

# Food practices and nutritional status of university students who use the University Restaurant

## *Práticas alimentares e o estado nutricional entre estudantes universitários usuários do Restaurante-Escola*

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### ABSTRACT

#### Objective

To evaluate the food practices and nutritional status of students who use the University Restaurant at a public university.

#### Methods

This is a cross-sectional study carried out with 958 university students. Data related to regular eating practices ( $\geq 5$  times/week), routine food consumption and nutritional status were collected. The association between University Restaurant attendance and dietary practices and body mass index was reviewed by bivariate logistic regression model and multiple regression.

#### Results

Students who attended the University Restaurant three or more times a week were more likely to regularly consume beans (OR: 1.35,  $p=0.041$ ) and fresh salad (OR: 1.77,  $p<0.001$ ) and less likely to have afternoon snack (OR: 0.68;  $p=0.008$ ). In addition, an association between soda consumption and overweight was observed.

#### Conclusion

Thus, the importance of strategies that seek to promote incentives for healthy eating and lifestyle practices in the university population become evident.

**Keywords:** Feeding behavior. Nutritional status. Public policy. Students.

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## RESUMO

### Objetivo

O objetivo do estudo foi avaliar as práticas alimentares e o estado nutricional de estudantes usuários do restaurante-escola em uma universidade pública.

### Métodos

Trata-se de um estudo transversal realizado com 958 estudantes universitários. Foram coletados dados relacionados às práticas alimentares regulares ( $\geq 5$  vezes/semana), à rotina alimentar e ao estado nutricional. A associação entre a frequência de ida ao restaurante-escola, práticas alimentares e índice de massa corporal foi analisada por modelo de regressão logística bivariada e regressão múltipla.

### Resultados

Os estudantes que frequentaram o restaurante-escola 3 ou mais vezes por semana apresentaram maiores chances de consumir regularmente feijão (OR: 1,35,  $p=0,041$ ) e salada crua (OR: 1,77,  $p<0,001$ ) e menos chances de realizar o lanche da tarde (OR: 0,68;  $p=0,008$ ). Além disso, foi observada associação entre o consumo de refrigerante e o excesso de peso.

### Conclusão

Dessa forma, evidencia-se a importância de estratégias que busquem promover incentivos a práticas alimentares e de vida saudáveis na população universitária.

**Palavras-chave:** Comportamento alimentar. Estado nutricional. Política pública. Estudantes.

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## INTRODUCTION

The food environment has been considered as one of the determinants of food intake and has been widely studied in recent years [1]. Individual factors, physical, economic, political, and sociocultural dimensions are constituent factors of the food environment [2]. Organizations that have food services available, such as universities, should take advantage of this environment to promote healthy eating habits and Food and Nutrition Security to users, such as employees and students [3].

The beginning of the university period generally includes the transition period between adolescence and adulthood, a phase that is often characterized as a time of greater autonomy of the student over his life due to factors such as the separation from the parental home and the acquisition of new responsibilities [4,5]. Added to this, introduction in the academic environment is also associated with new social relationships, behavioral and eating habits changes, stress, inadequate time management, the need to spend more time away from home, and psychosocial instability [5-7].

In this context, college students may be more exposed to nutritionally unbalanced food combinations usually offered in the fast food model, a dietary pattern that can reflect directly on their nutritional conditions, contributing to an increased prevalence of overweight in that public [8-11]. Studies indicate that college lifestyle is often characterized by practices harmful to health, such as consumption of high energy density diet, sedentarism, frequent consumption of alcoholic beverages and meals skipping; these are risk factors for the development of Chronic Non-communicable Diseases [12-14].

Healthy eating among college students is a governmental concern worldwide. The organization food environment, including the university, has been recognized as a strategic site for health promotion, since the food offered there can have a direct impact on students' eating practices [15]. In Europe and in the United States the food environment is composed of a wide variety of establishments that provide food, such as restaurants, canteens and cafeterias; however, public policies implemented by colleges to foster access of this population to healthy food vary according to each country [16-20].

