REVISTA DE NUTRIÇÃO
Brazilian Journal of Nutrition

DOSSIER

85 years of professional nutritionist pratice in Brazil

Editor
Maria Angélica Tavares de Medeiros

Conflict of interest
The authors declare that there is no conflicts of interest.

Received
August 1, 2024

Final version
November 8, 2024

Approved
January 20, 2025

Seventy years of nutritionists' activity in the National School Feeding Program: background, numerical reference parameters, reflections and perspectives

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How to cite this article: Chaves Medeiros LG, Alves ICC, Florintino CS, Corrêa EN, Gabriel CG, Vasconcelos, FAG. Seventy years of nutritionists' activity in the National School Feeding Program: background, numerical reference parameters, reflections and perspectives. Rev Nutr. 2025;38:e240119. https://doi.org/10.1590/1678-9865202538e240119en

ABSTRACT

Objective
The objective of this study was to critically review nutritionists' practice within the National School Feeding Program in Brazil.

Method
The study was carried out based on a literature review and analysis of regulations and legislation. Official data from nutritionists' registration systems were used, covering the years 2012 to 2024; the relevant data were provided by the General Coordination of the National School Feeding Program/National Education Development Fund.

Results
We observed that the number of nutritionists associated with the Program almost doubled between 2009 and 2023 despite fluctuations throughout the period. The year with the greatest number of registered nutritionists was 2013 (n=9,209). In 2023, adequacy in the number of nutritionists registered in the Program was 32.1% considering Brazil as a whole. Considering the geographic region, the registrations of the South (37.9%), Northeast (37.8%) and Midwest (33.7%) regions stand out, showing rates above Brazil's average. The North (27.2%) and Southeast (26.9%) regions had percentages below 30% adequacy. Adequacy rates at the state level were lower than at the municipal level, in all the states.

Conclusion
The timeline shows that important advances have been made in the nutritionists' practice in the *Programa Nacional de Alimentação Escolar* (National School Feeding Program). These advances may have contributed in qualifying the school feeding programs especially by seeking to ensure that the food served in schools meets not only basic nutritional needs but also the

regional, cultural, social and sustainability specificities of each school community. Multiple challenges are in the way to meeting the recommended numerical parameters. Overcoming these challenges can yield strategic and sustainable progress in enhancing the PNAE as a public policy in Brazil, in line with the commitment to providing food within the framework of local realities and demands.

Keywords: Brazil. National school feeding program. Nutritionists. Nutritionist' history in the PNAE. Professional Practice. School Feeding.

INTRODUCTION

The *Programa Nacional de Alimentação Escolar* (PNAE, National School Feeding Program) after seventy years of existence is considered one of the most successful Brazilian programs in the area of *Segurança Alimentar e Nutricional* (SAN, Food and Nutrition Security). It has been highlighted as one of the public policies responsible for Brazil's historic exit from the Hunger Map, reported by the Food and Agriculture Organization of the United Nations (FAO) in 2014. Furthermore, throughout the multiple political, economic, social and health crises that the country has faced since 2020, the PNAE, as a public policy, has established itself as a vital strategy for improving the SAN rates of the Brazilian population [1-3].

In terms of scope, R$5.3 billion were allocated in 2023 to school meals to attend 40 million schoolchildren in the public basic education; meals were distributed across approximately 150,000 schools in Brazil, figures evidencing the grandeur of the PNAE [4]. Studies published between 2019 and 2023 seeking to analyze school feeding programs in different countries and their contributions to ensuring food security, Food And Nutrition Education (FNE) and promoting healthy and sustainable eating for schoolchildren have identified the PNAE as one of the largest, historic and universal public school feeding policies in the world [4-7].

Given the multiple activities foreseen within the program, its planning and execution entails the involvement of a network of different players and collaborators. Among these, the nutritionist deserves to be highlighted; Law No. 8,913/1994 [8], officially included nutritionists as being in charge for preparing school meal menus; the law also established the decentralization of the program to the states, the Federal District and municipalities. It is also worth noting that, in 2006, by a regulation of the *Fundo Nacional de Desenvolvimento da Educação* (FNDE, National Education Development Fund) [9], the role of the nutritionist was expanded, being now a technician in charge appointed by the PNAE; this development was ratified by Law No. 11,947/2009 [10,11]. Being technically responsible for the PNAE, the nutritionist has, among his or her multiple responsibilities, the preparation of school meal menus, using basic foodstuffs, respecting the nutritional references, eating habits, culture and food tradition of the locality, based on the sustainability and agricultural diversification of the region, and on healthy and adequate nutrition [11].

Due to the importance of school meals and nutritionists in achieving the objectives of the PNAE, there are several papers in the literature addressing the role of this professional in the program. These studies focus especially on the insertion, profile and/or role of nutritionists in the PNAE [12,13]; the experiences and training required to operate in this field [13,14]; the relationship of the nutrition professional with the food purchases from family farmers [15,16] or the development of Food and Nutrition Education (FNE) initiatives [17]. In general, those studies are geographically localized, lack temporal updating and seek to respond to specific themes and realities. One of the studies found, however, sought to reflect broadly on the role of the nutrition professional, based on official data that portrayed the national distribution of nutritionists in the PNAE until 2011 [18]. Since then, the

country has gone through different economic, social and political situations, including significant advances and setbacks in the field of SAN.

