



## Nutritional quality of Federal Education Institutions

### *Qualidade nutricional dos cardápios de Instituições Federais de Educação*

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#### ABSTRACT

This study aimed to evaluate the quality of the planned menus of Federal Education Institutions (FEI) in the city of Rio de Janeiro and Niterói. The method used was a cross-sectional study conducted in eleven FEI through the lunch menu analysis, through the Quality Index of the Food and Nutrition Security Coordination (QI FNSC), which qualifies the menu as to the presence of six food groups, presence of regional and socio-biodiversity foods, weekly food diversity and absence of restricted, prohibited foods and sweet foods or preparations. The assessment of the quality of the menus shows that 63.6% of the FEI are adequate and 36.3% need some improvements, specifically related to the increase of fresh fruits, vegetables, regional foods and sociobiodiversity. It was concluded that the use of QI FNSC tool enabled the analysis of the quality of the FEI menus and it was verified the need of their adaptation in favor of the improvement of the school feeding.

**Keywords:** School feeding. School. Menu planning. Food and Nutrition Security.

#### RESUMO

O objetivo deste estudo foi avaliar a qualidade dos cardápios planejados de Instituições Federais de Educação (IFEs) no município do Rio de Janeiro e de Niterói. Trata-se de um estudo transversal realizado em 11 IFEs mediante análise de cardápio de almoço, por meio do Índice de Qualidade da Coordenação de Segurança Alimentar e Nutricional (IQ COSAN), que o qualifica quanto a presença de seis grupos alimentares, presença de alimentos regionais e de sociobiodiversidade, diversidade semanal de alimentos e ausência de alimentos restritos, proibidos e alimentos ou preparações doces. A avaliação demonstra que 63,6% das IFEs estão adequadas e 36,3% precisam de melhorias, especificamente relacionadas ao aumento da oferta frutas *in natura*, hortaliças, alimentos regionais e da sociobiodiversidade. Concluiu-se que o uso da ferramenta IQ COSAN possibilitou a análise da qualidade dos cardápios das IFEs e demonstrou a necessidade de adequação deles em favor de uma melhor alimentação escolar.

**Palavras-chave:** Alimentação escolar. Escola. Planejamento de cardápio. Segurança Alimentar e Nutricional.

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## INTRODUCTION

Federal Education Institutions (FEI) and all Brazilian public schools for early childhood, elementary, technical education, and high school, whether federal, state, and municipal, offer free and quality food to all students enrolled as part of the National School Feeding Program (known in Brazil by the Portuguese acronym, PNAE). Intending to meet the students' nutritional needs partially, it has changed throughout its history, specifically in the dietary guidelines, reflecting the changes in food and nutrition in Brazil, the population's demands, and changes in society<sup>1</sup>. Decentralization of federal resources to states, municipalities, and the Federal District in the 1990s was reflected in the expansion of the management role of these entities and also made it possible to improve the quality of the menus, with the inclusion of fresh foods, respecting the students' eating habits and the local agricultural "vocation".<sup>2,3</sup>

In changes to the PNAE guidelines, the National Fund for Education Development (known in Brazil by the Portuguese acronym, FNDE) highlights importance as an inducer and regulator of different strategies for improving Brazilian schools' food. In 2001, the mandatory inclusion of 70% raw foods purchased with funds transferred by the federal government was determined, with repercussions on meals' nutritional quality.<sup>2,4</sup>

In 2009, School Feeding Law's enactment included the mandatory use of 30% of those resources transferred by FNDE to executing entities to purchase food from family farming. This practice plays significant consequences on local development and expansion in the supply of fresh food in school meals.<sup>5-7</sup> These measures have directly impacted farmers' income, the productive structural organization of properties, and the increase in the diversity and variety of fresh products, in addition to encouraging small agro-industrial cooperatives.<sup>8</sup>