In general, in Brazil the university food environment is characterized by the type of meal or service offered and the meals that are available in restaurants, snack bars, fast food and/or canteens located within or near the university campus [3,15]. In contrast to places that sell ready-to-eat foods, University Restaurants (UR) tend to present menus that offer their users a nutritionally balanced and varied diet, helping in the process of food and nutrition education and health promotion [21].

Another relevant point to highlight is that UR play an essential role in the Students Assistance Policy, since they provide low cost meals subsidized by the Federal Government, which objective is regularly offer nutritionally balanced meals prepared with safe food, contributing to the achievement of Food and Nutrition Security for users in the academic community [22].

Considering that the university environment represents a strategic space for the promotion of healthy eating and Food and Nutrition Security, the present study aimed to evaluate the dietary practices and nutritional status of college students according to the frequency of the UR use at a public university in the city of Rio de Janeiro.

## METHODS

This work is part of the project *Papel Social da Universidade no Fortalecimento das Políticas Públicas de Segurança Alimentar* (Social Role of the University in the Enhancement of Public Policies for Food Security and Nutrition), which involved teaching, research, and extension initiatives, funded by the Ministry of Science, Technology, and Innovations and the *Conselho Nacional de Desenvolvimento Científico e Tecnológico* (National Council for Scientific and Technological Development).

This is a cross-sectional study carried out with a non-probability sample of undergraduate students enrolled in the *Universidade Federal do Estado do Rio de Janeiro* (UNIRIO, Federal University of the State of Rio de Janeiro). Inclusion criteria were students (undergraduate and graduate) duly enrolled and attending the University restaurant during the study period. Individuals who were not students or who presented limitations for performing any phase of the research were excluded. The project is registered with the Research Department of UNIRIO and was approved by the Research Ethics Committee, under opinion number 1662.177. Only those who signed the informed consent form participated in the study.

The UNIRIO spreads over seven *campi*, distributed in the city of Rio de Janeiro (Urca, Botafogo, Tijuca and Downtown). The UR in which the present study was conducted is located in the Urca district and serves the academic community (students, professors, and administrative staff) of different undergraduate and graduate courses. On the *campus* where the UR is located classes of humanities and exact sciences courses are taught; in addition, the educational institution has *inter-campus* transportation that circulates with pre-defined schedules.

The UR dining hall deploys 340 seats, distributed over two floors (first floor and mezzanine). It is open from Monday to Friday, serving approximately 1,200 meals/day (1000 of which are for students), distributed between lunch (11 am to 2 pm) and dinner (5 pm to 8 pm). UNIRIO community has priority in the use of the Restaurant. In 2019 the price charged for undergraduate students was R\$ 3.00 per meal, R\$ 6.00 for graduate students and R\$ 11.00 for the staff.

The meal distribution modality is characterized by mixed type food with self-service for all preparations, except for the protein dish and vegetarian option, which are portioned. Lunch and dinner include salad with two types of vegetables or a vegetable and a fruit; white rice, brown rice and beans; one type of side dish; one protein dish; a vegetarian option (egg-based or vegan) and a 300 ml soft drink, made from concentrated fruit pulp.

Survey data were collected at two time points: between March 11 and 15 and between June 24 and 28, 2019, in the UR. The instrument used in data collection was a questionnaire self-completed by students, adapted from an instrument previously used in a survey conducted at the University Restaurant of the *Universidade do Estado do Rio de Janeiro* (UERJ, University of the State of Rio de Janeiro) [23].

Before starting the field survey, a pilot test was performed with the instrument. In this stage, students, scholarship students and volunteers from the nutrition course, were previously trained by the team of teachers who were members of the project to apply the self-completed questionnaire and obtain each other anthropometric measurements. During the training, the initial version of the adapted questionnaire was tested with the field surveyors, to anticipate questions and clarify them and to improve a better fit of the instrument with the purpose of the study.

