ARCHIVOS LATINOAMERICANOS DE NUTRICIÓN
Revista de la Sociedad Latinoamericana de Nutrición
https://doi.org/10.37527/2023.73.1.002

Vol. 73 N° 1; enero - marzo 2023
Artículo Original

Ultra-processed foods in institutional food services: what are diners eating?

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Abstract: Ultra-processed foods in institutional food services: what are diners eating? Introduction. Frequent use of ultra-processed foods (UPF) leads to poor health outcomes, and the population must avoid their consumption. **Objective.** To assess the occurrence of ultra-processed foods (UPFs) in culinary lunch menus from various institutional food services. **Materials and methods.** Over one month, the five institutional food services analyzed served 1,128 culinary preparations; and a total of 3,863 ingredients were classified according to the extent and purpose of processing using the NOVA classification system. Associations between the occurrence of UPFs and the type, size, and management of food service establishments were analyzed. Five institutional food services in three municipalities (Bauru, Limeira, and Campinas), Brazil. **Results.** We found 8.4 % up to 12.6 % UPF ingredients used in culinary preparations. The highest frequency of UPFs was associated with private cafeterias (p = 0.002). Most UPFs were part of the recipe or the main ingredient in protein dishes and desserts (p < 0.05) and in university and hospital food services, respectively. UPF use was associated with food service size and type of management ($p \leq 0.003$) and was more prevalent in protein dishes (p = 0.003) and large-size institutional food services (28.8 %). Self-managed units (p = 0.03) also use high amounts of UPFs in protein dishes (20.3 %). **Conclusions.** The presence of UPF rounded 10%; the validity of this value needs further studies. There are no comparative data in the scientific literature regarding the use of these ingredients in institutional food service culinary preparations. Therefore, it is necessary to stimulate reflection to promote healthy food habits and adequate nutrition for diners. **Arch Latinoam Nutr 2023; 73(1): 8-18.**

Keywords: Ultra-processed foods, institutional food service, lunch menus, diner's health.

Resumen: Alimentos ultraprocesados en los servicios de alimentación institucionales: ¿qué comen los comensales?. Introducción. El uso frecuente de alimentos ultraprocesados (UPF) conduce a complicaciones de salud, y la población debe evitar su consumo. **Objetivo.** Evaluar la presencia de alimentos ultraprocesados (UPFs) en los menús de almuerzos de diversos servicios de alimentación institucionales. **Materiales y métodos.** Durante un mes, los cinco servicios de alimentación institucionales analizados sirvieron 1.128 preparaciones culinarias; y se clasificaron un total de 3.863 ingredientes según el alcance y el propósito del procesamiento, utilizando el sistema de clasificación NOVA. Se analizaron las asociaciones entre la ocurrencia de UPFs y el tipo, tamaño y gestión de los establecimientos de servicio de alimentos. Cinco servicios institucionales de alimentación en tres municipios (Bauru, Limeira y Campinas), Brasil. **Resultados.** Se encontró entre un 8,4 % hasta un 12,6 % de ingredientes UPF utilizados en las preparaciones culinarias. La mayor frecuencia de UPF se asoció a cafeterías privadas (p = 0,002). La mayoría de los UPFs formaban parte de la receta o eran el ingrediente principal en platos proteicos y postres (p < 0,05) y en los servicios de alimentación universitarios y hospitalarios, respectivamente. El uso de UPFs se asoció con el tamaño del servicio de alimentación y el tipo de gestión ($p \leq$ 0,003) y fue más frecuente en platos proteicos (p = 0,003) y servicios de alimentación institucional de gran tamaño (28,8 %). Las unidades autogestionadas (p = 0,03) también utilizan altas cantidades de UPF en platos proteicos (20,3 %). **Conclusiones.** La presencia de UPF ronda el 10 %; la validez de este valor necesita más estudios. No existen datos comparativos en la literatura científica sobre el uso de estos ingredientes en las preparaciones culinarias de los servicios de alimentación institucional. Por ello, es necesario estimular la reflexión para promover hábitos alimentarios saludables y una adecuada nutrición de los comensales. **Arch Latinoam Nutr 2023; 73(1): 8-18.**

Palabras clave: alimentos ultraprocesados, servicio de alimentación institucional, menús de almuerzo, salud del comensal.