In view of the above, this study aimed to perform a critical analysis of the role of nutritionists in the PNAE, from 2012 to 2024, based on a narrative review of the literature, documentary analysis of institutional regulations and analysis of secondary data on the subject made available by the FNDE. The research also seeks to update and deepen the previous findings of Chaves et al. [18], who identified the trajectory, advances and challenges of the nutritionist's role in the PNAE in the decade 2003 to 2011 prior to the period addressed in this article.

Our investigation is structured along three sections; it aims to carry out a historical review of the inclusion of nutritionists in the PNAE, to discuss the evolution and adaptation of numerical parameters for the nutrition professional in the program and, finally, to reflect on the advances, challenges and perspectives for nutritionists in this field.

METHODS

This is a critical essay based on a literature narrative review, including scientific articles and the analysis of normative documents, such as Laws, Resolutions and Technical Notes from the FNDE/Ministry of Education and the *Conselho Federal de Nutrição* (CFN, Federal Nutrition Council), which set forth the nutrition professional's duties and the minimum numerical reference parameters within the scope of the Program. In addition, an analysis of secondary data on the inclusion of nutritionists in the PNAE was carried out, based on a database made available by the FNDE.

The request for access to the data was made in May 2024, through the electronic platform Fala.BR, which allows queries and requests based on the 2011 Information Access Laws [19]. The data used came from the nutritionists' registration systems managed by the General Coordination of the National School Feeding Program (CGPAE/FNDE), for the years 2012 to 2024, broken down as follows: *Sistema de Cadastro de Nutricionistas* (SINUTRI, Nutritionist Registration System) for the years 2011 to 2014, no longer active [20]; *Sistema Integrado de Monitoramento Execução e Controle* (SIMEC, Integrated Monitoring, Execution and Control System) from 2015 to 2023 [21], an active system, but which no longer contains the nutritionists registration module; and the PNAE Management System (SIGPNAE) until June 2024, currently active for nutritionists' registration [22].

A non-exhaustive systematic search for scientific articles was carried out in the SciELO and PubMed electronic databases, aiming to retrieve studies published between 2014 and 2024. The keywords School Feeding Program AND Nutritionist in Portuguese and their corresponding terms in English were used. The articles were selected intentionally (arbitrarily), after reading the papers' titles and abstracts.

Background of the nutritionists' insertion process in the PNAE

The article by Chaves et al. [18] is a survey on the trajectory of nutritionists in the PNAE since its creation until 2010. We ought to point out that, since the origins of Nutrition Science in the 1930s (with the first studies by Josué de Castro and his peers and the creation of the first courses for the training of nutritionists in Brazil at the University of São Paulo [USP] and at the Federal University of the State of Rio de Janeiro [UNIRIO], in 1939), nutritionists participated in the idealization of the school policy, regulated in 1955 as the School Meal Campaign and formalized as PNAE in the 1970s [23,24]. The regulation of the profession occurred in 1967 which was later replaced by Law

No. 8,234/1991, still in force [25]. In 1978, the Federal and Regional Councils of Nutritionists were created. However, in July 2024, Law No. 14,924/2024 was enacted, which regulated the profession of nutrition and dietetics technician and amended Law No. 6,583/1978, which created the councils and regulated their operation. Consequently, the body is now called the Federal and Regional Nutrition Council [26]. After the promulgation of the 1988 Federal Constitution, access to school meals was assured to all elementary school students through the PNAE [27] (Figure 1).

In the 1990s and 2000s the presence of nutritionists in the PNAE was further consolidated. Law No. 8,913/1994 institutionalized the activities of such professionals [8]. In 2001, the decentralization of the PNAE ensured the continuous participation of the nutritionists in the preparation of menus [28]. Another historic milestone was set in 2003: for the first time, a nutritionist was appointed as coordinator of the PNAE under federal management; an expansion of the program ensued as well as an increase in the number of nutritionists operating in the country [18]. The technical responsibility for the program was assigned to nutritionists by the FNDE in 2006 (FNDE), consolidating their relevance [10] (Figure 1).

In order to support and be a reference for nutritionists and other PNAE players, the partnership between the FNDE and the Federal Higher Education Institutions, yielded the creation of the *Centros Colaboradores em Alimentação e Nutrição Escolar* (Cecanes, Collaborating Centers for School Food and Nutrition). Among other activities, the Cecanes promote training of the program's social players [29] (Figure 1).

The 2009 legal framework (Law No. 11,947/2009) expanded the PNAE to cover the entire public basic education network; it also established purchases from family farmers (FF) and included FNE as an axis of action [11]. In 2005, the CFN defined the nutritionists' responsibilities and updated them through the CFN Resolution No. 465/2010 [30] in 2010 (Figure 1).

