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## Cost and time as obstacles to healthy eating among university students

*Custo e tempo como obstáculos para uma alimentação saudável entre universitários*

### Abstract

**Introduction.** The Dietary Guidelines for the Brazilian Population addresses the understanding and overcoming of potential obstacles to adopting a healthy diet, including food costs and time. **Objective.** To investigate the occurrence of time and cost as obstacles to adequate and healthy eating and its association with demographic and socioeconomic factors in university students. **Method.** Cross-sectional study carried out from April to May 2019. The evaluated outcomes were cost and time. Exposure variables were sex, age, household composition, paid work, economic class and study shift. **Results.** 207 students participated in the research. Regarding the cost of food, 76.3% have already stopped buying fruits and/or vegetables due to the price. Regarding time, 69.9% have already stopped preparing a meal due to lack of time. Cost was associated with male gender, age equal to or greater than 30 years, living with friends, studying at night and/or being in the lowest economic class; time has been associated with being male, younger than 30 years old, living alone, studying daytime/full time and/or not working. **Conclusion.** A large proportion of university students face difficulties, related to time and food costs, to have a proper and healthy diet.

**Keywords:** Students. Nutritional Epidemiology Dietary Guidelines.

### Resumo

**Introdução.** O Guia Alimentar para a População Brasileira aborda a compreensão e superação de potenciais obstáculos para a adoção de uma alimentação saudável, entre eles, custo dos alimentos e tempo. **Objetivo.** Investigar a ocorrência de tempo e custo enquanto obstáculos para uma alimentação adequada e saudável e sua associação com fatores demográficos e socioeconômicos em universitários. **Método.** Estudo transversal realizado de abril a maio de 2019. Os desfechos avaliados foram custo e tempo. As variáveis de exposição foram sexo, idade, composição de moradia, trabalho remunerado, classe econômica e turno de estudo. **Resultados.** Participaram da pesquisa 207 estudantes. Sobre o custo dos alimentos, 76,3% já deixaram de comprar frutas, verduras e/ou legumes devido ao preço. Em relação ao tempo, 69,9% já deixaram de preparar alguma refeição por falta de tempo. Custo se associou com sexo masculino, idade igual ou superior a 30 anos, morar com amigos, estudar no período noturno e/ou estar na classe econômica mais baixa; já tempo se associou com sexo masculino, idade inferior a 30 anos, morar sozinho, estudar no período diurno/integral e/ou não trabalhar. **Conclusão.** Grande proporção dos universitários enfrenta dificuldades, relativas a tempo e custo dos alimentos, para ter uma alimentação adequada e saudável.

**Palavras-chave:** Estudantes. Epidemiologia nutricional. Guias alimentares.

## INTRODUCTION

In order to contribute to food and nutrition education actions in different populations, it is recommended that nations develop guidelines on food and nutrition, considering the local epidemiological and nutritional scenario, as well as current scientific evidence.<sup>1</sup> One of the strategies created by the Brazilian government to implement the guidelines to promote adequate and healthy eating is the Dietary Guidelines for the Brazilian Population (DGBP), a document that contains information, recommendations and principles of adequate and healthy eating, with the aim of helping in the dietary practices of individuals, families and communities.<sup>2,3</sup> In its fifth chapter, the DGBP deals with understanding and overcoming potential obstacles to adopting adequate and healthy nutrition, including cost and time.<sup>2</sup>

Although data from the 2008-2009 POF [Family Budget Survey] showed that in Brazil culinary preparations based on in natura and minimally processed foods (especially rice and beans) were cheaper than a diet based on ultra-processed foods,<sup>4</sup> more recent data point to the opposite, since food prices changed and disfavor a healthy diet for Brazilians.<sup>5</sup> One of the DGBP guidelines for saving on the purchase of vegetables, greens and fruits is to prefer varieties that are in season and that are produced locally, in addition to claiming with the municipal authorities the installation of community gardens so that the price is accessible to the entire population. When addressing time as a potential obstacle, the DGBP points out that, to adopt the recommendations for healthy eating, people need to allocate time to selecting, buying, preparing food and cleaning utensils, bringing strategies to help organize and plan meals.<sup>2</sup>