Dietary and nutritional guidelines are well detailed in the PNAE legislation and represent a

management mechanism based on the need to maintain meals with a standardized nutritional value throughout the national territory, but that simultaneously guarantee the diversity and socio-cultural adequacy of the regions and population served by the program.<sup>4,6</sup>

Regarding the quantitative aspects of school meals, there was an increase in the percentage of energy differently by the period of attendance at school and by clientele: previously characterized by 15% of daily energy needs, it increased to 30%.<sup>3,9</sup> Other regulations have advanced, determining reference values for the supply of energy, macro and micronutrients subdivided by education category and age group. In addition to the quantitative approach, the legislation also began to focus on qualitative aspects. It included the restriction of foods with a high amount of fat, salt, and sugars, the prohibition of drinks with low nutritional value, and the mandatory supply of fruit and vegetables in menus three times a week to encourage fresh foods consumption.<sup>5,6</sup>

Until 2009, PNAE served only elementary school students. The program expanded to the entire public primary education network from the law's publication, including students participating in the More Education Program and youth and adults. In this context, the Federal Institutes of Education, Science, and Technology (Fiest) were also included in the PNAE, reinforcing the universality principle and guaranteeing all students' right to a free, healthy, and adequate school meal.<sup>5</sup>

The inclusion of FEI is still recent, with few experiences in analyzing management processes and menus. Thus, the present study aimed to assess the menus' quality in FEI located in Niterói and Rio de Janeiro's municipalities.

## METHODOLOGY

This cross-sectional study occurred in School Food and Nutrition Units (SFNU) of Federal Schools

(FEI) and Federal Institutes of Education, Science and Technology (FIEST) in the municipalities of Rio de Janeiro and Niterói, Brazil. It followed Resolution 466/12 of the National Health Council, Ministry of Health, which ensures compliance with current ethical principles.<sup>10</sup>

#### SAMPLING SIZE

Federal Education Institutions were mapped on the FNDE website<sup>11</sup>, totaling 26 in Rio de Janeiro and 3 in Niterói. Only those who attended elementary and high school were included, while those from early childhood education were excluded.

#### DATA COLLECTION AND ANALYSIS

The responsible nutritionists were contacted by email and telephone in July 2019 to obtain the planned lunch menus for June 2019 for elementary and high school students. The Quality Index of the Food and Nutrition Security Coordination (known in Brazil by the Portuguese acronym, IQ COSAN) was used to evaluate the planned lunch menus, aiming to qualitatively analyze the school meal menus prepared under the PNAE between two and five weeks<sup>6</sup>. In the present study, they were evaluated for three weeks in June 2019, as the IQ COSAN<sup>12</sup> does not evaluate the week with a holiday.

This instrument takes into account 1) components of daily evaluation such as the presence of six food group (cereals and tubers; beans; vegetables and fruit; fresh fruit; milk and dairy products; and meat and eggs), absence of foods classified as restricted (canned, sausages, semi-ready or ready-to-eat preparations) and sweet foods or preparations (candies, milk drinks, confectionery and cookies with fillings or toppings, desserts, edible ice creams, paste sweets, fruit jellies, sweet milk, honey, molasses and similar, fruit in syrup and candied fruit, breakfast cereals with sugar and cereal bar); and 2) components of weekly assessment such as the presence of regional

foods and socio-biodiversity foods that are included in a list on IQ COSAN<sup>13</sup>; weekly diversity of meals offered (one meal per day, two meals per day or three meals per day), and the absence of prohibited foods (soft drinks, artificial juices, sugary syrups)<sup>12</sup>

Box 1 lists the qualitative parameters composing IQ COSAN.