In 2013, the Resolution CD/FNDE No. 26/2013 was adopted; this Resolution included a section on FNE recognizing the concept and principles of the FNE Framework [31]. In 2015, Resolution CD/FNDE No. 4/2015 was enacted to enhance FF and its impact on local social and economic development [32]. Subsequently, Resolution CD/FNDE No. 6/2020 [33], among other changes, enhanced the inclusion of FNE as a cross-cutting subject in the school curriculum giving priority to the acquisition of fresh and minimally processed foods. In 2022, the PNAE released a Technical Note to guide how each social player should act in the development of FNE [34]. Resolution FNDE No. 2/2023 restated the per capita values of the previous Resolution [35] (Figure 1).

Other political movements in the field of food and nutrition in the 1990s, 2000s, and 2010s were essential to guide the work of nutritionists in ensuring SAN and the Human Right to Adequate Food (HRAF), as well as in the *Promoção da Alimentação Adequada e Saudável* (PAAS, Adequate and Healthy Food Promotion). In this connection, the *Política Nacional de Alimentação e Nutrição* (National Food and Nutrition Policy) created in 1999 (updated in 2011) stands out, with actions in the SUS (Government Health Program) [36], including the formulation of Food Guides [37]. The 2003 *Programa Fome Zero* (Zero Hunger Program), with the *Programa de Aquisição de Alimentos* (PAA, Food Acquisition Program) for the purchase of food from family farmers (replaced by the Alimenta Brasil Program in 2021, but relaunched as PAA in 2023) [23,38]. The 2006 *Lei Orgânica de Segurança Alimentar e Nutricional* (Organic Law on Food and Nutrition Security), which created the *Sistema Nacional de Segurança Alimentar e Nutricional* (National Food and Nutrition Security System) [39]. In 2006 and 2007, regulations were instituted to articulate the education and health sectors, with the aim of strengthening the FNE in the school setting [23,40]. Further, in the 2010s, the Food and Nutrition Education Reference Framework for Public Policies (FNE Framework) was consolidated, establishing the concept of FNE and its principles [40]. To celebrate the 10th anniversary of the

FNE Framework, the *Laboratório de Inovação de EAN* – LisEAN (FNE Innovation Laboratory), was launched in 2022, with FNE experiences in health, education, and social assistance [41]. Figure 1 shows the timeline of the nutritionists' trajectory in the PNAE.