After final review, the instrument included 44 questions, open-ended and closed questions, which addressed issues associated with the students' eating practices at home and in the UR. Among the questions included in the questionnaire, the present study focused the review of the descriptive characteristics, student frequency visit to the UR, eating routine outside the UR, and frequency of food consumption in the last seven days of the week prior to the study. These last two topics were detailed in the next section related to eating practices.

To characterize the students, the following questions were asked with the following relevant response options: gender (female, male, other), age (numeric variable, later recategorized into <20; 20-35; >35 years), type of entry course (descriptive variable later recategorized into human, biological and exact science areas), aid received from the University (yes (specify) or not), type of paid activity (yes (specify) or not. The answers were recategorized – does not have; formal or informal job; or academic scholarship holder), with whom they lived (alone, family, friends, and others (specify)), and the frequency of consumption of fast food, such as sandwiches, cookies, among others (yes (in which period of the week) or not). Attendance at the UR was also evaluated by weekly frequency and later the students were categorized into two groups: regular attendance students who went 3 or more times during the week to the UR and not regular attendance for those who went less than 3 times a week. The students were also asked about the reasons for using the UR as a place to have their meals. This was an open-ended question, and the answers were categorized by subject: price, convenience, curiosity, social relations, meals quality, meal variety, amount of food served, service, among others).

Besides the application of the questionnaire, the weight (kg) and height (m) of the students were measured to calculate the Body Mass Index (BMI) ( $\text{kg}/\text{m}^2$ ). Weight was measured using a Supermedy® digital scale with 50 g accuracy and maximum capacity of 150 kg, with the individual standing on the scale platform, barefoot and wearing light clothes. Height was measured using a mobile rod stadiometer of the same brand, with 01 cm accuracy, with the individual standing with the head positioned in the Frankfurt plane, barefoot, feet together, heels in contact with the base of the stadiometer and non-flexed knees. The nutritional status was classified according to the ranges proposed by the World Health Organization (WHO) [24], being diagnosed as overweight and obese when the BMI reached a value equal to or greater than  $25 \text{ kg}/\text{m}^2$  and with no excess weight when the BMI remained below  $25 \text{ kg}/\text{m}^2$ .

Data on food routine and frequency were assessed according to the criteria adopted by the *Pesquisa Nacional de Saúde do Escolar* (National School Health Survey) and the *Sistema de Vigilância de Doenças Crônicas por Inquérito Telefônico* (VIGITEL, Surveillance of Chronic Diseases by Telephone Inquiry) [25,26].

The food frequency was evaluated considering the number of days within the last seven days that the students consumed meals prior to the data collection. The response options were: “I didn’t eat that in the last seven days” and the other options ranged from “1 to 7 days during the last seven days”.

The food groups or the culinary preparations evaluated were: 1) beans, 2) vegetables (cooked vegetables), 3) salad (fresh vegetables), 4) fresh fruit or fruit salad, 5) french fries and/or fried snacks, 6) sausages (hamburger, sausage, bologna, salami, ham, turkey breast), 7) cookies (sweet, and potato chips), 8) sweets (cakes, candies, chocolates, chewing gum, candy, or lollipops), 9) soft drinks, and 10) sweetened beverages (juices or soft drinks, mate, natural guarana, other teas, coffee, flavored waters, isotonic drinks, soy-based drinks, and others). The first four groups were considered healthy foods and the last six were considered unhealthy foods. Frequency was categorized as: consumption <5 days/week and ≥5 days/week (regular consumption) [25,26].

Questions were asked in connection with the eating routines regarding the number of meals (breakfast, snack, lunch, afternoon snack, and dinner) and the substitution of lunch and/or dinner by snacks per week, in the seven days prior to the survey. Lunch and dinner were considered the meals composed of rice and beans, meat and salad, boiled vegetables, soup, pasta, among others, excluding from this category any kind of sandwich or ready-to-eat meal such as pizza or lasagna.