Eating habits are built during childhood and consolidated later in life. The end of adolescence and the beginning of adulthood are phases usually marked by social changes that can contribute to the adoption of inappropriate eating practices.<sup>6</sup> An example of such changes is entering university - when they leave their parents' homes, students are faced with different situations, such as assuming responsibilities for self-care, household and food and managing their financial resources, aspects that favor a scenario that is potentially harmful to health.<sup>7</sup> Still in this new phase, young people find it difficult to have regular meals, due to the lack of time, as they face the extensive routine of university activities.<sup>8,9</sup> The lack of time to have meals clearly influences diet, as the main meals are usually replaced by quick snacks and processed products.<sup>10</sup>

Food prices are another factor associated with healthy eating practices among university students. A study carried out with freshmen from a Brazilian public university observed that, on weekends, there was a greater consumption of sweets and ready-to-eat foods, due to their convenience and lower cost.<sup>7</sup> Also, a bibliographic review on food environments in the USA showed that the cost was reported as the second most important factor in decisions about food purchases, and may influence mainly the purchase of fruits, vegetables and meats.<sup>11</sup>

In view of the above, this study aimed to investigate the occurrence of time and cost as obstacles to an adequate and healthy diet and their association with demographic and socioeconomic factors in university students.

## METHOD

This work is part of a larger study entitled "Consumo alimentar, comensalidade e obstáculos para uma alimentação adequada e saudável em estudantes da Universidade Federal do Pampa (Unipampa), *campus* Itaqui/RS" [Food consumption, commensality and obstacles to adequate and healthy eating among students at the Federal University of Pampa (Unipampa), Itaqui/RS campus], which has a cross-sectional observational design.

Itaqui is a municipality located in the extreme west of Rio Grande do Sul state, on the border with Argentina. According to an estimate by the Instituto Brasileiro de Geografia e Estatística<sup>a</sup> [Brazilian Institute of Geography and Statistics], there were 37,363 inhabitants in 2021, and in 2010 32.2% of its territory was urban, and its Human Development Index was 0.713. The municipality has an economy based on agriculture and livestock and is one of the largest rice producers in the country.

To participate in the research, students should be freshmen at Unipampa, Itaqui/RS campus in 2019, be regularly enrolled and be present on the day of data collection. According to information from the Pedagogical Projects of the Courses, 400 vacancies are offered annually, divided into five courses with 50 vacancies each and one course with 150 vacancies. However, throughout the semester, there are partial and/or total withdrawals, dropouts and other situations that may lead to a reduction in the initial number.

To collect information from the larger study, a self-administered questionnaire was used, prepared by the research authors based on the DGBP.<sup>2</sup> The outcomes considered for this study were two potential obstacles to the adoption of an adequate and healthy diet, time and cost. To investigate the users' perception of the influence of cost on food, four questions were used: 1 - *"Do you think that your difficulties in eating healthy are due to the high price of foods considered healthy?"* (Yes; No); 2 - *"How do you rate the price of fruits, vegetables and/or greens in the places where purchases are made?"* (Inexpensive; Fair; Expensive; I cannot rate it); 3 - *"Have you ever stopped buying fruits, greens and/or vegetables because of the price?"* (Yes; No); 4 - *"Of the two types of food mentioned below, which do you believe is more expensive?"* (Food based on processed foods - frozen, instant, soft drinks, etc.; Food based on natural foods - fruits, vegetables, rice, beans, etc.). To assess the perception of time, four other questions were asked: 1 - *"Do you think your difficulties in eating healthy are due to lack of time?"* (Yes; No); 2 - *"When having to prepare a meal, what is your first thought?"* (I am apprehensive as it will take a long time to prepare the meal; I am indifferent as preparing meals does not take a lot of time; None as I never need to prepare meals); 3 - *"Have you ever stopped preparing a meal due to lack of time?"* (Yes; No); 4 - *"Do you consider yourself an organized person with your time?"* (Yes; No). As exposures, demographic variables were investigated: sex and age (in complete years, obtained from the date of birth); socioeconomic: household composition (degree of kinship of residents with the interviewee), paid work (Yes; No) and economic class (based on the Brazil Economic Classification Criteria developed by ABEP, which takes into account the purchasing power of individuals);<sup>12</sup> and related to the university: shift (Daytime; Fulltime; Nighttime).

