

Artículo Original / Original Article

Food environment of a Brazilian public university: challenges to promote healthy eating

Ambiente alimentario de una universidad pública brasileña: desafíos para promover una alimentación saludable

ABSTRACT

This study evaluated the food environment (FE) of a Brazilian public university regarding availability, accommodation and economic accessibility. Audits and check lists were used. Foods and meals marketed in the university were classified according to their level of processing. FE of the university was composed of 21 food services (FS), a central university restaurant (UR) and four satellite UR. Accommodations in most FS included furniture for customers and two provided free water. UR had an adequate physical structure and provided water during meals. Meal prices were much higher in FS compared to the UR. With respect to availability, the highest percentage of foods marketed were ultra-processed. Fruits, vegetables were offered daily at the UR. The university food environment was characterized by providing a large supply of ultra-processed foods in FS located on all campuses; however, fresh or minimally processed food options were available only at UR.

Keywords: Environment; Food; Food and Nutritional Security; Food Service; University.

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RESUMEN

Este estudio evaluó el entorno alimentario de una universidad pública brasileña con respecto a las dimensiones de disponibilidad, alojamiento y accesibilidad económica. Se realizó una auditoría y se aplicó una lista de verificación. Los alimentos y comidas comercializados por los establecimientos alimentarios se clasificaron según su grado de procesamiento. El entorno alimentario de la universidad estaba compuesto por 21 Servicios de Alimentación, un Restaurante Universitario central y cuatro Comedores Satélites. El alojamiento en la mayoría de los servicios de alimentación incluía muebles para los clientes y sólo dos ofrecían agua gratuitamente. El Restaurante Universitario tenía una estructura física adecuada y proveía agua durante las comidas. Los precios de las comidas en los Servicios de Alimentación fueron más altos que en el Restaurante Universitario. En la dimensión disponibilidad, el mayor porcentaje de alimentos comercializados en los Servicios de Alimentación eran ultraprocesados. En el Restaurante Universitario disponía diariamente de frutas y verduras. En resumen, el entorno alimentario universitario, dominado por los Servicios de Alimentación ubicados en todos los campus se caracterizó por proporcionar

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un gran suministro de alimentos ultraprocesados. Sin embargo, las opciones de alimentos frescos o mínimamente procesados solo estaban disponibles en Restaurant Universitario.
Palabras clave: Ambiente; Alimentos, Seguridad Alimentaria y Nutricional; Servicio de Alimentación; Universidad.

INTRODUCTION

The increase in obesity prevalence worldwide among different age groups is a reflection of the interaction between environmental factors and genetic characteristics of each individual. The environment in which people live can be considered obesogenic as it seduces and induces the individual to consume high energy density foods and the adoption of sedentary lifestyles¹. Thus, the environment can promote or

not the adoption of healthy food choices and life habits^{2,3,4}.

The food environment is characterized as the union of several aspects related to food such as type, availability, nutritional quality, physical and economic accessibility, accommodation, advertising and labeling, which can highlight certain nutritional properties and, on the other hand, mask the real composition of foods³. Thus, barriers and facilitators of healthy food choices can influence diet-related outcomes, such as weight gain and obesity⁴. In this way, the government is increasingly concerned with the formation of food environments in institutional spaces such as schools, companies, universities and hospitals^{5,6} and the need to create strategies to promote healthy eating environments⁷.

One of the main pillars of universities is professional training, but it is important to recognize their role in the development and maintenance of healthy eating practices, considering the amount of time students spend at the university. Thus, it is important to recognize this space for its potential in promoting a healthy food environment. The food environment of Brazilian public universities usually consists of a University Restaurant (UR) and Food Services (FS) that provide quick and complete meals to the academic community. UR plays an essential role in the Student Assistance Policy by offering healthy meals and health promotion. FS are food stores that, through contracts and/or biddings, acquire the right to occupy a space within the university and contribute to the university food environment in the form of cafeterias, restaurants and snack bars, located in different areas of the university.

In general, FS offer practicality to users due to the lower need for commuting; however, they provide few healthy options due to the lack of availability of fresh foods and a high supply of ultra-processed products with more affordable prices, which make them more attractive at the moment of choice⁸. However, current dietary guidelines state that fresh or minimally processed foods should be the basis for a nutritionally balanced, tasty and culturally appropriate diet and promote a socially and environmentally-sustainable food system in which ultra-processed foods should be avoided⁹.

Food environments have been studied by researchers in several countries worldwide^{10,11,12,13,14}; however, there are few studies on the food environment of universities, especially regarding the relationship between university policy on student support and the construction of healthy food environments. Thus, the characterization of the university food environment is an important tool for more consistent analyses of potentialities and challenges. Public universities are charged with guaranteeing an environment capable of promoting adequate and healthy food in accordance with guidelines of the National Food and Nutrition Security Policy and the Human Right to Adequate Food provided by law. Thus, the aim of this study was to evaluate the food environment of a public university regarding availability, accommodation and economic accessibility dimensions.