Healthy eating routine marker was considered when the frequency of meal consumption was ≥5 days/week and as a marker of unhealthy eating routine the habit of replacing lunch and/or dinner by snacks, following the same criteria mentioned above (≥5 days/week). In parallel, the prevalence of the food groups most consumed by students at lunch or dinner in the UR and the reason for the respondents’ consumption of such foods was also evaluated.

Descriptive data were presented as absolute values and percentages (%) for categorical variables. Pearson’s chi-square test was used to review the association of descriptive variables in relation to the frequency of UR attendance. The association between UR attendance, dietary practices, and BMI was analyzed by bivariate logistic regression model and multiple regression. Variables with a *p*-value <0.2 in the bivariate analysis were included in the multivariate analysis, and those with a *p*-value <0.05 in the multivariate analysis were associated with UR attendance. Models were adjusted for sex and age. Statistical significance was set at *p*-value <0.05. Analyses were conducted using STATA®, version 17 and Microsoft Office Excel® 2013.

## RESULTS

Initially in this study, 999 college students were interviewed; however, 41 did not report the information about attending UR and were thus excluded totaling a final sample for analysis of 957 students. For other variables, there were losses of information due to failing to complete the forms; the number of participants for each variable studied is described in Table 1. From the total of each variable assessed, it was found that more than half were female (55.0%), aged between 20 and 35 years (75.5%), enrolled in the humanities disciplines (66.8%), had no job (52.1%), and lived with their families (82.1%). Female students (*p*<0.001) and students in the humanities (*p*<0.01) were found to have a statistical association regarding attendance at the UR. The descriptive characteristics of the sample according to the students UR attendance frequency are described in Table 1.

When evaluating the results of the frequency of food consumption, a low regular consumption in relation to the healthy foods, especially fruit (28.2%) and salad (29.5%) was observed. As for the

**Table 1** – Descriptive characteristics of college students from a public university according to attendance to University Restaurants. Rio de Janeiro (RJ), Brazil, 2019.

Variables	Total		<3 times		≥3 times		p-value*
	n	%	n	%	n	%	
<b>Gender (n=957)</b>							
Female	526	55.0	342	59.6	184	48.0	<0.001
Male	431	45.0	232	40.4	199	52.0	
<b>Age Group (years) (n=931)</b>							
<20	188	20.2	102	18.1	86	23.5	0.12
20 a 35	703	75.5	437	77.3	266	72.7	
>35	40	4.3	26	4.6	14	3.8	
<b>Course Type (n=882)</b>							
Human	589	66.8	341	66.0	248	67.9	0.01
Biologicals	162	18.4	110	21.3	52	14.2	
Exact	131	14.9	66	12.8	65	17.8	
<b>Occupation (n=906)</b>							
Does not have	472	52.1	266	50.6	206	54.2	0.40
Formal Employment	65	7.2	42	8.0	23	6.1	
Informal Employment	106	11.7	58	11.0	48	12.6	
Academic scholar	263	29.0	160	30.4	103	27.1	
<b>With whom live (n=947)</b>							
Alone	83	8.8	48	9.0	35	9.2	0.41
With Family	784	82.8	442	83.2	306	80.5	
With friends	67	7.1	36	6.8	31	8.2	
Other	13	1.4	5	0.9	8	2.1	
<b>Snack consumption (n= 902)</b>							
Yes	721	79.9	432	82.4	289	76.5	0.30
No/Does not apply	181	20.1	92	17.6	89	23.5	
<b>Nutritional Status** (n=913)</b>							
Not overweight	638	69.9	382	70.4	256	69.2	0.71
Overweight	275	30.1	161	29.7	114	30.8	

Note: \*Chi-square test; \*\*Classified by Body Mass Index.

unhealthy foods, the regular consumption of sugary drinks (47.3%), sweets (24.9%) and cookies (23.7%) were high. When comparing the results found for the two groups assessed, it was possible to notice that those who attended the UR regularly ( $\geq 3$  times a week) had a higher consumption of salad and that those who did not attend the UR had a higher consumption of unhealthy foods (Table 2).