For fieldwork organization, lists of new entrants to Unipampa, Itaqui/RS campus, in 2019, were generated through the university's internal management system. In addition, prior contact was made with the professors responsible for the first semester curriculum components, to arrange data collection. The research team was trained to carry out data collection, thus standardizing the way of approaching and assisting the participants.

Data collection took place in April and May 2019, carried out in the classroom and conducted by six students, under the supervision of the professor coordinating the research project. Upon arriving at the classroom, the team introduced itself, gave a brief explanation about the research and invited everyone to participate. Then, the aforementioned inclusion criteria were verified, and the Free and Informed Consent Form (FICF) was delivered for individual reading. Students who agreed to participate in the research signed the FICF, returned it to the team and received the printed questionnaire. At that moment, the team explained how the questions should be completed and was available for any questions. As the students signaled that they had finished filling out the questionnaire, the team checked for possible filling errors, thanked the

<sup>a</sup> (<https://cidades.ibge.gov.br/brasil/rs/itaqui/panorama>).

student for participating in the research and delivered, as a form of immediate return, a folder with the “Ten steps to an adequate and healthy diet”.<sup>2</sup>

Data processing was carried out by two team members, trained by the professor coordinating the research project for this function. After reviewing the questionnaires, data were double-entered in the EpiData 3.1 program, typing validation and data export to the Stata 12.1 program, in which the statistical analyzes were conducted. Initially, all variables were explored, calculating absolute and relative frequencies. Then, for the bivariate analyses, some outcome variables were regrouped; in Table 3, “Consider the price of fruits, vegetables and/or greens to be expensive”: inexpensive + fair (no) vs expensive (yes) - the category “I cannot rate it” was considered missing; and in Table 4, “Feels apprehensive when having to prepare a meal”: apprehensive (yes) vs indifferent + none (no). In addition, 95% confidence intervals (95%CI) were obtained for all categories. Pearson's chi-square ( $p^h$ ) and/or linear trend ( $p^l$ ) tests were used, depending on the nature of variables, considering a significance level of 5%.

This study was approved by the Research Ethics Committee of Unipampa under opinion number 3,058,365, and the interviewees were asked to sign the FICF prior to the interview. At all stages of the study, compliance with the requirements set out in Resolution No. 466/2012 of the Brazilian National Health Council, which regulates the development of research involving human beings, was ensured.

## RESULTS

Of the 400 vacancies offered by Unipampa, Itaqui/RS campus, 353 were filled in the first half of 2019. During the data collection period, there were 29 course cancellations/lockouts; 03 non-enrolled students; 28 students dismissed; and 58 failed due to absence, in addition to 25 absences and 03 refusals. Thus, 207 students participated in the survey.

Table 1 presents the description of demographic, socioeconomic and university-related variables. It was observed that more than 60% of the participants were female and almost half were younger than 20 years old. Living with relatives was mentioned by 61.3% of the students, about 20% reported that they were currently engaged in paid work and most were included in economic classes B2, C1 and C2. Regarding the shift, approximately one third studied at night.

**Table 1.** Description of evaluated students, according to demographic, socioeconomic and university-related characteristics. Itaqui, RS, Brazil, 2019. (n = 207)

Characteristics	n	%	CI95%
Sex			
Male	68	32.9	(26.4 – 39.3)
Female	139	67.1	(60.7 – 73.6)
Age (complete years)			
< 20	100	48.3	(41.4 – 55.2)
20-29	79	38.2	(31.5 – 44.8)
≥ 30	28	13.5	(8.8 – 18.2)
Household composition			
Alone	43	20.8	(15.2 – 26.3)
Friends	37	17.9	(12.6 – 23.1)
Family	127	61.3	(54.7 – 68.0)

**Table 1.** Description of evaluated students, according to demographic, socioeconomic and university-related characteristics. Itaqui, RS, Brazil, 2019. (n = 207). Continues.

Characteristics	n	%	CI95%
Present work			
No	162	79.0	(73.4 – 84.6)
Yes	43	21.0	(15.4 – 26.6)
Economic class (ABEP)			
A	15	7.7	(3.9 – 11.5)
B1	22	11.3	(6.8 – 15.8)
B2	51	26.2	(19.9 – 32.4)
C1	44	22.6	(16.6 – 28.5)
C2	49	25.1	(19.0 – 31.3)
D-E	14	7.2	(3.5 – 10.8)
Shift			
Daytime / Fulltime	135	65.2	(58.7 – 71.8)
Nighttime	72	34.8	(28.2 – 41.3)

CI95%: 95% confidence interval

ABEP: Associação Brasileira de Empresas de Pesquisas [Brazilian Association of Survey Companies]

\* The maximum number of missing information was 12 (5.8%) in the economic class variable.