Introduction

The NOVA classification aims to classify foods according to the extent and purpose of their industrial processing if any (1). The NOVA categorizes foods into four groups: Group 1 - *in natura* or minimally processed foods; Group

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2 - processed culinary ingredients; Group 3 - processed foods; and Group 4 - ultra-processed foods (UPFs). UPFs refer to those foods that contain at least one item within their ingredients that is characteristic of the NOVA ultra-processed food group, i.e., food substances that are never or rarely used in cooking - such as cosmetic food additives, different types of sugars, and modified oils, which allow shelf-life extension and may give the product other sensory properties (1). Most often, UPFs have high levels of total fat, free sugars, and sodium and lower levels of protein, fiber, and micronutrients (1,2). Due to the chemical properties of UPFs, there are several diseases and co-morbidities which may result from their consumption, such as the increased risk of mortality (3-6), development of cardiovascular disease (7,8), metabolic syndrome (9,10), overweight and obesity (11-14), depression (15), and gastrointestinal disorders (16).

Although the evidence of health problems associated with UPF consumption is clear, it is worth noting that these foods generally demonstrate 'attractive' aspects, such as convenient preparation or consumption, long shelf-life, and hyper palatability. These reasons may favor the exponential growth of the UPF market in the food service industry (17). Food service establishments frequently serve UPFs, such as ready-to-eat condiments, beverages, and desserts (18). However, we do not have national data to justify the high use of UPFs in these locals. Logistics and financial resources of food service operations may increase the use of UPF.

The food service industry includes many businesses, institutions, and companies that prepare meals outside the home (19). Among them are institutional food services, such as establishments that provide food in schools, public and private cafeterias, hospitals, and universities (20). According to Brazilian legislation, institutional food services must be managed by a nutritionist (21). Studies conducted in Brazil over the last twenty years show that meals served in institutional food services, especially in private cafeterias, are excessively high in calories and promote an increase in body mass index (BMI) and the prevalence of obesity (22-28). It is necessary to emphasize that such studies do not evaluate the quality of ingredients used in the culinary preparation of food services. Therefore, this paper attempts to fill a scientific gap in this area, aiming to evaluate the quality of culinary ingredients according to their degree of industrial processing, understanding that the use of UPFs in the menus of institutional food service could help to develop specific strategies for this sector. This study is the first that attempts to evaluate and classify each recipe offered in different types of institutional food services using a thorough assessment. Thus, this study aimed to analyze the ingredients used in various categories of the institutional food service menus, according to the NOVA classification, and evaluate the occurrence of UPFs in all culinary preparations.

Materials and Methods

Contact with the units and inclusion criteria

A cross-sectional, descriptive, and exploratory study was developed after approval from the Research Ethics Committee of the University of Campinas (UNICAMP) (No. 3.115.326). This study was conducted in institutional restaurants in the Campinas region, São Paulo - Brazil. The sample consisted of five institutional food service facilities in three municipalities (Bauru, Limeira, and Campinas) in the interior of the Brazilian state of São Paulo. The study included institutional food service facilities (private cafeterias in companies, private hospitals, and universities). Selection criteria included that a) had a nutritionist as manager and b) served at least one full meal. The menu must consist of a salad (leafy green option), base dish (rice and beans), protein dish (red or white meat), a side dish to accompany the main course (i.e., mashed potatoes), dessert (fruit or ready-made, i.e., gelatin), and an optional beverage.

Contact with food services took place from April 2019 to March 2020, initially by phone and later by email, to present the study's details. Out of 117 food services contacted, five agreed to participate in the study (4.2%), namely #1: university A; #2: private cafeteria A; #3: private cafeteria B; #4: hospital; and #5: university B. Note that the menu analyzed at the hospital was served only to hospital staff. The number of adherences was low mainly because, in Brazil, no legislation obliges establishments to disclose the ingredients used in culinary preparations. Therefore, there may be fear on the part of institution managers to reveal the

ingredient composition since it is known that ultra-processed foods should be avoided. Also, due to the Covid-19 pandemic scenario, data collection could not continue as planned beyond March 2020.

Data collection

In-person, data-collection occurred from April to November 2019. Analyses of lunch menus took place over one month (24 days on average). All culinary preparations served during this period were first registered ('name of preparation'), and their ingredients were listed. Meal's standard recipes were checked, and if the institution did not have a technical file, the preparation procedures were observed on-site with the cook in charge. A team of trained researchers carried out this procedure by adopting a qualitative assessment of the menu preparations without any quantitative measurement of ingredients.

