with severe FI was 5.2% among non-beneficiaries and 27.3% (more than fivefold higher) among financial aid beneficiaries. Moreover, Meldrum *et al.* [28] Micevski *et al.* [27], Dubick, *et al.* [24] and Payne-Sturges *et al.* [29] found that a large portion of students who face FI received some type of aid such as housing assistance, financial assistance, food stamps, etc. Also, the ethnicity/skin color of students who face FI is generally similar to that report in international studies. In such studies, Latino students are also at greater risk of experiencing this problem [4,8,24,29].

Despite differences between the groups, the percentage of FI was high in both. This may be explained by findings described in studies by Gaines *et al.* [9], in the United States, and Ukegbu *et al.* [30], in Nigeria, stating that factors related to FI among university students include the limited budget, ineligibility for assistance programs, non-development of money and food management skills, students' source of income and parents' occupation.

Some of these factors can also be considered in the case of financial aid non-beneficiaries. Many had greater amounts of money than the financial aid beneficiaries to maintain themselves (Table 1), but were still in a situation of FI. It is plausible that these students do not know how to manage money well or there may be a portion of students in this group whose socioeconomic status approaches the eligibility criteria for assistance and, therefore, these students may also be in a situation of social vulnerability.

Regarding eating habits, the Dietary Guide for the Brazilian Population highlights the importance of having and valuing cooking skills, as such skills not only assist in cooking, but also in making decisions about which foods to buy [18]. If recipe repertoire is wide, the possibility of choosing a greater variety of foods is greater compared to someone who does not know how to cook. Therefore, the present results seem satisfactory, as most students (60.4%) reported having both the skill and habit of cooking. In contrast, approximately 24% did not have the independent skill of having or not the habit of cooking. This reveals an opportunity for university extension that can enable students to develop this liberating practice.

Most of the overall sample (92.3%) reported being concerned with the choice of healthy foods. This proportion was higher among non-beneficiaries (96.6%). Regarding ultra-processed food consumption, 31.9% reported not consuming such products every day.

Even though no significant difference was found between the groups regarding ultra-processed food consumption, it is important to conduct further studies, with larger samples, since a diet rich in ultra-processed foods is of poor quality, as it is related to excessive caloric intake and is consequently associated with overweight and obesity. Moreover, there is sufficient evidence regarding its association with an increase in the risk of type 2 diabetes, cardiovascular disease, cancer, irritable bowel syndrome, depression and other adverse health conditions [31-34].

The fact that students consumed these products may be related to their low cost, high palatability and wide availability at cafeterias, restaurants and markets in general [35]. Moreover, some studies that assessed FI reinforces the need of assessing eating habits and food quality, due to BFIS's lack of sensibility to assess ultra-processed food consumption, for instance. Moreover, studies recently carried out in Brazil found an association between FI and ultra-processed food consumption, which alerts us to need to investigate this relation more closely [36,37]. According to the Dietary Guide for the Brazilian Population recommendations, there is no reference regarding the ideal quantity of ultra-processed foods, and the recommendation is to avoid such products [18].

This scenario of FI among Brazilian university students is particularly alarming. Recent national surveys have revealed an important increase of FI and hunger in Brazil during the first year of Covid-19 pandemic, aggravated by the health, environmental, economic, institutional and, above all, political crises in the country, resulting in the aggravation of social inequality and vulnerability as well as feelings of discouragement and helplessness among most of Brazilians [38,39].

The Brazilian National Student Aid Plan resources were previously insufficient and suffered a 21% reduction in 2021, which would likely lead to dropouts, putting an end to the dreams of thousands of Brazilian students of breaking the intergenerational cycle of social exclusion [40]. A year later, the Brazilian FI situation worsened. The scenario in 2022, here called post-covid, reveals an increase of 14 million more people in a situation of hunger [41].

In the case of more vulnerable university students, the impact of Ministry Education's budget cuts for federal universities will undoubtedly lead to a reduction or even the unfeasibility of knowledge production through the funding of teaching, research and extension activities, which will result in greater difficulty for these students to stay at universities [42,43].

This study has some limitations, as although the number of students needed in each group has been reached, they represent university students from a single campus of a Brazilian federal university. Another point to mention is that the food questionnaire was not previously validated, as it was only tested in the population and adapted. Currently, there are questionnaires that assess food using the premises of Dietary Guide for the Brazilian Population, but at the time it did not yet exist, so the option was made for adaptation [18].

Even so, the findings and hypotheses raised may serve as the basis for further studies that broaden our understanding of FI perception among university students as well as guide strategies that promote food security in this group.

The lack of cooking skills of nearly one-fourth of the sample underscores the need for intervention and reveals opportunities for university extension that can enable students to develop them.

CONCLUSION

The IF scenario found in university students prior to the Covid-19 pandemic is revealing. Despite receiving financial aid, a large portion of students faced FI and hunger in the three months prior to the survey. FI was associated with socioeconomic status, as occurs in the Brazilian population in general. However, it was also associated with the fact of being a university student, as even those who are not in a situation of social vulnerability may face some degree of FI.

The data are insufficient to explain this association, which is a limitation. However, several international and national studies have demonstrated that university students are at risk of FI regardless of socioeconomic status, revealing the importance of taking the results presented as a basis for conducting further studies with larger samples.

Considering the overlapping crises in Brazil, the growing disinvestment of the Ministry of Education in science, technology and student aid, and the impacts on the lives of thousands of Brazilian students and their families, further studies are needed along these lines. Monitoring the Brazilian FI situation among university students is essential to contribute to the struggle for the continuity and improvement of student aid programs to ensure basic social rights, including the human right to food.

CONTRIBUTORS

All authors fully contributed to all steps of this work – conception, design, analysis, review, and approved the final version.

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Received: March 21, 2022

Final version: September 6, 2022

Approved: October 13, 2022