The description of the variables related to the obstacles to an adequate and healthy diet, cost and time, are shown in Table 2. More than half of the students indicated that a *"diet based on processed foods"* is more expensive than a *"diet based on natural foods"*. In addition, the majority did not consider the price of fruits and/or vegetables to be expensive. However, 76.3% of the students answered that they had already stopped buying these same foods due to the price and approximately 50% considered that the difficulties in having an adequate and healthy diet are due to the high price of foods considered healthy.

More than 40% of students considered themselves organized with their time. When asked about the first thought they have when preparing a meal, almost 70% of students reported "I am indifferent, because preparing meals does not take a lot of time" or "None, because I never need to prepare meals", indicating that time seems not interfere with meal preparation. However, when asked if they had already stopped preparing a meal due to lack of time, again, almost 70% answered positively. Finally, approximately 50% of the sample mentioned that the lack of time makes it difficult to adopt an adequate and healthy diet.

**Table 2.** Description of variables related to obstacles to adequate and healthy eating, cost and time. Itaqui, RS, Brazil, 2019. (n = 207)

Variables	n	%	(CI95%)
<b>COST</b>			
Which food do you believe has the highest cost?			
Based on processed foods	119	57.5	(50.7 – 64.3)
Based on natural foods	88	42.5	(35.7 – 49.3)

**Table 2.** Description of variables related to obstacles to adequate and healthy eating, cost and time. Itaqui, RS, Brazil, 2019. (n = 207). Continues.

Variables	n	%	(CI95%)
How do you rate the price of fruits, greens and/or vegetables?			
Inexpensive	03	1.4	(0.0 – 3.1)
Fair	111	53.6	(46.8 – 60.5)
Expensive	72	34.8	(28.2 – 41.3)
I cannot rate it	21	10.1	(6.0 – 14.3)
Have you ever stopped buying fruits, greens and/or vegetables because of the price?			
No	49	23.7	(17.8 – 29.5)
Yes	158	76.3	(70.5 – 82.2)
Does the high price of healthy foods make it difficult to adopt a healthy diet?			
No	63	51.2	(42.3 – 60.2)
Yes	60	48.8	(39.8 – 57.7)
<b>TIME</b>			
Do you consider yourself an organized person with your time?			
No	121	58.7	(52.0 – 65.5)
Yes	85	41.3	(34.5 – 48.0)
When having to prepare a meal, what is your first thought?			
Apprehensive, because it will take a long time	65	31.4	(25.0 – 37.8)
Indifferent, as it does not take a lot of time	113	54.6	(47.8 – 61.4)
None, as I never need to prepare	29	14.0	(9.2 – 18.8)
Have you ever stopped preparing any meals due to lack of time?			
No	62	30.1	(23.8 – 36.4)
Yes	144	69.9	(63.6 – 76.2)
Does the lack of time make it difficult to adopt a healthy diet?			
No	60	49.2	(40.2 – 58.2)
Yes	62	50.8	(41.8 – 59.8)

CI95%: 95% confidence interval

As variáveis relativas ao obstáculo custo apresentaram associação com sexo, idade, composição de moradia, classe econômica e turno de estudo (Tabela 3). A prevalência de universitários que acredita que uma alimentação à base de alimentos naturais é mais cara que uma alimentação à base de alimentos industrializados foi maior entre os participantes do sexo masculino ( $p=0,034$ ) e entre aqueles que estudavam à noite ( $p=0,006$ ). A percepção de que o preço das frutas, verduras e/ou legumes seja caro diferiu conforme a composição de moradia, sendo mais frequente entre estudantes que moram com amigos ( $p=0,016$ ). Já ter deixado de comprar frutas, verduras e/ou legumes por causa do preço apresentou associação inversa com a classe econômica, chegando a mais de 90% em estudantes das classes D+E ( $p=0,039$ ). Além disso, a frequência de estudantes que responderam que o preço elevado dos alimentos saudáveis dificulta a adoção de uma alimentação saudável aumentou conforme a idade ( $p=0,010$ ) e foi maior entre estudantes do noturno ( $p=0,039$ ).