**Box 1.** Qualitative parameters composing the Quality Index of the Food and Nutrition Security Coordination (IQ COSAN)

Weekly assessment components	
Presence of foods from the cereals and tubers group	Daily frequency
Presence of foods from the beans group	Daily frequency
Presence of foods from the vegetable group	≥ Three times/week
Presence of fresh fruit	≥ Three times/week
Presence of foods from the milk and dairy products group	Daily frequency
Presence of foods from the meat and egg group	Daily frequency
Restricted foods	< Twice/week
Sweet foods	< Twice/week
Prohibited foods	Never
Weekly assessment components	
Regional foods	> 1 time/week
Socio-biodiversity foods	> 1 time/week
Food diversity (1 meal a day)	
> 15 foods	Suitable variety
10 to 14 foods	Needs improvements
< 9 foods	Low variety

Source: Brazil, 2018.

After completing the evaluation of the mentioned parameters, the tool adds the score for each week and calculates the weekly averages using an Excel spreadsheet available on the FNDE website. The IQ COSAN score varies between 0 and 95 points, and the final classification evaluates the menus as inadequate (0 to 45.9 points), needs improvement (46 to 75.9 points), and adequate (76 to 95 points).<sup>12</sup>

Analyses were made of the average weekly frequency of the six food groups, the presence of regional foods, socio-biodiversity foods, restricted and prohibited foods, and sweet preparations. The variety was determined based on the average of foods that are forecasted weekly. According to the final classification of the IQ COSAN score, menus of the FEI were expressed in relative frequency.

## RESULTS

Of the total education institutions that met the inclusion criteria ( $n = 27$ ), four were not providing lunch, eight refused to participate in the study, and the researcher could not contact four institutions. Therefore, 11 FEI took part in the research.

The quality assessment of the menus offered at FEI by the IQ COSAN method (Table 1) showed that 63.6% ( $n = 7$ ) are adequate, and 36.3% ( $n = 4$ ) still need some improvement.

**Table 1.** Classification of Federal Education Institutions' menu quality in Rio de Janeiro and Niterói ( $n = 11$ ) using the IQ COSAN classification

IQ COSAN Classification	Federal Education Institutions	
	n	%
Adequate	7	63.6
Need improvement	4	36.3
Inadequate	0	0

Source: Brazil, 2018<sup>12</sup>

All menus analyzed showed a daily frequency of the groups of cereals and meats. For the other food groups, the frequency was not daily in most institutions: of the 11 surveyed, only four provided the groups of vegetables daily, and five include the group of fresh fruit every day on the menus. The group of vegetables and fruit was not included in the minimum weekly frequency recommended by the PNAE (three times/week) in three and four of the institutions, respectively. It was found that no FEI presented the menu with a minimum weekly frequency for both criteria (vegetables and fruit) (data not shown in the table). All participants' menus indicated a frequency less than twice a week for restricted foods and sweet preparations (Table 2).

In assessing the weekly presence of regional foods, most FEI had a frequency of at least once a week ( $n = 7$ ). Regarding socio-biodiversity foods, most did not offer them once a week ( $n = 8$ ). As for the menu diversity, most presented it adequately ( $n = 7$ ). However, four FEI need to improve this aspect. The weekly presence of prohibited foods was not recorded in any of the lunch menus. All of these data are listed in Table 2.

**Table 2.** Average weekly frequency of food groups, restricted and sweet foods, regional foods, socio-biodiversity foods, and food groups' diversity on the lunch menu of Federal Education Institutions in Rio de Janeiro and Niterói

	Food groups			
	5x/week (n)	3 to 4x/week (n)	≤ 2x/week (n)	None (n)
Cereals and tubers	11	0	0	0
Beans	8	3	0	0
Vegetables	4	4	3	0
Fresh fruit	5	2	1	3
Milk and dairy products	0	0	2	9
Meat and eggs	11	0	0	0
Restricted and sweet foods				
	≥ 3x/week (n)	≤ 2x/week (n)	None (n)	
Restricted foods	0	6	5	
Sweet foods and preparations	0	4	7	
Prohibited foods	-	-	11	
Regional and socio-biodiversity foods				
	1x/week (n)	None(n)		
Regional foods	7	4		
Socio-biodiversity foods	3	8		
Classification according to the diversity of food groups				
	Adequate variety (> 15 foods) (n)	Needs improvements (10 to 14 foods) (n)	Low variety (up to 9 foods) (n)	
Menu diversity	7	4	0	