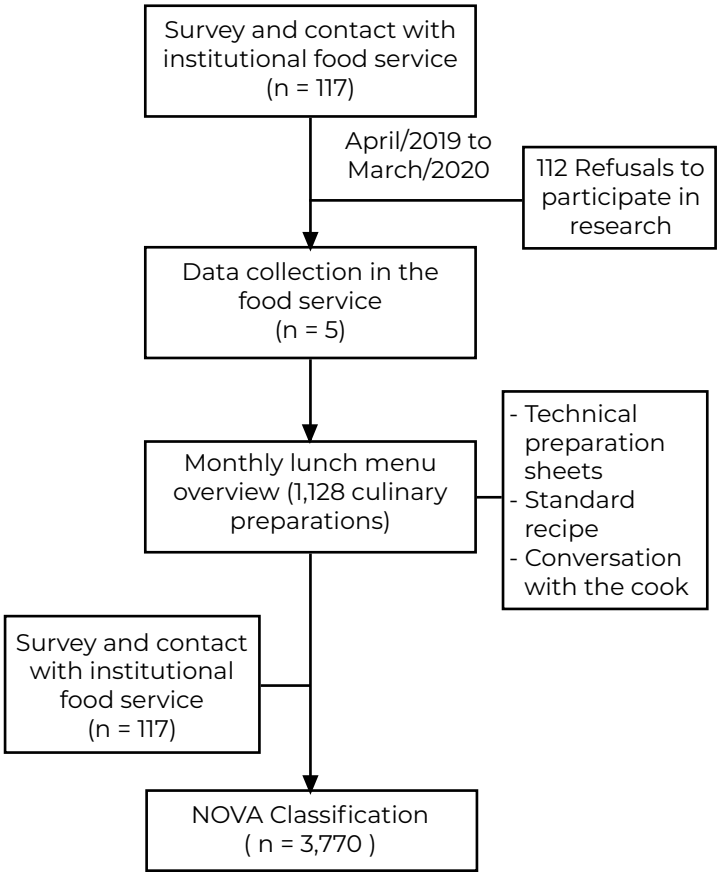

Figure 1. Development stages of the study and the classification of ingredients.

An image database of package photographs from stocks available in both the dry and refrigerated deposits served to compile the ingredient lists of prepared foods. The access to ingredient lists allowed us to classify in-stock items as processed foods or UPFs according to NOVA classification (1). It was necessary to categorize all the ingredients used for each lunch preparation rather than the culinary preparation *per se*.

In this study, the acronym UPFs represent all ultra-processed foods utilized. It includes foods and ultra-processed ingredients used in culinary preparations, such as sausage and meat seasoning.

Classification of ingredients and items in stock

A decision flowchart (Botelho *et al*., (29), as adapted by Monteiro *et al*., (1), was used to avoid the under or overestimation of Nova Ingredients (1). With this tool, we used the same classification criteria for all ingredients. Four groups were established: unprocessed or minimally processed food; processed culinary ingredients (such as oils, fats, salt, and sugar); processed food; and UPF. The classification obtained was verified by another researcher to warrant reliability.

If there was not enough information on an ingredient for its classification, for instance, if the label did not provide a list of ingredients, the Conservative-Criterion was used (30). According to this norm, when in doubt, the item is retained or classified in the lowest level of processing. Figure 1 illustrates the development stages of the study and the ingredient classification.

Characteristics of institutional food services

Institutional food services were classified into three groups by their size based on the number of meals served daily: small (up to 500 meals per day), medium (501 to 2.000 meals per day), and large (2.001 to 10.000 meals per day) (31). We also grouped them by local type (university, company, or hospital) and management (outsourced or self-managed)

Statistical analysis

The occurrence of UPFs in each menu category was identified and described as frequency (absolute and relative); a 95 % confidence-interval was established. Pearson's chi-square test was used to establish associations between the occurrence of UPF and various characteristics of food services. For this purpose, the items from NOVA were divided into two groups, the first including in natura/minimally processed foods, processed culinary ingredients, and processed foods (referred to as the "non-UPF" group) and the other containing only UPFs. For the analyses, food services were grouped by type of establishment: private cafeterias (n = 2), public hospitals (n = 1), and public universities (n = 2). Associations were also made based on the food service size (small, medium, or large), type (university, company, or hospital), and management (outsourced or self-managed) (31). Analyses were conducted using the Statistical Package for Social Sciences, version 15.0.1 (SPSS Inc., Chicago, Ill., USA). Values of $p < 0.05$ were considered significant.