**Table 3.** Description of the variables on the cost obstacle, according to the exposure variables. Itaqui, RS, Brazil, 2019. (n = 207)

Variables	Believe that food based on natural foods is more expensive.		Consider the price of fruits, greens and/or vegetables to be expensive.		Have stopped buying fruits, greens and/or vegetables because of the price.		High price of healthy food makes healthy eating difficult.	
	%	(CI95%)	%	(CI95%)	%	(CI95%)	%	(CI95%)
Sex	$p^h = 0.034$		$p^h = 0.568$		$p^h = 0.973$		$p^h = 0.444$	
Male	52.9	(40.9 – 65.0)	41.7	(29.0 – 54.3)	76.5	(66.3 – 86.7)	43.9	(28.4 – 59.4)
Female	37.4	(29.3 – 45.5)	37.3	(28.8 – 45.8)	76.3	(69.1 – 83.4)	51.2	(40.2 – 62.2)
Age (complete years)	$p^h = 0.180$		$p^h = 0.263$		$p^h = 0.612$		$p^t = 0.010$	
< 20	36.0	(26.5 – 45.5)	36.0	(25.9 – 46.0)	75.0	(66.4 – 83.6)	37.3	(24.7 – 49.9)
20-29	49.4	(38.2 – 60.5)	45.7	(33.9 – 57.5)	79.8	(70.8 – 88.7)	56.3	(41.9 – 70.6)
≥ 30	46.4	(27.5 – 65.4)	29.6	(12.0 – 47.3)	71.4	(54.3 – 88.6)	68.8	(45.1 – 92.4)
Household composition	$p^h = 0.443$		$p^h = 0.016$		$p^h = 0.064$		$p^h = 0.853$	
Alone	34.9	(20.4 – 49.4)	42.1	(26.1 – 58.1)	83.7	(72.5 – 95.0)	43.5	(22.6 – 64.4)
Friends	48.7	(32.2 – 65.1)	59.4	(42.0 – 76.8)	86.5	(75.3 – 97.7)	50.0	(29.4 – 70.6)
Family	43.3	(34.6 – 52.0)	31.9	(23.3 – 40.5)	70.9	(62.9 – 78.8)	50.0	(38.6 – 61.4)
Present work atualmente	$p^h = 0.794$		$p^h = 0.052$		$p^h = 0.489$		$p^h = 0.496$	
No	42.0	(34.3 – 49.6)	42.8	(34.6 – 50.9)	77.2	(70.6 – 83.7)	46.3	(36.1 – 56.5)
Yes	44.2	(29.1 – 59.3)	25.6	(11.7 – 39.6)	72.1	(58.4 – 85.7)	53.9	(34.1 – 73.6)
Economic class (ABEP)	$p^t = 0.072$		$p^t = 0.118$		$p^t = 0.039$		$p^t = 0.109$	
A+B	33.0	(23.0 – 42.9)	32.5	(21.9 – 43.1)	70.5	(60.8 – 80.1)	37.3	(23.7 – 50.8)
C	45.2	(34.9 – 55.4)	37.7	(27.2 – 48.1)	79.6	(71.3 – 87.9)	52.7	(39.3 – 66.2)
D+E	50.0	(22.6 – 77.4)	57.1	(30.1 – 84.2)	92.9	(78.8 – 99.9)	55.6	(20.8 – 90.4)
Shift	$p^h = 0.681$		$p^h = 0.574$		$p^h = 0.720$		$p^h = 0.039$	
Daytime / Fulltime	41.5	(33.4 – 50.0)	40.2	(31.8 – 49.1)	75.6	(67.6 – 82.1)	41.3	(30.7 – 52.8)
Nighttime	44.4	(33.4 – 56.1)	35.9	(25.1 – 48.4)	77.8	(66.7 – 86.0)	60.4	(46.0 – 73.2)

CI95%: 95% confidence interval



$p^h$  = Chi square of heterogeneity

$p^t$  = linear trend test

Table 4 shows that the variables on the time obstacle were associated with sex, age, housing composition, occupation and study shift. Regarding the organization of time, students aged 30 or over ( $p=0.002$ ), who are currently working ( $p=0.028$ ) and who study at night ( $p=0.006$ ) considered themselves to be more organized with their time. The prevalence of students who stated that they were apprehensive about having to prepare a meal was higher among male students ( $p=0.034$ ). The proportion of students who live alone and reported that they have already stopped preparing a meal due to lack of time was greater, compared to those who live with friends or family ( $p=0.011$ ). Likewise, the perception that the lack of time makes it difficult to adopt an adequate and healthy diet was also higher among students who live alone ( $p=0.012$ ) in relation to their peers.