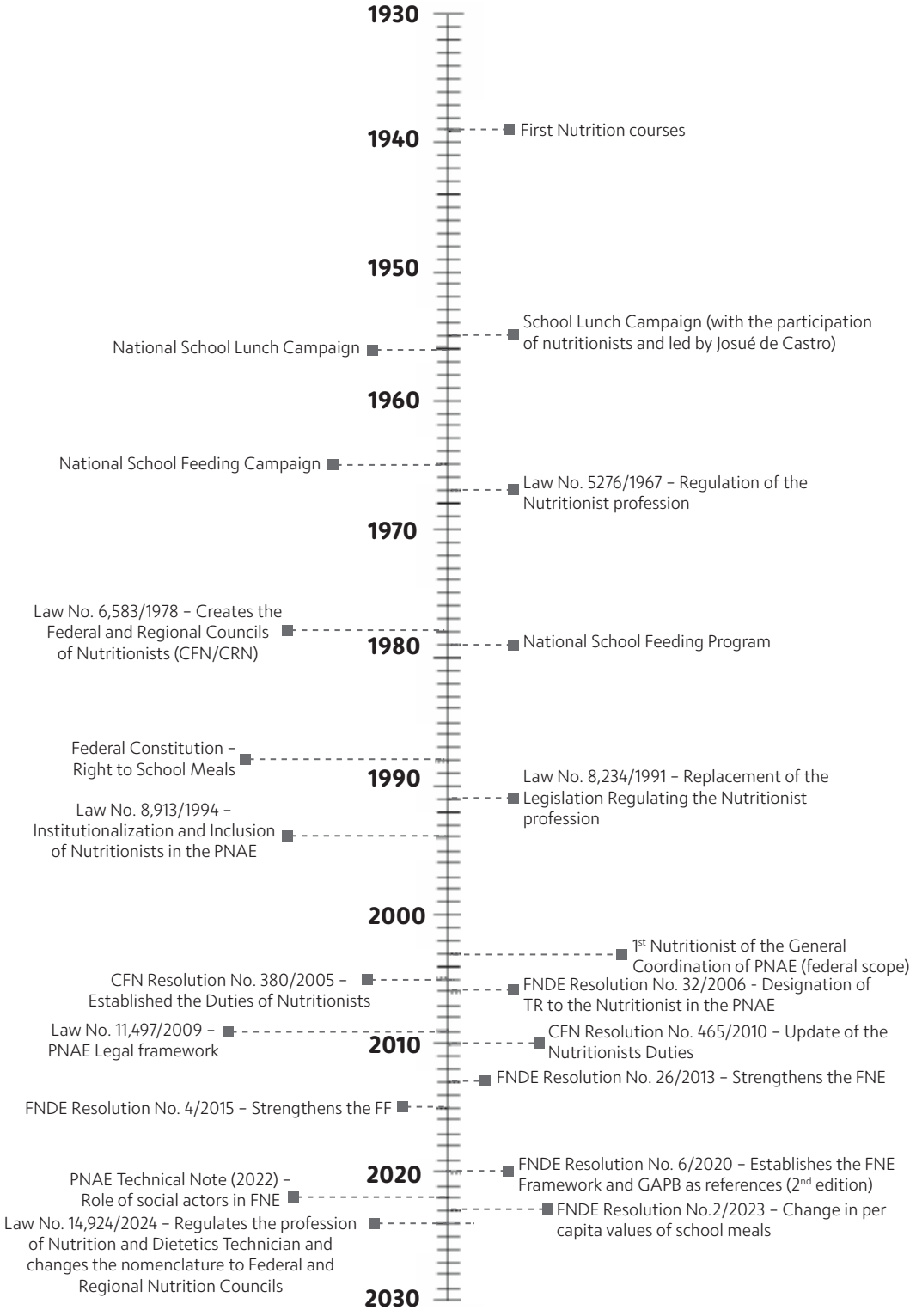

Figure 1 – Trajectory of the nutritionists' performance in the School Feeding Program (1930-2024). Brazil, 2024.

Note: FF: Family Farming; FNE: Food and Nutrition Education; FNDE: National Education Development Fund; GAPB: Dietary Guidelines for the Brazilian Population; FNE Framework: FNE Reference Framework for Public Policies; PNAE: National School Feeding Program; TR: Technical Responsibility.

Evolution and adequacy of the nutritionists' numerical parameters in the PNAE

Table 1 shows the evolution of the number of nutritionists registered in the FNDE systems. A growth in the number of professionals is observed; however, there is a considerable decrease in the years in which registration systems were changed like in the years 2015 and 2024. It is noteworthy that in 2021, possibly due to the COVID-19 pandemic, nutritionists responsible for school meals were laid off from the implementing entities; this may have occurred, possibly because of the suspension of in-person classes on account of social distancing and the non-production of school meals in the schools physical settings., even with the continuation of food supply, through the distribution to parents or guardians of students, of foodstuffs purchased with federal resources from the PNAE (Law No. 13,987/2020) [42]. However, a return to nutritionists' previous numbers was observed in the following year (2022).

Regarding the evolution of the nutritionists'' registrations, Table 1 shows that 2013 was the year with the highest number of registrations (9,209), a fact that can be explained by the efforts made during that year [18] and in previous years, when the FNDE requested the implementing entities the updating of the nutritionists' registration in SINUTRI; the FNDE also enhanced the regulations of the nutritionists' attributions regarding coordination and implementation of FNE actions jointly with the school's management and the pedagogical coordinators [31]; combined with the need for a greater coordination with the FF in view of the updates brought by FNDE Resolution No. 4/2015 [32], as shown in Figure 1.

Table 1 – Total number of nutritionists registered in the monitoring systems of the FNDE, from 2011 to June 2024. Brazil, 2024.

Monitoring system	Year	Total number of registered Nutritionists	% growth (*)
SINUTRI	2011	6,218	–
	2012	6,994	12.5
	2013	9,209	48.1
	2014	8,481	36.4
SIMEC	2015	8,925	43.5
	2016	6,095	-2.0
	2017	7,195	15.7
	2018	7,851	26.3
	2019	8,015	28.9
	2020	8,066	29.7
	2021	7,726	24.3
	2022	8,824	41.9
	2023	8,627	38.7
SIGPNAE	2024 (up to June)	5,704	-14.9

Note: (*): Year 2011 (n=6,218 being considered as base or 100%).
Source: Prepared by the authors based on data provided by the Monitoring Systems – SINUTRI (Nutritionist Registration System of the PNAE); SIMEC (Integrated Monitoring, Execution and Control System) and SIGPNAE (PNAE Monitoring System) of the National Education Development Fund (FNDE).

Table 2 describes the number of registered nutritionists in the different regions of the country, considering the execution entities and the state and municipal domains from 2018 to the first half of 2024. We can observe that the Midwest and North regions display the lowest number of registered nutritionists over the years, while the Southeast and Northeast have the highest numbers.

It is also evident that the number of professionals associated to the states' network is significantly lower than that of the municipal network. Furthermore, when reviewing the evolution

over the last seven years, it is clear that the number of professionals registered in the states is also tiny, and even decreasing, as is the case of the Midwest region, in relation to the increase that occurred in the municipalities during the same period (with the exception of the year 2024, because of a partial time analysis and also because of the changes in the registration system).

Table 2 – Number of nutritionists registered in the National School Feeding Program from 2018 to June 2024 by region and Executing Entity. Brazil, 2024.