MATERIALS AND METHODS

This was a cross-sectional quantitative study conducted at a Brazilian public university located in the State of Rio de Janeiro from June 2016 to April 2017. The study was conducted

in accordance with Resolution 466 / 12¹⁵ of the National Health Council, Ministry of Health, which ensures compliance with current ethical principles.

Characterization of the university spaces

The University is located in the municipality of Niterói and in 8 municipalities (Angra dos Reis, Campos dos Goytacazes, Macaé, Nova Friburgo, Santo Antônio de Pádua, Rio das Ostras, Volta Redonda, Petrópolis) in the state of Rio de Janeiro - Brazil. The present study was carried out in Niterói, which has three campuses, six Academic Units (AU) located in different neighborhoods, the university hospital and the rectory. In 2017, the University registered a population of 3,599 active teachers, 4,308 administrative technical workers, 2,150 outsourced personnel and 35,835 undergraduate students.

The FS are located inside campuses or in AU buildings. The UR produces an average of 7,500 daily meals that are distributed to its central cafeteria and 4 satellite cafeterias located in the university rectory and in 3 university campuses.

Data collection

The university food environment was evaluated in four categories: (a) university restaurant (complete meals), (b) cafeterias (snacks and sandwiches), (c) commercial restaurant (complete meals) and (d) mixed restaurants (snacks, candy store items, self-service and complete meals). At the time of data collection, the campuses had 1 UR and 21 FS, with 11 snack bars and 10 mixed restaurants.

The following were considered as food access dimensions: availability, physical and economic accessibility and accommodation, as described below²:

- Availability: corresponds to the number of food marketing equipment and type and variety of food marketed. The quality of these foods/beverages was defined based on the level of processing explained in the Food Guide for the Brazilian Population⁹, namely:
- Fresh and minimally processed foods: including those that can be consumed without suffering any alteration or those submitted to cleaning, removal of inedible parts, portioning, freezing and other processes that do not add some other substance that changes its original quality.
- Culinary ingredients: including substances from fresh foods that are used as items of culinary preparations, such as oils, vinegar, sauces, salt and sugar.
- Processed foods: including those made with added salt or sugar, oil or another processed ingredient on a fresh or minimally processed food.
- Ultra-processed foods: including industrialized products usually made with more than five ingredients that confer high palatability and longer duration. These ingredients are additives, antioxidants, stabilizers and preservatives.
- Accommodation: corresponds to the adaptation of the commercial establishment to the needs of consumers such as opening hours, days of operation and physical structure (drinker or free water, tables and chairs for meals).
- Physical accessibility: corresponds to the distance between

establishments that market meals and the academic units and the level of difficulty to reach these establishments.

- Economic accessibility: corresponds to the price to purchase these meals.

As a method to measure availability, accommodation and economic accessibility dimensions in FS and UR, an audit was conducted, which corresponds to the evaluation of the food environment by direct observation. In this observation, a check-list type instrument was used, combining information about the type and variety of food/beverages, opening hours, days of operation, price of complete meals and ambience of spaces destined for meals (existence of drinker or free water, tables and chairs for meals).

Specifically, in the UR audit, the frequency of fruits and vegetables (FLV) (healthy food markers) and ultra-processed foods (unhealthy food markers) offered in the monthly menu was considered⁹.

To assess physical accessibility, only access to UR and satellite cafeterias was considered. Thus, the distance between UR/satellite cafeterias and academic units/campuses by Google maps and the presence of facilitators/barriers to this access were observed.

Statistical analysis

Data obtained were processed and analyzed using SPSS software 17.013. The association between the quality of foods marketed according to the level of processing and types of food stores present in the university was verified by the chi-square test. Statistical significance was set at $p < 0.05$.

RESULTS

The study included 21 FS distributed among campuses and academic units, of which 52% (n= 11) were snack bars and 48% (n= 10) were mixed restaurants. All were located within the university. Among FS, 60% (n= 13) operated in the three shifts and 40% (n= 8) operated in the morning and afternoon shifts only. On Saturday, only half of FS opened in the morning shift. FS located in the university hospital operated on weekends and holidays in all three shifts. Regarding physical structure, most (n= 16) provided a place with furniture (table and chairs) for customers

and two provided free water. In the economic accessibility dimension, it was observed that the prices of complete meals marketed in FS ranged from R\$ 10 to R\$ 15.

UR provided complete meals (lunch and dinner) Monday to Friday, with adequate physical structure and a supply of free water during meals. In the economic accessibility dimension, meal cost was R\$ 0,70. The commuting of the academic community from academic units / campuses to UR / satellite cafeterias was performed by a free university shuttle and the distance between them was approximately 2 km.