**Table 4.** Description of the variables on the time obstacle, according to the exposure variables. Itaqui, RS, Brazil, 2019. (n = 207)

Variables	Considers him/herself an organized person with his/her time.		Feels apprehensive about having to prepare a meal.		Has already stopped preparing a meal due to lack of time.		Lack of time makes it difficult to adopt a healthy diet.	
	%	(CI95%)	%	(CI95%)	%	(CI95%)	%	(CI95%)
Sex	$p^h = 0.068$		$p^h = 0.034$		$p^h = 0.094$		$p^h = 0.225$	
Male	32.4	(21.1 – 43.6)	41.2	(29.3 – 53.0)	77.6	(67.5 – 87.7)	58.5	(43.1 – 74.0)
Female	45.7	(37.3 – 54.0)	26.6	(19.2 – 34.0)	66.2	(58.2 – 74.1)	46.9	(35.9 – 58.0)
Age (complete years)	$p^h = 0.002$		$p^h = 0.086$		$p^h = 0.106$		$p^h = 0.632$	
< 20	37.4	(27.7 – 47.0)	29.0	(20.0 – 38.0)	64.7	(55.1 – 74.2)	50.9	(37.9 – 63.8)
20-29	35.4	(24.8 – 46.1)	39.2	(28.3 – 50.1)	78.5	(69.3 – 87.7)	54.2	(39.8 – 68.6)
≥ 30	71.4	(54.3 – 88.6)	17.9	(3.3 – 32.4)	64.3	(46.1 – 82.5)	40.0	(14.1 – 65.9)
Household composition	$p^h = 0.152$		$p^h = 0.471$		$p^h = 0.011$		$p^h = 0.012$	
Alone	39.5	(24.7 – 54.4)	34.9	(20.4 – 49.4)	86.1	(75.5 – 96.6)	78.3	(60.9 – 95.7)
Friends	27.8	(12.9 – 42.7)	37.8	(21.9 – 53.8)	75.7	(61.6 – 89.8)	50.0	(29.4 – 70.6)
Family	45.7	(36.9 – 54.4)	28.4	(20.4 – 36.3)	62.7	(54.2 – 71.2)	42.7	(31.3 – 54.0)



**Table 4.** Description of the variables on the time obstacle, according to the exposure variables. Itaqui, RS, Brazil, 2019. (n = 207). Continues.

Variables	Considers him/herself an organized person with his/her time.		Feels apprehensive about having to prepare a meal.		Has already stopped preparing a meal due to lack of time.		Lack of time makes it difficult to adopt a healthy diet.	
	%	(CI95%)	%	(CI95%)	%	(CI95%)	%	(CI95%)
Present work	$p^h = 0.028$		$p^h = 0.383$		$p^h = 0.178$		$p^h = 0.236$	
No	37.3	(29.7 – 44.8)	30.3	(23.1 – 37.4)	67.9	(60.6 – 75.2)	48.4	(38.2 – 58.6)
Yes	55.8	(40.7 – 70.9)	37.2	(22.5 – 51.9)	78.6	(65.9 – 91.2)	61.5	(42.3 – 80.8)
Economic class (ABEP)	$p^h = 0.849$		$p^h = 0.606$		$p^t = 0.532$		$p^t = 0.529$	
A+B	41.4	(30.9 – 51.9)	33.0	(23.0 – 42.9)	72.4	(62.9 – 81.9)	49.0	(35.0 – 63.0)
C	37.6	(27.7 – 47.6)	26.9	(17.8 – 36.0)	69.9	(60.5 – 79.3)	55.6	(42.0 – 69.1)
D+E	42.9	(15.8 – 69.9)	35.7	(9.5 – 61.9)	64.3	(38.1 – 90.5)	55.6	(20.7 – 90.4)
Shift	$p^h = 0.006$		$p^h = 0.662$		$p^h = 0.672$		$p^h = 0.742$	
Daytime / Fulltime	34.3	(26.2 – 42.4)	30.4	(22.5 – 38.2)	70.9	(63.1 – 78.7)	52.0	(40.5 – 63.5)
Nighttime	54.2	(42.5 – 65.8)	33.3	(22.3 – 44.4)	68.1	(57.1 – 79.0)	48.9	(34.3 – 63.5)