Geographical region Executing Entities	Years (n)						
	2018*	2019*	2020*	2021*	2022*	2023*	2024**
Midwest							
State	93	91	91	87	84	84	54
Municipality	564	578	581	549	550	637	390
Total	657	669	672	636	634	721	444
North East							
State	159	191	185	172	223	223	97
Municipality	2,304	2,344	2,372	2,226	2,698	2,400	1,495
Total	2,465	2,535	2,557	2,398	2,921	2,623	1,592
North							
State	85	89	87	102	103	102	140
Municipality	546	558	588	537	532	662	364
Total	631	647	675	639	635	764	504
Southeast							
State	115	109	77	93	92	91	53
Municipality	2,534	2,596	2,607	2,504	2,490	2,898	1,804
Total	2,649	2,705	2,684	2,597	2,582	2,989	1,857
South							
State	8	7	7	6	6	4	48
Municipality	1,443	1,452	1,471	1,450	1,446	1,526	1,259
Total	1,451	1,459	1,478	1,456	1,452	1,530	1,307

Notes: Prepared by the authors based on data provided by the Monitoring Systems – SIMEC* (Integrated Monitoring, Execution and Control System) and SIGPNAE** (PNAE Monitoring System) of the National Education Development Fund (FNDE).

The analysis of the number of Brazilian municipalities without a registered nutritionist was carried out based on the year 2023, since this is the year with the most recent and complete data (12 months) available in the system (Table 3). It was found that 205 municipalities do not retain registered nutritionists. The state of Paraná leads the ranking of states with the largest number of municipalities that have not retained a nutritionist, followed by the states of Bahia, Goiás and Tocantins. The only state with the presence of nutritionists in all its municipalities was Rio de Janeiro.

Table 4 shows the adequacy rate of the numerical parameter of nutritionists, according to the CFN Resolution No. 465/2010 [30]. The figures show only 32.1% adequacy, a percentage below that expected after the publication of the standard. By geographic region, the South (37.9%), Northeast (37.8%) and Midwest (33.7%) regions stand out with rates above Brazil's average. The North (27.2%) and Southeast (26.9%) regions showed rates below 30% adequacy.

Still on Table 4, we observe that the adequacy rates at state level are lower than at the municipal level, in all states. The states in the South region show rates close to zero (Paraná and Rio Grande do Sul 0.3% and Santa Catarina 0.9%). The State of Acre does not even have one registered nutritionist. On the other hand, the State of Piauí in the North has an adequacy rate of 86%, well above the national average.

Table 3 – Number of nutritionists registered in the National School Feeding Program by state and geographic region in 2023. Brazil, 2024.

Geographic region	States (municipalities) (n)	Municipalities with nutritionists (n)	Municipalities without nutritionists (n)
Midwest	Goiás (246)	233	13
	Mato Grosso (141)	134	7
	Mato Grosso do Sul (79)	78	1
North East	Alagoas (102)	96	6
	Bahia (417)	400	17
	Ceará (184)	176	8
	Maranhão (217)	205	12
	Paraíba (223)	211	12
	Pernambuco (185)	177	8
	Piauí (224)	212	12
	Rio Grande do Norte (167)	158	9
	Sergipe (75)	74	1
North	Acre (22)	20	2
	Amazonas (62)	61	1
	Amapá (16)	15	1
	Pará (144)	140	4
	Rondônia (52)	50	2
	Roraima (15)	14	1
	Tocantins (139)	126	13
Southeast	Espírito Santo (78)	75	3
	Minas Gerais (79)	78	1
	Rio de Janeiro (92)	92	0
	São Paulo (645)	635	10
South	Paraná (399)	379	20
	Santa Catarina (295)	286	9
	Rio Grande do Sul (497)	485	12
Total	Brasil (5,569)	5,364	205

Notes: Prepared by the authors based on data provided by SIMEC (Integrated Monitoring, Execution and Control System) of the National Education Development Fund (FNDE).

Table 4 – Adequacy (%) to the numerical parameter of nutritionists in 2023, according to CFN Resolution No. 465/2010[1]. Brazil, 2024.

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Geographic region States/Spheres	Nutritionists (n)	Students (n)	Nutritionists needed (n)	Adequacy (%)
Midwest	721	3,096,616	2,140	33.7
Distrito Federal				
State	76	488,328	298	25.5
Goiás				
State	2	494,841	201	1.0
Municipal	315	520,372	631	49.9
Mato Grosso				
State	4	377,170	154	2.6
Municipal	192	426,523	435	44.1
Mato Grosso do Sul				
State	2	199,769	83	2.4
Municipal	130	382,931	342	38.0
North East	2,921	11,780,200	7,721	37.8
Alagoas				
State	5	191,761	79	6.3
Municipal	197	579,097	414	47.6
Bahia				
State	54	753,984	305	17.7
Municipal	623	2,248,821	1,617	38.5

Table 4 – Adequacy (%) to the numerical parameter of nutritionists in 2023, according to CFN Resolution No. 465/2010[1]. Brazil, 2024.