With regard to the food availability dimension, in addition to the presence of FS and UR, the presence of a small weekly agro-ecological fair was identified in one university campus. The percent of foods marketed in FS according to the level of processing can be observed in figure 1.

Regarding the food supply by type of food store, the snack bar had greater availability of ultra-processed foods (66.8%), compared to mixed restaurants (52.6%) (Table 1).

Table 2 shows that UR menus offered FLV daily; however, the presence of ultra-processed foods was also observed (Table 2).

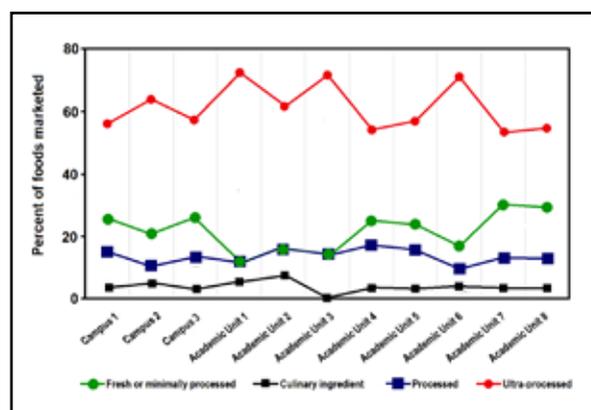


Figure 1: Percentage of food marketed in FS in campus and academic unit of a Public University according to the level of processing.

Table 1. Prevalence of foods according to processing level by type of food store in a Public University.

Type of food store	Food classification			
	Minimally processed n (%)	Culinary ingredient n (%)	Processed n (%)	Ultra-processed n (%)
Snack bar	39 (18.5)	22 (10.4)	9 (4.3)	141 (66.8)
Mixed restaurant (Snack bar and marketing of complete meals)	79 (27.7)	46 (16.1)	10 (3.5)	150 (52.6)
Total	118 (23.8)	68 (13.7)	19 (3.8)	291 (58.7)

Chi squared test= $p < 0.05$.

Table 2. Frequency of fruits, vegetables, sweets and ultra-processed foods in the menus of the university restaurant.

Offer frequency Days	Leafy foods		Vegetables B and C		Fruits		Sweets		Ultra-processed foods	
	n	%	n	%	n	%	n	%	n	%
	Days	14	77.7	18	100	14	77.7	4	22.2	18

DISCUSSION

Food consumption patterns of the Brazilian population has changed over the years and the consumption of foods outside home has increased¹⁶, which reinforces the idea that institutional food environments should be designed considering health promotion for groups of individuals. UR and FS can influence the eating behavior of students, especially regarding food quality and can encourage healthy practices and commensality¹⁷.

The present study showed that most foods marketed in FS are ultra-processed. The high consumption of these foods by university students has been related to the great volume of academic activities and consequent time limitation for complete meals^{18,19}. Thus, the increased offer of these products in food stores in universities can influence the choices of students who often spend most of their time in this environment, since they are enrolled in full-time undergraduate courses¹⁷. The offer of ultra-processed foods was also evidenced in a similar study where the majority of foods and beverages marketed in universities were of low nutritional quality⁸. In addition to the university space, studies have shown that food stores in school surroundings market exclusively ultra-processed foods^{20,21,22}.

The main characteristics of snack bars are convenience, practicality and service agility and, therefore, they market a greater variety of ultra-processed foods, as evidenced in this study. On the other hand, mixed restaurants offered a high variety of fresh or minimally processed foods, being justified by the greater offer of complete meals such as lunch. A similar study also showed that food stores that offer complete meals had higher availability of healthy foods compared to other establishments²³. In this sense, it could be inferred that places that offer complete meals facilitate access to a healthier diet.

UR is also part of the university's food environment, offering two complete meals (lunch and dinner) and can be considered a promoter of healthy eating due to the daily supply of FLV. On the other hand, industrialized juices, offered daily and classified as ultra-processed foods, can be considered a barrier to the promotion of healthy eating, as well as the offer of dinner on two university campuses. The use of healthy foods in the UR is critical for health

promotion among university students since for, many of them, UR is considered essential for adequate nutrition²⁴.

In recent years, access to higher education, especially by low-income youths, has gained ground in the agenda of the government and Brazilian society through public policies and affirmative actions directed at the most excluded social groups. The National Program of Student Assistance (PNAES), carried out within the scope of the Ministry of Education, aims to increase the conditions of permanence of young people in public higher education institutions in the various areas (student housing, food, transportation, health care, digital inclusion, culture, sports, daycare, pedagogical support)²⁵. Thus, in the food area, access to adequate and healthy nutrition at affordable prices (R\$ 0.70) at the UR is considered a student assistance action and can minimize the effects of social and regional inequalities in the permanence and completion of higher education studies^{26,27}.