CI95%: 95% confidence interval

 $p^h$  = Chi square of heterogeneity

 $p^t$  = linear trend test

## DISCUSSION

Most participants in this study believe that processed foods are more expensive than those based on natural foods and do not consider the price of fruits and/or vegetables to be expensive, suggesting that, in general, cost is not an issue to an adequate and healthy diet. About having already stopped buying fruits and/or vegetables because of the price, more than 75% of the students answered positively. The analysis of the two questions about fruits and vegetables in the present study suggests that when the students answered about the price, they may have been thinking about conventional, seasonal foods that are on sale, that is, those that they usually buy. On the other hand, when they answered about stopping buying, they may not have been thinking about the current moment or about the same foods, but about some moment in life or those foods that are not usually bought by them, because they have a higher price compared to others.

Also, when the cost was directly investigated as an obstacle, no difference was observed between the response categories, indicating that approximately half of the sample considers that the high price of healthy foods makes it difficult to adopt a healthy diet. This result may be related to the definition of “healthy foods”, which may be different among students. While some consider foods such as rice, beans, milk, eggs, meat, fruits and vegetables in general to be healthy, others may think of foods that are often presented in the media as healthy, for example, dried and oilseed fruits, exotic fruits (blueberry, gojiberry), cereal bars, wholemeal biscuits, shakes, etc. The self-perception of healthy eating has varied in the literature, depending on the public, study location and design.<sup>13-15</sup>

A study assessing the price of healthy and unhealthy foods over time in Brazil found that, in 1995, ultra-processed foods were the most expensive group, followed by processed foods, then unprocessed or minimally processed foods and culinary ingredients. Although the price of ultra-processed foods has suffered successive reductions since the beginning of the 2000s, until 2017 there was still an economic advantage in preparing meals at home, showing that in Brazil it is possible to maintain an adequate and healthy diet. However, if the downward trend in the price of ultra-processed products continues, the authors forecast that, from 2026, unhealthy foods will become cheaper than healthy foods, which may imply a decrease in the quality of food in the population.<sup>5</sup>

Most participants in this study reported that they do not consider themselves organized with their time and that they have already stopped preparing a meal due to lack of time, suggesting that this factor is an obstacle to having a healthy diet. However, when asked about the first thought when having to prepare a meal, almost 70% reported indifference or no thought. It seems that, “in general”, students consider that preparing a meal does not take a lot of time, but that “occasionally” they have already stopped preparing a meal due to lack of time.

In a public university in Bangladesh, it was found that, in periods prior to tests and exams, students choose not to prepare their meals and end up neglecting some of them, so they can have more time to study.<sup>16</sup> University students in Rio de Janeiro reported that they are unable to eat regularly due to lack of time, expressing that sometimes they can only “swallow something”. The authors<sup>17</sup> state that the reasons for this were the very extensive study load, the short intervals between classes, in addition to the time spent to travel to where meals were served.

The Reference Framework for Food and Nutrition Education (EAN) for Public Policies emphasizes the importance of strengthening the protagonism of individuals, with a view to encouraging the ability to make adequate and healthy food choices.<sup>18</sup> In this sense, it is understood that future EAN actions aimed at this public should include moments of reflection on the organization and management of time in academic life, so that students may consider jointly constructed solutions as feasible.

In this study, the prevalence of those who believe that a diet based on natural foods is more expensive was higher among male students. A study with a qualitative approach<sup>19</sup> carried out in Santos/SP identified that male individuals hardly participate in food purchases, so when they need to shop, they believe that healthy foods are more expensive compared to processed products.

The perception that fruits, greens and/or vegetables are expensive was associated with household composition, with a higher prevalence being observed among students who live with friends compared to those who live alone or with their family. In Bangladesh,<sup>16</sup> it was observed that when classmates bought food in canteens, the costs were shared between them, in order to increase the variety of foods consumed.