Regarding the eating routines, it was observed that more than half of the students assessed frequently ( $\geq 5$  times a week) had breakfast (59.1%) and lunch (83.6%), but a little less than half had dinner (47.0%) with the same frequency. We could observe that snacking in the afternoon (46.4%) was more recurrent than in the morning (18.6%) and replacing dinner with snacks (14.4%) than lunch (3.5%) (Table 2).

Regarding food consumption in the UR, it was observed that less than half (45.2%) of respondents reported consuming all food groups offered in the menu and only 15.5% reported the habit of consuming fruit. Regarding the use of the UR services, 84.4% of the students reported that the low cost was the main reason for seeking this establishment, followed by convenience (77.4%) and quality (33.2%) (data not shown).

When assessing the association between UR attendance and eating routines it was observed that students who had a higher UR attendance were less likely to snack in the afternoon (OR=0.68,  $p=0.01$ ) and more likely to consume fresh salad (OR=1.77 and  $p<0.01$ ) and beans (OR=1.35 and  $p=0.04$ ) (Table 3).

**Table 2** – Frequency of regular food practices according to the use of the University Restaurants. Rio de Janeiro (RJ), Brazil, 2019.

Food Practices	Total (≥5 vezes)		Frequency to UR (times/week)			
			<3		≥3	
	n	%	n	%	n	%
<b>Food Routine</b>						
Breakfast (n=905)	535	59.1	319	59.6	216	40.4
Morning Snack (n=901)	168	18.6	92	54.8	76	45.2
Lunch (n=903)	755	83.6	430	57.0	325	43.0
Afternoon Snack (n=898)	417	46.4	258	61.9	159	38.1
Dinner (n=615)	289	47.0	174	60.2	115	39.8
Replacement of lunch with snack (n=898)	31	3.5	22	71.0	9	29.0
Replacement of dinner with snack (n=904)	130	14.4	90	69.2	40	30.8
<b>Frequency of Food Consumption</b>						
Vegetables (n=899)	517	57.5	285	55.1	232	44.9
Beans (n=900)	513	57.0	283	55.2	230	44.8
Fruits (n=876)	247	28.2	145	58.7	102	41.3
Salad (n=897)	265	29.5	129	48.7	136	51.3
French Fries (n=902)	19	2.1	11	57.9	8	42.1
Cookies (n=876)	208	23.7	126	60.6	82	39.4
Sausages (n=900)	109	12.1	69	63.3	40	36.7
Candies (n=876)	218	24.9	121	55.5	97	44.5
Sugar-sweetened beverages (n=876)	414	47.3	241	58.2	173	41.8
Soft drink (n=872)	100	11.5	60	60.0	40	40.0

**Table 3** – Odds Ratio (OR) of meal pattern food frequency and nutritional status adjusted by gender and age with reference to attendance to the University Restaurants <3 times/week. Rio de Janeiro (RJ), Brazil, 2019.

Food Practices and Nutritional Status	Adjusted OR*	95% CI	p-value**
<b>Bivariate analysis</b>			
<b>Food routine (≥5 vezes/semana)</b>			
Breakfast (n=905)	0.88	0.66-1.16	0.35
Morning Snack (n=901)	1.21	0.85-1.70	0.28
Lunch (n=903)	1.28	0.88-1.86	0.20
Afternoon Snack (n=898)	0.72	0.55-0.95	0.02
Dinner (n=615)	0.97	0.69-1.37	0.22
Replacement of lunch with snack (n=898)	0.6	0.27-1.34	0.22
Replacement of dinner with snack (n=904)	0.63	0.42-0.96	0.03
<b>Food frequency (≥5 vezes/semana)</b>			
Vegetables (n=899)	1.34	1.01-1.77	0.04
Beans (n=900)	1.37	1.03-1.81	0.03
Fruits (n=876)	0.99	0.73-1.35	0.96
Salad (n=897)	1.77	1.31-2.38	<0.001
French Fries (n=902)	0.89	0.34-2.34	0.82
Cookies (n=876)	0.89	0.64-1.23	0.47
Sausages (n=900)	0.75	0.49-1.15	0.19
Candies (n=876)	1.17	0.85-1.60	0.34
Sugar-sweetened beverages (n=876)	0.96	0.72-1.26	0.76
Soft drink (n=872)	0.89	0.58-1.37	0.60
<b>Nutritional Status (BMI) (n=950)</b>			
Not overweight	1	-	-
Overweight	1.12	0.79-1.58	0.5
<b>Multivariate analysis</b>			
Afternoon Snack (n=898)	0.68	0.51-0.90	0.01
Beans (n=900)	1.35	1.01-1.79	0.04
Salad (n=897)	1.77	1.31-2.40	<0.001
Vegetables (n=844)	0.01	-0.15-0.19	0.83
Sausages (n=845)	-0.04	-0.26-0.18	0.74