Geographic region States/Spheres	Nutritionists (n)	Students (n)	Nutritionists needed (n)	Adequacy (%)
Ceará				
State	6	459,064	187	3.2
Municipal	281	1,3983,848	1,108	25.4
Maranhão				
State	4	327,006	134	3.0
Municipal	298	1,460,828	1,088	27.4
Paraíba				
State	6	237,086	97	6.2
Municipal	316	561,226	423	74.7
Pernambuco				
State	35	558,250	227	15.4
Municipal	332	1,128,531	810	41.0
Piauí	86	242,577	100	86.0
State				
Municipal	272	555,629	430	63.3
Rio Grande do Norte				
State	19	222,338	91	20.9
Municipal	236	410,972	341	69.2
Sergipe				
State	8	179,150	73	11.0
Municipal	143	268,032	212	67.5
North	764	173,435	2,804	27.2
Acre				
State	0	153,894	64	0.0
Municipal	28	98,016	99	28.3
Amazonas				
State	42	449,805	183	23.0
Municipal	104	623,526	463	22.5
Amapá				
State	17	118,355	51	33.3
Municipal	30	79,123	70	42.9
Pará				
State	9	566,135	230	3.9
Municipal	246	1,495,471	1,063	23.1
Rondônia				
State	9	192,401	79	11.4
Municipal	75	173,435	155	48.4
Roraima				
State	1	81,300	35	2.9
Municipal	24	80,678	69	34.8
Tocantins				
State	24	154,125	65	36.9
Municipal	155	202,707	190	81.6
Southeast	2,989	15,006,442	11,108	26.9
Espírito Santo				
State	11	238,338	98	11.2
Municipal	197	539,612	477	41.3
Minas Gerais				
State	28	1,764,501	709	3.9
Municipal	1,193	1,936,303	1,894	63.0
Rio de Janeiro				
State	2	759,036	307	0.7
Municipal	342	1,780,265	1,424	24.0
São Paulo				
State	50	3,594,070	1,442	3.5
Municipal	1,166	4,394,317	4,764	24.5

Table 4 – Adequacy (%) to the numerical parameter of nutritionists in 2023, according to CFN Resolution No. 465/2010[1]. Brazil, 2024.

Geographic region States/Spheres	Nutritionists (n)	Students (n)	Nutritionists needed (n)	Adequacy (%)
South	1,530	5,486,7691	4,033	37.9
Paraná				
State	1	979,461	395	0.3
Municipal	514	1,148,587	1,161	44.3
Santa Catarina				
State	2	553,015	225	0.9
Municipal	374	887,062	909	41.1
Rio Grande do Sul				
State	1	796,724	323	0.3
Municipal	638	1,121,912	1,025	62.2
Brasil	8,925	39,838,990	27,806	32.1

Notes: Prepared by the authors based on data provided by SIMEC (Integrated Monitoring, Execution and Control System) of the National Education Development Fund (FNDE); [1]CFN Resolution No. 465/2010 [30].

Advances, challenges and perspectives for nutritionists working in the PNAE

The timeline previously presented shows that between 2000 and 2010, there were important advances in the performance of nutritionists in the PNAE (Figure 1). During this period, the implementation of technical responsibility [10] and the expansion of the responsibilities of nutritionists in the program [30] stand out. The PNAE guidelines were periodically updated to standardize and guide the social players, especially nutritionists, seeking to ensure the supply of adequate and healthy food [43]. Previously, nutritionists' activity was limited to the preparation and adaptation of school meal menus [18]. However, after the establishment of the PNAE Legal Framework in 2009 [11], and with the enactment of CFN Resolution No. 465/2010 [30], nutritionists began to have thirteen mandatory responsibilities, which include: (i) Preparation of the menu; (ii) Participation in bidding processes and direct purchase from family farmers; (iii) Monitoring of schoolchildren's nutritional status; (iv) Development of an annual work plan; (v) Advice to the *Conselhos de Alimentação Escolar* (CAE, School Feeding Councils); (vi) carrying out acceptability tests with schoolchildren; (vii) coordination with family farmers; (viii) Carrying out acceptability tests with schoolchildren; (ix) Supervision of food production and distribution; (x) Hygienic-sanitary control of the stages of school feeding production; (xi) Training and guidance of food handlers; (xii) Participation in intersectoral initiatives aimed at promoting healthy eating; and (xiii) Preparation of technical and administrative reports related to school feeding.

In general, our study identified a growing evolution in the number of nutritionists registered in the PNAE monitoring systems, as shown in Table 1. In fact, between 2011 and 2023, there was a 38.7% increase (from 6.218 to 8.627) in the number of nutritionists associated with the Program. Chaves et al. [18], in a pioneering review of the period from 2003 to 2011, had already pointed out the gradual increase in the number of nutritionists working in school feeding programs. According to the study [18], in 2003 there were 813 nutritionists registered in the PNAE, and in 2009/2010, after the establishment of the Legal Framework [11], this number had expanded to 4,479 professionals. Therefore, between 2009/2010 and 2023, despite quantitative fluctuations throughout the period, the number of nutritionists associated with PNAE almost doubled.