Results

A total of 3,863 ingredients used in 1,128 culinary preparations included in the one-month lunch menus of the five food services were analyzed. Two food services were small-sized (#2 and #4 served up to 500 meals per day), two were medium-sized (#3 and #5 served between 501 and 2000 meals per day), and one was large (#1 served more than 2001 meals per day). Regarding the management of food services, three were outsourced (#2, #4, and #5), and two were self-managed (#1 and #3). The conservative criterion was applied to 316 ingredients (8.18 %) of the total of 3,863 items in the menus, with the conservative-criterion being most used in private cafeterias (n = 169), followed by the hospital (n = 96) and universities (n = 51). The sample included food services with different characteristics regarding the standardized menu. Thus, the categories "vegetarian dishes" and beverages (artificial juices) were not used for evaluation analysis in this study, as they were missing from 60% of the food services. In this way, the results of the analyses of 3,770 ingredients used in the other menu categories are presented.

Occurrence of UPFs in menus

The frequency of occurrence of UPFs in lunch menus varied. The average use of UPF in the food services searched was 10.8 %. Restaurant #3 (private cafeteria) had the highest proportion of UPFs on the menu (13.1%; p=0.002), followed by restaurant #2 (private cafeteria) with 12.3 %. Restaurant #1(university) and restaurant #4 (hospital) showed, respectively, 10.6 % and 9.9 % of UPF occurrence on the menu, while restaurant #5 (university) had the lowest (6.5 %). When analyzing the prevalence of UPFs by the type of food service establishment, a higher association of the use of UPFs (p = 0.002) in comparison to non-UPFs was found in private cafeterias (12.6 %), followed by the hospital (9.9%), and universities (8.4 %) (Table 1).

Table 2 shows the occurrence of ingredients in each menu category and by NOVA, size, and management of food services. An association was found between the use of UPFs in salads (p < 0.001) and the side dishes (p = 0.009) served in the restaurants of the private cafeterias, with a frequency of 9.3 % and 20.3 %, respectively. The frequency of UPF use in protein dishes was higher in universities (p < 0.001). On

Table 1. Occurrence of ingredients on the menu of the evaluated food services, grouped according to the NOVA classification.

Food service	NOVA classification *		Total n (%)
	Non-UPFs n (%)	UPFs a n (%)	
Universities (n=2)	831 (91.6)	76 (8.4)	907 (100)
Private cafeterias (n =2)	1597 (87.4)	231 (12.6)	1828 (100)
Hospital	933 (90.1)	102 (9.9)	1035 (100)
Total	3361 (89.2)	409 (10.8)	3770 (100)

*Grouping is according to the NOVA classification (1). ap = 0.002, significant occurrence of UPFs in culinary preparations. Non-UPFs: includes in natura or minimally processed foods, processed culinary ingredients, and processed foods; UPFs: includes ultra-processed foods only.

Table 2. Occurrence and associations of ingredients in each menu category according to the NOVA classification, size, and management of food services.