Note: \*OR: Odds ratio; \*\*Adjusted for gender and age.

As for the students' nutritional status, it was found that 30.1% of the population is overweight and obese, but no association was observed between regular visits to the UR and nutritional status (Tables 2 and 3). An association was found between regular consumption of soft drinks and overweight (OR: 1.84;  $p=0.005$ ) (data not shown).

## DISCUSSION

The university food environment is a relevant subject not only in Brazil, but in the world. In several countries, universities have been making efforts to develop policies to promote healthy eating among students.

In the United States, universities typically have different food outlets such as restaurants, canteens, cafeterias, and vending machines; however, studies show that a high percentage of American students have been exposed to food insecurity [16,19]. For this reason, universities have launched different interventions that include the set up of pantries in which students can receive free food to be prepared later, food vouchers for free meals in the campus dining hall, emergency assistance funds, and programs to help students obtain public population food assistance benefits such as the Supplemental Nutritional Assistance Program [18,19].

In Europe a wide variety of commercial food outlets have also been observed within the university *campi* [11,17,20]. In many countries, such as Belgium, there are no dining halls that provide meal plans for resident students, but there is the possibility of obtaining weekly financial aid [17]. In the European Union, the *farm-to-fork* strategy seeks to ensure food security, adequate nutrition, and public policies so that the entire population has access to sufficient, safe, nutritious, and sustainable food, but no studies were found regarding its application specifically to university students [27].

In Brazil, at the university level, the current initiative is the *Plano Nacional de Assistência Estudantil* (PNAES, National Plan for Student Assistance, which offers assistance and seeks to expand conditions for young people to remain in federal public higher education, with food as one of the areas for student assistance initiatives [28]. It is up to each institution to decide whether the assistance will be offered as food allowance or as UR, since the operation of the UR is not guided by specific Ministry of Education guidelines, and may vary according to the institution [29].

The findings of our study suggest a positive relationship between the use of the UR and healthy eating practices, since the students who were more assiduous in attending the restaurant ( $\geq 3$  times per week) were those who consumed beans and salad regularly (on at least 5 days of the 7 days reviewed) when compared to the less assiduous students ( $< 3$  times per week). Regarding nutritional status, although an expressive rate of overweight students was observed in the study, no relationship was detected between the frequency of use of the UR and the nutritional status exhibited by students ( $p > 0.05$ ).

Perez and collaborators (2019) [30] also observed an association between more attendance to the UR and higher frequency of consumption of beans and vegetables by students of a public university in Rio de Janeiro. According to the *Guia Alimentar para a População Brasileira* (Food Guide for the Brazilian Population), an adequate diet should be composed primarily of fresh or minimally processed foods [31]. For decades, studies have shown the importance of regular consumption of fruits, vegetables, and greens, since these foods supply the daily requirements of vitamins, minerals, and fiber that are essential for a good human body development, whether physical or mental [32,33]. Data from the 2017-2018 *Pesquisa de Orçamentos Familiares* (POF, Household Budget Survey) showed that fresh or minimally processed foods accounted for more than half of the calories consumed by

the Brazilian population, with prominence of rice and beans, fruits, pasta, vegetables, roots, and tubers [34].