n=11

## DISCUSSION

Dietary indices are methods of analyzing the individuals' diet one or more parameters, enabling a more global assessment of quality than quantitative analyses of nutrients.<sup>12</sup> Recently, FNDE developed the IQ COSAN index - which consists of a tool for planning and evaluating menus based on the PNAE regulations so that they can be used by nutritionists in Brazilian municipalities and states -, reaffirming its competence as a guiding body and establishing general rules for monitoring and evaluating the Program.<sup>5,12</sup>

In this research, more than 30% of FEI need to improve the quality of menus and that the supply of vegetables and fruit was not daily in half of them - in three, the frequency was less than recommended by the PNAE, and in four, did not meet what was established (both for fruit and vegetables). Data regarding the quality of meals offered to students at FEI are still poorly documented in the literature. A national study carried out on FIEST distributed in the Brazilian macro-regions reported that most menus were not in compliance with the nutritional recommendations provided for in legislation.<sup>14</sup>

Similar findings were found in studies carried out in Brazilian public schools that showed that the supply of fruit and vegetables on the school menu does not meet the resolution requirements.<sup>15-17</sup> Research conducted in public schools in São Paulo found an inadequate IQ COSAN index, influenced by the daily presence of chocolate powder and low presence of fresh fruit, regional foods, socio-biodiversity foods, and the diversity of the menu.<sup>1,18</sup>

The evaluation of the milk's frequency group and dairy products' frequency is a limitation of the instrument since when analyzing only one large meal, such a group will not be scored. When analyzing small meals, such as breakfast and snacks, this component is essential to consider the instrument's application.<sup>12</sup>

The nationwide school-based survey revealed that the weekly consumption of healthy marker foods, such as vegetables and fruit, is still low (around 30% of students). For those markers of unhealthy food, the percentages were higher for sweets (41% students) followed by ultra-processed foods (30%) and soft drinks (26%), and a prevalence of 25% overweight<sup>19</sup>. This scenario reinforces the importance of the PNAE as a healthy public policy and Food Security and Nutrition (FSN), mainly due to the priority in the offer of fresh food, the mandatory purchase of food from family farming, and the promotion of healthy eating habits and practices through intersectoral arrangements.<sup>20</sup>

Properly planned menus can contribute to students' access to healthy food by offering meals that include all food groups and a greater variety, avoiding monotony, as observed in most analyzed menus (greater than 15 foods).<sup>21</sup> Thus, such planning must be seen as one of the elements that make up the school food environment, as it is capable of affecting frequent access to fruit and vegetables, reducing the consumption of processed and ultra-processed foods, and favoring prevention, promotion, and integral care in health.<sup>22-23</sup>

Regarding restricted foods and sweet preparations, no institution had a frequency higher

than twice a week, as determined by legislation<sup>6</sup>, reinforcing the importance of dietary and nutritional guidelines in directing the execution of the PNAE. These foods are rich in fats, sugars, and sodium and low in dietary fibers, classified by the "Food Guide for the Brazilian Population" as processed or ultra-processed and with limited consumption recommendation.<sup>24</sup>

A survey that analyzed the lunch menus of municipal schools in São Paulo found that only 7.6% of foods were processed and ultra-processed. However, when analyzing the breakfast and snack menu, about 68.4% of these foods were restricted.<sup>25</sup> The inclusion of fresh and minimally processed foods in small meals is a challenge for nutritionists who work in school meals, mainly due to the physical structures of the SFNU, which sometimes do not support the preparation processes necessary to meet the more elaborate preparations, in addition to the fact that they usually have an insufficient number of cooks.<sup>26</sup> The operational difficulties of these units with physical-functional structure and inadequate amounts of human resources can be considered the main reasons for the low supply of fruit and vegetables in meals at FEI.