Menu categories	NOVA Classification*	Total %	Food service			*p*	Size‡			*p*	Management§		*p*
			Universities (n=2)	Private cafeterias (n=2)	Hospital (n=1)		Large (n=1)	Medium (n=2)	Small (n=2)		Self-management (n=2)	Outsourced (n=3)	
			%	%	%		%	%	%		%	%	
Salad	IN/MP	75.9	96.9	69.7	67.7	<0.001	98.0	72.7	71.9	<0.001	85.4	72.7	0.54
	ICP	9.3	0.5	7.3	20.2		0	12.0	3.1		1.5	12.0	
	P	7.6	1.5	13.8	3.1		2.0	8.5	8.3		5.1	8.5	
	UPF	7.1	1.0	9.3	9.0		0	6.8	16.7		8.1	6.8	
	Total	100	100	100	100		100	100	100		100	100	
Protein dish	IN/MP	52.3	42.3	54.0	56.5	<0.001	38.7	53.8	54.1	0.003	49.5	53.8	0.03
	ICP	22.3	21.9	21.2	25.6		18.0	23.4	21.2		20.3	23.4	
	P	8.0	11.4	7.2	7.2		14.4	7.2	7.3		9.5	7.2	
	UPF	17.4	24.4	17.6	10.8		28.8	15.5	17.4		20.8	15.5	
	Total	100	100	100	100		100	100	100		100	100	
Side dish	IN/MP	50.6	56.1	47.3	55.2	0.009	45.7	52.0	46.2	0.35	46.1	52.0	0.15
	ICP	25.7	25.5	25.2	27.0		25.7	24.8	29.5		28.7	24.8	
	P	6.9	7.1	7.1	6.3		8.6	7.6	3.8		4.8	7.6	
	UPF	16.8	11.2	20.3	11.5		20.0	15.6	20.5)		20.4	15.6	
	Total	100	100	100	100		100	100	100		100	100	
Dessert	IN/MP	65.2	67.2	74.8	52.6	<0.001	71.4	69.2	48.1	0.19	56.1	69.2	0.07
	ICP	5.7	6.9	8.1	2.1		10.7	1.6	16.7		14.6	1.6	
	P	6.4	1.7	9.9	5.3		0	3.3	20.4		13.4	3.3	
	UPF	22.7	24.1	7.2	40.0		17.9	25.8	14.8		15.9	25.8	
	Total	100	100	100	100		100	100	100		100	100	

* Retrieved from NOVA (1). IN /MP: in natura or minimally processed food; ICP: processed culinary ingredients; P: processed food; UPF: ultra-processed food.
‡ Size. Small: up to 500 meals per day; medium: from 501 to 2000 meals per day; large: more than 2001 meals per day.
§ Management. Outsourced: hospital, one university, and one company; self-management: one university and one company

average, this menu category contained 17.4 % UPFs. For desserts, there was an association with the use of UPFs in hospital meals ($p < 0.001$), which contained up to 40 % UPFs on average. No association was found in the analysis of rice and beans (base dish), as the food services do not use UPFs in these culinary preparations.

Classification of ingredients into menu categories according to the size and management of institutional food services.

The occurrence of UPFs in the menu categories was related to the size and type of management in the food service. Regarding size, there was an association between salads ($p < 0.001$) and protein dishes ($p = 0.003$). Small food services used more UPFs in salads (16.7 %), while the large ones used more UPFs in protein dishes (28.8 %) (Table 2). UPFs were related to the type of management only in protein dishes ($p = 0.03$), with more use in food services with self-management (20.3 %) (Table 2).

The most frequently used UPFs in the menu categories

Table 3 shows the most frequently used UPFs in each menu category. The most commonly used UPFs in the private cafeteria salads were: mayonnaise, mozzarella cheese, chicken broth, soy sauce, and cream. In addition,

Table 3. Ultra- processed foods (UPFs) with the largest share in each category of the menus of the food and nutrition units studied. Campinas, 2019

Menu categories	Ingredients				
	n (%)				
Salad	Mayonnaise	Mozzarella cheese	Chicken broth	Soy sauce	Heavy cream
	15 (1.94)	5 (0.65)	4 (0.52)	3 (0.39)	3 (0.39)
Protein dish	Soy sauce	Mozzarella cheese	Broth	Mustard	Chicken broth
	28 (2.71)	26 (2.52)	11 (1.07)	11 (1.07)	8 (0.78)
Side dish	Margarine	Mozzarella cheese	Ham	Pepperoni sausage	Cream cheese
	18 (2.65)	14 (2.06)	8 (1.18)	8 (1.18)	5 (0.74)
Dessert	Gelatin	Pudding powder	Condensed milk	Curing powder	Creamy guava
	16 (6.03)	9 (3.41)	5 (1.89)	5 (1.89)	3 (1.14)

private cafeterias provided condiments like ready-made salad dressings that, although not counted as an ingredient in the recipe, were used frequently, as observed during on-site data collection. In the side dishes, we listed margarine, mozzarella cheese, ham, pepperoni sausage, and cream cheese as the main UPFs. In protein dishes, the main UPFs used included prepared condiments, mozzarella cheese, and mustard sauce, while in desserts, gelatin, and ready-to-use powdered mixes for sweets stood out as the principal UPFs.