Regarding beans, it is worth mentioning they are important in the diet of college students, for being a source of complex carbohydrates, vitamins and minerals, besides providing satiety due to the high content of fiber present in their composition [33]. Because it is a legume with high consumption by the Brazilian population, beans are considered an important source of protein, especially due to the lower cost compared to products of animal origin [35,36]. According to the 2017-2018 POF, it was observed that the Brazilian population had a high consumption of beans (60%) and the analyses indicated that the population that reported consumption of beans had a fiber consumption 20% higher compared to the population average [34].

It is worth considering that the intake of vegetables and fruits remains a challenge in the university food setting, since the rate of regular healthy foods consumption found was low, especially in relation to fruit (28.2%) and salad (29.5%). Data from a narrative literature review that evaluated the food consumption of college students pointed out that in most of the 37 studies assessed, 8 of which were conducted in Brazil, low consumption of fruits, vegetables, and cereals was observed, and two of these studies showed a high consumption of legumes, especially beans [37]. Another study conducted in Germany with 689 students from 40 German universities reported that the consumption of specific food groups, such as fruits and vegetables, also needed improvement [11].

The last VIGITEL Survey conducted in Brazil ratified that the frequency of regular consumption of fruit and vegetables in the adult population was low (34.4%), but still remained above that found in our study [26]. At the population level, when comparing the results of the 2008-2009 POF survey with the one performed in 2017-2018, we could notice a small reduction in the consumption of fruits, vegetables and legumes, which was already far below the recommendations [34].

A possible explanation for the reduced consumption of fruits and vegetables among students would be the fact that they have less time available and irregularity in the frequency and hours of meals [21]. The location of the UR in the Urca neighborhood may have been another limiting factor for part of the students who study basic subjects at other *campi* of the University, since most of them are concentrated in the Downtown neighborhood, a distance that makes it difficult for them to go to the UR.

A recent systematic review of 11 studies found that although the quality of the diet of college students is more susceptible to family structure and socioeconomic status, the diet tends to become poorer due to the higher consumption of salt, fat, and added sugar observed on the university *campus* [20]. It is also worth mentioning that access to fresh food, due to the need of preservation, may become less practical for students when compared to pre-cooked and ready-to-eat foods. In addition, they are usually less available near universities and more expensive when compared to ultra-processed foods [38].

Regarding the consumption of unhealthy foods, although it was observed that the consumption of some of these foods was lower (<5 times per week) among students who attended the UR on a regular basis, no statistical association was found. On the other hand, a significant percentage of regular consumption of sugary drinks was found among college students as well as a statistical association between regular consumption of soda and overweight students. A study conducted with 524 American college students showed that the excessive consumption of sugar increased 1.2 times the chance of being overweight [39].

Data from the 2017-2018 POF indicate that foods considered to be associated with an unhealthy diet (sugary drinks, sweet cookie, sweets, cold cuts and sausages, pizza, and sandwiches)

had their consumption by the Brazilian population related to reduced fiber intake means and with an increased consumption of energy, saturated fat, and trans fat [34]. In a study conducted with 1220 Chinese university students, a positive and significant association was found between the consumption of ready-made snacks rich in fats and sugars and high BMI [40].

Soft drinks are classified as sugary; despite presenting low individual consumption regularity, adding up the frequency of consumption of these two variables (soft drinks and sugary drinks) a regular consumption by more than half of the students is observed. The high consumption of these beverages may be a determining factor for a reduction in the consumption of other healthier beverages such as milk and natural fruit juices, causing a lower intake of vitamins and minerals [41].

The frequency of sugary drinks consumption found in the study population may be related to the fact that college students often choose fast and cheap foods, such as fast food, and these are usually consumed together with sugary drinks such as soda [39,42]. It is worth noting that in the last decade the consumption of sugary drinks has increased alarmingly among young adults, due to their low cost, social marketing, and because they strain an ever smaller rate of the family budget [26]. Therefore, the main strategies advocated by regulatory agencies are the reduction of added sugar in these products and the taxation of sugary drinks and processed foods of low nutritional value [41].