In this study, it can be observed that the lower the economic class, the greater the prevalence of students who have already stopped buying fruits and/or vegetables because of the price. In the same sense, a study evaluating data from the POF 2008-2009<sup>20</sup> observed the consumption of healthy foods as the main pattern in economic classes A+B, and in economic class E, the consumption pattern of processed and sugary products. Also, research carried out with male university students identified that the practice of replacing products with low nutritional value for healthy foods was directly associated with the family and individual income of the interviewees. When only individual income is analyzed, students generally did not have the financial margin to choose healthy foods.<sup>21</sup>

The frequency of students who considered the high price of food an obstacle to healthy eating was directly proportional to age and 1.5 times higher among students on the night shift. Additional analyzes showed that the oldest student is the one who works (probably during the day) and studies at night. These individuals are often heads of household, being responsible for most of the household expenses and, therefore, may perceive the price of food differently, unlike younger individuals who, for the most part, receive financial help from their parents to maintain their academic life.

Time management is an important characteristic for maintaining healthy eating habits, especially for individuals who study one shift and work another. Considering themselves to be organized with their time was perceived more frequently by individuals in the older category, who are currently working and studying at night. A survey carried out with students from a public university in the interior of Rio Grande do Sul found that most participants in the time management workshops were students from the initial and intermediate semesters, with a mean age of  $22.8 \pm 5.4$  years. This assumes that the problems faced by university students, such as time management and the need to plan their professional careers, was what motivated them to seek the workshops.<sup>22</sup>

Qualitative research that analyzed the association between dynamics related to food and gender showed that men appear as auxiliaries and as protagonists only in celebrations or when they feel like cooking something different, being the responsibility of the female figure to take care of the family's daily diet.<sup>19</sup> These results are in line with the present study, which found that the apprehensive thought when having to prepare a meal was more frequent among male students, suggesting that these tasks are not routinely performed by them.

The lack of time as an obstacle for having a healthy diet and having already stopped preparing a meal due to lack of time were situations mentioned more frequently by students who live alone compared to those who live with other people. A study with American university students<sup>23</sup> showed that support from friends to maintain a healthy diet was an important stimulus. In addition, parents also played a fundamental role in building good eating habits among students, as these were used to a routine in which parents prepared their meals and it was not necessary to worry about planning and preparing them. Additionally, research with students from the Federal University of Sergipe<sup>24</sup> observed that having a poor diet was related to not having

company at mealtimes and that the choice of healthy foods was favored by having the main meals with the family. This scenario can be further aggravated by the possibility that students, upon entering the university, are more concerned with having a good academic performance, participating in cultural relations and maintaining good social relations, leaving food care in the background.

A possible limitation of this study was the use of a non-validated questionnaire, which may have led to different interpretations by the students. In order to minimize this limitation, the questions were pre-tested with a similar population. The cross-sectional design must be taken into account for the interpretation of the results, which must be carried out with caution. Also, convenience sampling, used in the present study, allows exploration and generation of hypotheses on the subject, without extrapolating the results. It is suggested that research with other designs and validation studies be carried out, not only among university students, but with different populations, given the relevance of the theme to the current epidemiological scenario.

The overcoming of obstacles by university students should not be seen only individually, since the associated factors concern a collectivity. Institutional initiatives that seek to encourage, support, protect and promote the health and food and nutritional security of this public are necessary, and must be carried out together with the various sectors of the university, in order to address the issue comprehensively.

## CONCLUSION

The results of this study suggest that a considerable proportion of male university freshmen face difficulties, concerning time and food costs, to have an adequate and healthy diet. Still, those aged 30 or over, who live with friends, study at night and/or are in the lowest economy class more often perceive cost as an obstacle. Students under the age of 30, who live alone, study during the day/full time and/or do not work, perceive time as an obstacle more often.

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**Contributors**

Olivier GPF participated in data collection, analysis and interpretation, and paper writing. Almeida LC participated in paper writing and final review, and approval of final version for submission. Baptista EF participated in data collection, analysis and interpretation. Zanini RV participated in the study design, in data collection, analysis and interpretation; paper writing and final review, and approval of final version for submission.

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