Over time, the role of nutritionists in the PNAE has proven to be essential to ensure that the food served in schools meets not only basic nutritional needs, but also the sustainable, regional, cultural and social specificities of each school community [8,13,44]. The surveys indicated that

the presence of nutritionists in public schools is associated with greater implementation of FNE actions [12,17], transparency and an increase in the purchase of food from family farmers [12,45] and better academic performance of students [10]. However, studies carried out in some Brazilian municipalities highlight as the main challenge the insufficient number of nutritionists to carry out the duties provided for in the PNAE, with the aggravating factor that the work time allowed is often insufficient (less than 30 hours per week) [13,14]. This situation highlights the non-compliance with CFN regulations and other PNAE legislation, corroborated by the data on adequacy to the numerical parameter (Table 4).

Research on the perceptions of nutritionists working in the PNAE indicates that difficulties in complying with their duties are associated with a lack of adequate technical training and an insufficient number of professionals composing the teams [12,14,46]. In 2024, Teixeira et al. [47] conducted an integrative review of the literature on the implementation of the PNAE guidelines, pointing out the inadequacy of nutritional composition and menu planning in several Brazilian municipalities. Carvalho et al. [13] investigated the performance of nutritionists (technical managers) in the states of Minas Gerais and Espírito Santo and found a predominance of operational and administrative activities, which compromised technical tasks such as the promotion of SAN and FNE actions. In addition, they identified that the preparation of menus, taking into account habits, culture, and food seasonality, was also hampered due to the limited work time available. Triches and Brito [48] conducted a study with nutritionists from the southwest and west of Paraná and observed that the economic dimension was given priority over sustainability when developing menus and proposing educational actions. To face these challenges and strengthen FNE actions, in 2022, FNDE/PNAE prepared the Technical Note "Food and Nutrition Education in the PNAE: social players and possibilities for action". This document includes as social players: nutritionists, directors/pedagogical coordinators (school management), teachers, school meal cooks, family farmers, schoolchildren family members or guardians, and members of the CAE [34].

Therefore, it is essential to implement initiatives that increase the number of nutritionists in the PNAE, seeking to ensure adequate resources for hiring and training these professionals. Furthermore, investing in continuing education, career development, and optimizing human resource management is also crucial [14,47]. Another key point is to develop strategies that enable an equitable distribution of nutritionists, especially in more remote regions or those with greater social vulnerability. The inequality in the distribution of nutritionists in the country, as shown in Tables 2, 3, and 4, can be influenced by factors such as population density, health and education infrastructure, availability of qualified professionals, and local financial resources. The difficulty in attracting and retaining qualified nutritionists in these regions can compromise the implementation of the PNAE as a whole and directly impact the program's objectives.

In short, nutritionists working in the PNAE still face significant challenges, which may include a shortage of trained professionals in some regions of the country, heavy workload, and complex human resource management within the education systems. In addition, the possible reduction in the number of nutritionists in the PNAE may be a reflection of budgetary constraints, hiring policies, or even a lack of encouragement to value this professional category. This may result in an overload of work for the nutritionists available, jeopardizing the quality and scope of nutritional interventions in the program.

The number of registered nutritionists has varied over the last decade, alternating between periods of growth and reduction (Table 1). This scenario may be partly the result of the three changes in the FNDE nutritionist registration systems that have occurred over the last ten years (SINUTRI,

SIMEC and SIGPNAE). It is clear that the updating, improvement and subsequent implementation of new systems in public policies and programs, such as PNAE, may occasionally create, besides the expected improvements, operational obstacles to the proper registration of professionals and managers. These difficulties may include technical issues related to platform integration, users' lack of familiarity with new digital interfaces and necessary adjustments in the registration and information update processes. This phenomenon is represented in Table 1, where it can be seen that with each change in the registration system, there is a reduction in the number of nutritionists the year following the new registration system implementation.

The reduction in the number of professionals observed during the year 2021 (Table 1) can be attributed to the scenario of the Covid-19 pandemic, which hampered the permanence in the implementing entities of a number of professionals associated to the PNAE, as mentioned previously [49]. During that period (2021), even with the publication of Law No. 13,987/2020, which allowed the distribution of food kits [42,50], the re-registration of nutrition professionals was not observed. Only in 2022, with the resumption of the school routine, the number of nutritionists associated with the PNAE returned to the levels of the pre-pandemic years.

It is clear from Tables 2 and 4 that the number of nutritionists in the state network is lower than in the municipal network. There are many reasons for this disparity, but there are gaps to be investigated in the relationship between the adequacy of the number of professionals required and the type of management adopted by the state departments of education. It is worth noting that Resolution CD/FNDE No. 6/2020 provides that the implementing entities have autonomy to define the PNAE form of management, i.e. centralized, decentralized or school-based and semi-decentralized modalities [33].