Unlike other menu quality assessment indices, IQ COSAN values two components aligned with the FSN policy<sup>27</sup> that ranks this classification, the presence of regional foods and socio-biodiversity foods.<sup>28</sup> Most institutions included regional foods once a week, representing an advance for the program to respect eating habits and local culture. However, some did not consider this item in menu planning, similarly to the study by Guimarães et al.<sup>28</sup>, who observed the lack of regional preparations with fruit and vegetables typical of the cultural habits of the state of Goiás (Brazil). Regional foods refer to their territoriality, that is, the place where they are produced. Thus, their inclusion aims to strengthen relationships and support the local farmer through short chains, promoting a direct connection between producers and consumers by enhancing traditional and regional markets.<sup>30</sup> Socio-biodiversity, in turn, is the relationship between

goods and services generated from natural resources, aimed at the formation of productive chains of interest to traditional peoples and communities and family farmers. Socio-biodiversity foods were not included in the menus of most institutions, despite the recent publication of Inter-ministry Ordinance 284, which presents a list of species, which can be marketed under the PNAE.<sup>31</sup>

Brazil holds 15 to 20% of the world's biodiversity, and the use of these native resources is strongly associated with traditional communities such as quilombola, extractivist, fishers, and family farmers.<sup>31</sup> Thus, strategies for including these foods in the PNAE values family farming, local production, and the economy, promoting local biodiversity, rescuing food habits and cultures, strengthening traditional communities, and diversifying food in schools from the perspective of FSN.<sup>31,33</sup>

Work carried out in southern Brazil on the analysis of school menus identified that the presence of these foods is still reduced and that, when it occurs, it is not due to family farming but to other suppliers.<sup>34</sup> Most of these species are not known. Besides, traditional peoples and communities have additional difficulties for their organization to meet public calls for PNAE.

The analysis developed in this study suggests that some aspects of food and nutritional quality are incorporated into menu planning - for example, the limitation of foods/preparations traditionally included as unhealthy. Nevertheless, others still need to be signified in this process, such as introducing regional and socio-biodiversity foods. It is noteworthy that these are more recent guidelines that require more articulation and approximation of nutritionists with local food production processes.

Given the inclusion of the various dimensions to achieve an adequate and healthy diet<sup>24</sup>, food and nutritional quality should not be the nutritionists' sole objective when planning school menus. It is also necessary to consider the local production of food with the preservation of natural resources,

the valorization of biodiversity, the recycling of organic and inorganic residues, and the sustainable management of soil fertility, impacting the social and environmental balance and, thus, include regional and socio-biodiversity foods.<sup>6,34</sup>

## CONCLUSION

IQ COSAN made it possible to analyze the FEI menus' quality and identified that none were considered inadequate. However, adjustments need to be considered to improve school meals, such as increasing the supply of fresh fruit, vegetables, regional and socio-biodiversity foods to promote adequate and healthy food in school meals.

This tool must be widely used by nutritionists, enabling the analysis of the menu's nutritional quality and the valorization of local foods and socio-biodiversity foods, which should be prioritized for menu planning within the scope of PNAE. It should be noted that the quality of the menus is affected by different aspects that go beyond the definition of the foods included in the planning, such as the infrastructure of the SFNU, financial and human resources, technical and political management of the executing entities.

The present study offers an unprecedented contribution to the quality profile of school meals at FEI, pointing out the main convergences and divergences according to the dietary and nutritional guidelines provided for in the PNAE. This study is limited to documentary analysis of the planned menus, so it did not advance to understand the constraints of this process, such as the execution of the menus, the infrastructure of the SFNU, human resources, and the institutional purchasing process, for example, aspects that can generate changes in planning. In this way, a valuable research agenda opens up for these institutions, which have specificities concerning other PNAE executing entities, which deserve to be better understood.

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