Studies have shown an association between consumption of sugary drinks and increased BMI, risk of type 2 diabetes *Mellitus*, dental caries, decreased bone mass, dyslipidemia, gastritis, cardiovascular diseases, and insulin resistance [43-45]. Due to the high consumption prevalence in the college population, it is important to enhance the need for efforts on food and nutrition education within the university itself seeking to raise awareness of the population about the negative consequences of the high consumption of these products for health and intervention strategies that seek to reduce their availability in the university environment, i.e., it is necessary to adopt encouragement measures, support and protection in the college space.

As for the college students eating routine, we observed a greater recurrence of replacing dinner with snacks with higher energy density compared to lunch. According to Santos et al. [46], it is common for young people to replace their main meals with fast and less healthy snacks due to personal budget limitations to purchase healthy foods. The fact that more than half of the study population has no professional occupation enhances this trend. Perez et al. [23] found in their investigation a reduction in the rate of students who replaced dinner for snacks after the UR was opened in a public university in Brazil. This fact corroborates the idea that the University may be an environment that promotes healthy eating practices in its population.

We observed that students who attended the UR more regularly were less likely to consume afternoon snacks replacing dinner. However, when adjusting the model, only the association of lower frequency of snack consumption remained statistically significant, which may be associated with other factors, including socioeconomic factors, not addressed in this study.

However, when asked about the consumption of quick snacks, almost 80% responded that they used this eating practice. The habit of eating snacks is directly associated with the new lifestyle found when entering university, characterized by less time available and consequently the search for more practical diets. Due to the low nutritional quality of the foods that are usually accessible and preferred, the influence of snacks on the eating habits of college students can become harmful, affecting the diet quality [23,47].

It was found that students from the humanities area attended most the UR, since the population we studied was composed predominantly of students from this area. This fact is explained

considering that the UR is located next to where classes in this area are mainly taught. When compared to studies that evaluated the dietary practices only of students in the health area, more satisfactory results were found for the health maintenance of the individuals assessed [48]. This can be explained by the fact that students who attend health courses are more informed about the importance of making healthier food choices and how they should be made.

Although no association between BMI and the use of the UR was found, a considerable rate of overweight was observed in the population studied. Similar results were found by Peltzer et al. [49] in a survey conducted with 15,746 students in 22 countries, aiming to identify the prevalence of overweight in the population. Such results are consistent with those found in the 2019 *Pesquisa Nacional de Saúde* (National Health Survey), where a high prevalence of overweight Brazilian adult population was observed [50]. This evidence is of concern, since overweight is characterized as a risk factor for the development of Chronic Non-communicable Diseases [26,43].

We should notice that the cross-sectional design was a limitation of the study, which prevented the identification of the causal relationships between dietary practices and determining factors. Regarding the study design, it is important that future studies review the socioeconomic conditions of the population investigated. As for the potential of this study, the sample size and the methodology used should be validated and used in studies in the area.

## CONCLUSION

The UR proved to be a food space inserted in the university with the potential to positively impact on the dietary practices of college students, since the more assiduous students consumed more beans and the non-assiduous ones consumed more unhealthy foods, justifying the implementation of public policies aimed at this public. A low consumption of healthy foods was found, especially regarding fruits and salads, and a high consumption of sugary drinks, sweets, and cookies. New studies are needed to further evaluate the impact that this food environment can generate in the university population.

In the current context of the country, marked by economic and social crisis, college students' diet can be impacted, since many students have financial difficulties to feed themselves adequately. In this connection, it is the government's role to develop public policies that enable access to healthy and quality food for this population. Thus, the government's surveillance on the university environment, both in general and regarding food, is essential to promote the quality of academic education and ensure students' health and well-being.

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## CONTRIBUTORS

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