Some states adopt outsourced management to manage school meals, either by hiring companies to manage the Program, such as Santa Catarina (SC) [51] and Espírito Santo (ES) [52], or by hiring companies to provide professionals, such as Ceará (CE) [53]. The present study identified that, in 2023, these states presented low adequacy rates of the number of nutritionists in the PNAE, considering the national average (SC: 0.9; CE: 3.2 and ES: 11.2) (Table 4). Diamico [54] conducted a study on the management of school meals in Santa Catarina and observed that outsourcing makes it difficult to align the different knowledge and perceptions of social players about healthy and sustainable foods. Furthermore, Carvalho et. al. [55] pointed out that outsourcing has the disadvantage of high meal costs and requires the reassignment of lunch ladies who are civil servants to other roles, which can impact work processes, especially in the relationship with nutritionists.

It is important to remember that, regardless of their functions in the PNAE, nutritionists associated with outsourced companies should not be registered in the FNDE systems. Federal regulations indicate that the registration is intended for professionals from the PNAE implementing entities particularly with regard to funds transferred for the acquisition of food products. In this connection, outsourcing is not considered a form of PNAE management. However, it is imperative that the implementing entities comply with the numerical parameter established by CFN Resolution No. 465/2010 [30], as well as be responsible for the management of the Program, and should not delegate such regulatory attributions to outsourced companies. This issue shows that the number of nutritionists actually involved in the PNAE directly or indirectly, may be higher, indicating, at the same time, the precariousness of the links and the transfer of responsibilities inherent to public management.

On the other hand, the state of Piauí presented the highest percentage of adequacy (86%), well above the Brazilian average (Table 4). It is worth noting that the management modality of

this state is decentralized, characterized by the transfer of funds to the school units, which are in charge of acquiring food products and offering school meals [56]. However, due to the complexity of the subject, it is necessary to carry out future studies that should investigate the relationship between the forms of management adopted by the states and municipalities and the adequacy or inadequacy of the number of nutritionists, as observed in Tables 2 and 4.

The smaller number of nutritionists in 2024, compared to previous years (Table 1), is possibly due to the launch of the Nutritionist Registration Module in SIGPNAE, in June 2023. It is important to note that the registration and disengagement of nutritionists can occur throughout the course of the year, at any time the professional enters or leaves the implementing entity. The new registration system, proposed as an advance and for greater security and reliability of data, requires the professional to include the *Anotação de Responsabilidade Técnica* (Technical Responsibility Statement), in the case of the technical manager, and the *Declaração de Quadro Técnico* (Technical Staff Statement), in the case of the technical staff. Both documents are issued by the *Conselhos Regionais de Nutrição* (Regional Nutrition Councils), which may be causing a process with greater demands and more steps to complete the registration [57].

In summary, in order to more accurately adapt the PNAE nutritionists' responsibilities to the realities of the Brazilian states and municipalities, a careful analysis ought to be carried out that encompasses the different contexts of geographic regions, considering, for example, the size and territorial extension, the location of schools (urban or rural), whether indigenous or *quilombola* schools, and the travel distances to be covered by the professional within the state or municipality. From this perspective, the CFN has made efforts to adapt to current regulations, having updated CFN Resolution No. 465/2010 [30], which dealt with the PNAE nutritionists' responsibilities, as well as the numerical reference parameters for hiring these professionals. After being implemented for four years, the aforementioned Resolution was revised with the publication of CFN Resolutions No. 788 in September 2024 [58] (which changed the attributions of nutritionists), No. 789 [59] (which changed the number of nutritionists within the state and municipal schools) and No. 790 [60] (which changed the number of nutritionists within federal schools).

The increase in the number of PNAE nutritionists, according to the recommended numerical parameters, in a stable and consolidated manner, will represent a strategic and sustainable advance in strengthening the PNAE as a public policy. This will also contribute to more motivated and valued professionals, aligned with the commitment to provide adequate, quality nutrition to meet the needs of different local realities.

CONCLUSION

This article presents an updated critical review of the role of nutritionists in the PNAE. The presence of this professional in the Program has been recognized by scholars, managers, technicians and different stakeholders in the school community as an important differentiator for its implementation; it has proven to be fundamental for the PAAS and a guarantee of the HRAF and SAN. It has been demonstrated that over time, the role of nutritionists in this Program has been fundamental to ensuring that the food served in schools meets not only basic nutritional needs, but also the sustainable, regional, cultural and social specificities of each school community.

However, despite the many advances in the inclusion of nutritionists in the PNAE, there are still obstacles in local management for their more successful performance, depending on the choices and possibilities of managers for a greater quantitative inclusion of professionals to meet

the numerical parameters recommended by the CFN, as well as the possible overload in duties and the precariousness of the links with the implementing entity causing employment contracts to fluctuate over the years.

Different movements and articulations are still needed to strengthen the category in the PNAE; they ought to involve updating the numerical reference parameters, combined with greater monitoring and ensuring compliance with current regulations. We hope that further developments of this issue will yield increasingly promising results, with due presence and appreciation of the nutritionists in the largest SAN program in this country.

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ACKNOWLEDGMENTS

We are grateful to the Fundo Nacional de Desenvolvimento da Educação (FNDE, National Education Development Fund) for the support in making the data available.

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