Discussion

The most frequently used UPFs in the menu categories

Table 3 shows the most frequently used UPFs in each menu category. The most commonly used UPFs in the private cafeteria salads were: mayonnaise, mozzarella cheese, chicken broth, soy sauce, and cream. In addition, private cafeterias provided condiments like ready-made salad dressings that, although not counted as an ingredient in the recipe, were used frequently, as observed during on-site data collection. In the side dishes, we listed margarine, mozzarella cheese, ham, pepperoni sausage, and cream cheese as the main UPFs. In protein dishes, the main UPFs used included prepared condiments, mozzarella cheese, and mustard sauce, while in desserts, gelatin, and ready-to-use powdered mixes for sweets stood out as the principal UPFs.

In general, from 6.8 % to 13.1 % of UPFs were used in the culinary preparations of the five food service menus. Private cafeterias had the highest occurrence of UPFs on the menus, with food service #3 representing the highest use of UPFs (13.1%). These values appear meaningful. Generally, UPFs increase the concentration of sugars, fats, and sodium and decrease the concentration of proteins, fibers, and micronutrients in the diet (1).

Associations were found between UPFs' presence in all menu categories, except for the base dish (rice and beans), which contained no UPFs. The consumption of rice and beans at lunchtime is a Brazilian habit using only natural spices, such as garlic and onions, is in line with the requirements for a healthy diet and the nutritional guidelines recommended by the Dietary Guidelines for the Brazilian Population (32,33). We observed that mayonnaise and ready-to-eat sauces were the main UPFs used in the salads in private cafeterias. They may increase, for instance, the sodium levels in these culinary preparations (34), despite the nutritional recommendations encouraging the consumption of vegetables in salads (34).

Interestingly, the main ingredients contributing to UPFs (17.4%) in protein dishes were ready-made seasonings (i.e., stock cubes), for fresh or minimally processed meat, or meat substitutes, like sausage, chicken steaks, and others. Ready-made condiments are generally convenient, while meat substitutes are a cheaper alternative for fresh meat preparations. According to a Brazilian population survey (Household Budget Survey), meat consumption in Brazil remains high and, together with rice and beans, forms the staple of the traditional Brazilian diet (35). Therefore, it is necessary to monitor the tendency to include these meat substitutes due to the high price of fresh meat. For example, in the last three years (between July 2019 and April 2021), meat prices increased by 38% in the State of São Paulo, Brazil (36). Meat substitutes are easy to prepare (1), cost less than protein sources from other NOVA groups (37), do not require specialized professionals to prepare (38), and are accessible and convenient (39,40). Considering the relationship of UPFs used in protein dishes with the company size, like the large university, it probably results from the simplicity of preparing these foods (1), as large-size food services require adjustment in operationalization and cost control. Although it is difficult to derive an explanation from these results, a meaningful debate can be motivated. In this case, while the average use of UPFs was 17.4 %, in food establishments with a self-management system, it was 20.8 %. Besides the costs, some influencing factors can be mentioned (41), such as the storage capacity, the feasibility of the offer, the number of employees, and technological innovation. In addition, in some food service institutions, like public institutions (large university #1), the food procurement process faces certain obstacles during the tendering and budget forecasting process (31).

UPFs should be avoided (32). It is important to note that in the case of the private cafeterias, the use of UPFs in the side dish was probably due to the need to diversify the menu since they usually offer three types of side dishes daily. While using UPFs facilitates the preparation and increases acceptability, it reduces the availability of minimally processed foods. Besides, considering the results found and the most commonly used UPFs in all menu categories replacing most UPF items could be relatively easy in the food services since most of them are not the main ingredient of the dishes, except in the dessert case, and some protein dish preparations. It is also worth noting that although drinks were present on the menu of two food services, they were always UPFs.

Despite being early, it is necessary to discuss the presence of UPFs in desserts (30%), especially in the hospital (40%). Despite being served only to hospital staff, it is relevant to identify which factors determine this choice (i.e., the food service contract). Sometimes, these kinds of desserts, like ready-made desserts, are used for convenience. Therefore, starting from the premise that hospitals are health-promoting institutions is essential to consider the nutrition education iniciatives carried out by local dietitians trained to promote health interventions (42,43).