There are other affirmative action programs in the nutrition area provided by this university such as the Food Grant Program. This is a benefit that provides lunch tickets only to undergraduate students from the most vulnerable socioeconomic group. The "Auxílio Alimentação" program grants monthly financial support to students enrolled in undergraduate courses located in other municipalities to help with food expenses. This program does not guarantee access to a healthy diet since courses in other municipalities do not have a UR.

Another facilitator is the shuttle that allows students to reach the UR and satellite cafeterias, since AU/campuses are located at a distance of approximately 2 km from UR/satellite cafeterias. Despite affirmative actions and easy access, the UR provides only 7,500 meals per day (Monday through Friday), representing only 15% of the total number of students, faculty and staff. Thus, the number is much below the ideal.

In general, considering access to adequate food in the food environment of the public university under study, it was verified that ultra-processed foods are widely marketed in FS and more than half of these food stores operate all day (morning, afternoon and night shifts). In the UR, despite the offer of fresh or minimally processed foods, industrialized juices are offered daily and the UR only offers main meals

(lunch and dinner) for a small portion of the university population.

Studies that characterize the food environment in different contexts and institutions^{8,17,28} have identified a contradiction between what is stimulated by the food guide for the Brazilian population and the reality observed. Likewise, this study identified the wide availability of ultra-processed foods, directly influencing the food choices of individuals and, thus, are a barrier to healthy eating habits. This reality can generate an environment of food insecurity, where the individual does not find options for adequate and healthy food choices²⁹. A study that evaluated the perception of university students about the university's food environment indicated the absence of healthy, diversified and low-cost food alternatives^{28,30}.

The promotion of healthy food practices in these environments is referenced in the National Food and Nutrition Policy, which is part of the National Health Promotion Policy (PNaPS)³¹ and in the affirmative action policies of the university and the National System of Food and Nutrition Security³². Currently, agreements between the University and authorized food stores contain clauses related to the hygiene and sanitary conditions of restaurants and cafeterias, the prohibition of fried foods, and the marketing of alcoholic beverages. However, contracts do not restrict the marketing and commercial promotion of foods and preparations with high levels of saturated fat, trans fat, sugar and salt, nor the promotion of the consumption of FLV, similar to that existing in the school context³².

In this context, and considering the increase in the pattern of obesity and non-communicable chronic diseases (NCD), the Brazilian government has proposed strategies for interventions to promote health. One of the proposals is the purchase of foodstuffs from family farms by public institutions such as the public-school system of basic and higher education and other public institutions with a regular supply of meals, such as the armed forces, health system units and prisons³³. Universities play a key role in supporting these programs, in mobilizing policy and raising awareness and support for efforts to prevent and control NCD³⁴. These actions are urgent in nature as, in addition to the increase in overweight and obesity, some studies have shown low consumption of fruits and vegetables by university students^{35,36}.

Thus, the university food environment needs to be a space of health promotion for young students who are vulnerable to the influence of the environment. The full academic development of students relates to the quality of education and effective assistance policies in terms of housing, food, health, sports, culture and leisure, among other conditions²⁷. In this way, the University needs to advance in the construction of a policy that considers in its guidelines the university food environment, with advances in the expansion of agro-ecological fairs to other campuses, increases in the offer of fresh or minimally processed foods and reduction / elimination of the offer of ultra-processed

foods, expansion of UR to other campuses, regulation of food advertising within the university environment, purchase of foodstuffs from family farms and sustainability actions in university settings.

The university must also be committed to the quality of foods marketed in authorized food stores and should review the strategies for the establishment of contracts with FS that prioritize offering fresh and minimally processed foods, limit the offer of ultra-processed products and promote a healthy food environment. In addition, the development of a partnership between FS and the University for support, education and actions for health promotion is of paramount importance as a strategy for the promotion of a healthy food environment.

However, it must be taken into account that many authorized food stores have been in service for many years at the University and many have structures that make changes difficult. The development of extension projects that allow the establishment of goals to improve these environments, with proposals possible to be implemented seems feasible. The inclusion of a pilot FS that offers healthier food can be an important step towards a change in the university food environment. In addition, the participation of the academic community in this process should be included through different mechanisms.

It can be concluded that the food environment of the public university studied is characterized by the availability of a great diversity of ultra-processed foods in FS located on all campuses. Fresh or minimally processed foods at affordable prices are available in the UR, which, despite the easy physical accessibility via a free shuttle, has restricted hours and is not able to serve the entire academic community.

It is necessary to invest and increase the number of UR to guarantee food and nutritional security to students through the elaboration and implementation of food and nutrition policies focused on the university space. In this way, it is possible to facilitate permanent access to healthy food at affordable prices, favoring the construction of a healthy university food environment.

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