Besides the associations of UPF occurrence with size, management, and menu category, it is necessary to discuss the various health problems associated with frequent UPF consumption (43). Recurrent consumption of UPFs in meals consumed inside and outside the home can affect population health, as shown by various national and international studies (8,10,11,16,40,44-47). Considering that workers or students visit restaurants or institutional cafeterias about 20 days a month, it is reasonable to assume that regular exposure to UPFs may promote diseases related to poor nutrition. For this reason, the premise was that the absence or minimal presence of UPFs in the culinary preparations served in these food service establishments should be the "ideal" as these places should be health-promoting environments and "safe places" committed to offering healthier food and preparations. Although the nutritional parameters established in the national recommendations must guide the development of food service menus (48), the regular consumption of UPFs, to the detriment of offering in natura or minimally processed foods, can increase the consumption of fats and additives and reduce the levels of protein, fiber, and micronutrients, such as iron and zinc (1,18,40). For these reasons, it is necessary to carefully assess the quality of meals beyond the calculation of nutritional value and to publish the ingredients for the different culinary preparations on menus, as every consumer should know what they are eating (49).

The results of the present study can contribute to a discussion on the appropriateness of using UPFs in institutional food services. It should be borne in mind that even minimally processed foods have a certain level of convenience and that fresh food preparation can be made more practical by using appropriate kitchen equipment and developing the skills of the food handlers. In this sense, the current study justifies the implementation of training programs to favor the development of culinary skills of nutritionists and food handlers for healthy and practical meal preparation. The enactment of permanent food and nutrition education programs for those involved in food purchasing and production is necessary because everyone should be aware of the impact of UPF consumption on the population's health. To limit the abundance of UPFs in the food environment of institutional food services, we should promote public awareness of this issue to promote adequate and healthy diets for the population in general.

Study limitations

This study has some limitations, described as follows: the lack of technical preparation sheets for most preparations, and possible errors in reporting, forgetting or changing recipes by the cook in charge (i.e., emergency substitutions) or differences between what is written on the technical sheets or in the recipe book for a given preparation. Although this limitation reflects the reality of restaurants, the researchers consulted the standard recipe and, if necessary, the cook in charge. It is important to note that the scenario of the COVID-19 pandemic, followed by the policy of social isolation and the impact suffered by the restaurant sector during this period, contributed to an increase in the refusal of managers to participate in this research.

Although this is a preliminary study, it shows that the quality of meals on institutional food service menus requires a careful assessment to comply with the recommendations of recent studies and the Dietary Guidelines for the Brazilian Population (32). More comprehensive studies are needed to investigate possible links between eating habits and regular consumption of meals served in institutional restaurants and workers' health. There is also a need to study consumer perceptions and their health status to determine the possible harms of the frequent consumption of ultra-processed foods.

Conclusions

UPF usage was widespread in all categories of the analyzed menus except for the base dish (rice and beans). Private cafeterias had a higher occurrence of UPFs in the general menu. Their presence in each menu category, particularly in the protein dish, was prominent in universities. The results of the present study may stimulate reflections to improve the quality of ingredients used in the different culinary preparations in institutional food services. Moreover, it is necessary to emphasize that most of the UPF items in our study are easily replaceable since they are not the main ingredients except in desserts. This measure could effectively avoid the consumption of UPFs by diners. The GAPB and the NOVA classification bring qualitative recommendations for ingredients and foods. The present study focuses on quantitative data based on ingredients used in culinary preparations. So, it was impossible to infer whether our data were high or low. Our data serve as a warning for institutional food services, which should be aware of the health conditions of local diners. Finally, it is necessary to discuss the rights of consumers to have access to information on which and how much of each ingredient appears in each culinary preparation served so that they can make healthier food choices. Further studies are needed to assess the prevalence of these foods on menus to support appropriate policy decisions to reduce the institutional use of UPFs.

Acknowledgements

We are grateful for the National Council for Scientific and Technological Development (CNPq) for the scientific scholarship granted to N.S.B. (PIBIC CNPq) and the São Paulo State Research Support Foundation (FAPESP – Process 2019/06745-4) for the scientific initiation scholarship granted to A.R.N.

Financial Support:

This study was financed in part by the Coordination for the Improvement of Higher Education Personne (CAPES – Brazil) - Finance Code 001, by the scholarship granted to M. P.

Conflict of interest:

No conflicts of interest declared.

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Recibido: 14/12/2022
Aceptado: 30/01/2023