



Review article

Public policies strengthen the relationship between family farming and food security in Brazilian schools – A case study of Paraíba state

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ARTICLE INFO

Keywords:

Legislation
Human wellbeing
Healthy and local food
School-feeding

ABSTRACT

We reviewed the historical pathway that paved the way for the creation and implementation of public policies for food security in Brazilian schools. We then analyzed the implementation of such policies in Paraíba state (northeastern Brazil) in terms of the investment in purchasing food from *familiar agriculture*, i.e. agricultural production in small farm units where the labor comes from the owner's family that lives on the farm and receives gross income from agriculture. We conducted this study to determine the extent to which public policies for food security in schools promote income to family farmers in Paraíba state. We obtained data from the Management and Accountability System (SIGPC) to quantify the municipalities in Paraíba state that comply with the national school feeding program denominated *Programa Nacional de Alimentação Escolar* (PNAE). The fiscal years from 2015 to 2017 were used as a reference period because no data is available for the upcoming years. PNAE has been created to underpin programs offering free meals to school-age children, thus allowing for basic learning conditions while tackling hunger among social groups in poverty. PNAE became a public policy subsidiary of familiar agriculture through the Law 11,947 of 2009 which requires the minimal investment of 30% of PNAE funds to purchase food from family farmers. In Paraíba state, 80% of the municipalities buy food through PNAE. However, nearly 40% of the municipalities do not apply the minimum investment to purchase food from family farmers during the evaluated period (2011–2017). We identified that logistics and transportation of food coordinated by the school feeding councils are the main constraints for greater efficiency of the program. Despite such constraints, PNAE offers a unique opportunity to enhance human wellbeing by fostering family farmers to adopt conservation practices and provide healthy, local food to school-aged children.

1. Introduction

The political efforts in Brazil during the XX century focused on creating the infrastructure and juridical basis for the modernization of agriculture and the growth of agribusiness [1,2]. The modernization of Brazilian agriculture was underpinned by the so-called “green revolution” with the primary goal of increasing production and economic growth, but minimal efforts were put into practice to overcome critical social demands, e.g., agrarian reform, food security, income inequality, environmental protection, among

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others. [3,4]. Such modernization of agriculture was initiated during a dictatorship political regime (1964–1985) that was inevitably contested through numerous social reactions [5,6].

Reactions against this authoritarian regime and the lack of agrarian social programs gave rise to the peasant movements in Brazil [6–8]. Among the actions taken by the peasant movements in Brazil, we highlight the emergence of public policies for family farming, agrarian reform, and food security in school settings. In this paper, we unravel the historical origin of public policies that directly affect the synergy between family farming and food security in public schools in Brazil. To achieve our end, we reviewed several documents, including Federal Laws, Decree, and National Programs. Our focus is on the Brazilian program offering free meals to school-aged children. The Brazilian program we studied is denominated in the Portuguese language as *Programa Nacional de Alimentação Escolar* (PNAE). In addition to the historical background of PNAE, we investigated a case study to determine the extent to which the municipalities in Paraíba state (northeastern Brazil) utilize PNAE funds to obtain food from family farmers. Our study is based on datasets from the Brazilian institution that manages Federal funds for education development which is named *Fundo Nacional de Desenvolvimento da Educação* (FNDE).

2. Historical background

2.1. Family farming and agrarian reform in Brazil

For nearly 21 years during the dictatorship regime in Brazil (1964–1985), the peasant movements tackled the conditions of subalterns imperiled by social, political, and economic constraints. Ultimately, the authoritarian regime ensured the continuation of Brazil's unfair land tenure structure composed of large farmlands held by fewer owners [6,7]. Despite the political constraints, the peasants organized social movements and demanded better lawfare in rural areas, forcing the Federal government to create the Land Statute Law (*Lei do Estatuto da Terra*) in 1964.

The Land Statute Law (n° 4504) was sanctioned on November 30, 1964. This regulation instrument considered agrarian reform as the set of measures aiming to promote the distribution of land that does not meet the principles of social justice and increased productivity [9]. The social function of land is one of the main achievements of the Land Statute. Through Art. 2 of the Land Statute, the opportunity to access land ownership is guaranteed to all, conditioned by its social function, according to the following:

§ 1 The ownership of land fully performs its social function when simultaneously.

- a) favors the well-being of the owners and workers who toil, as well as their families;
- b) maintains satisfactory levels of productivity;
- c) ensures the conservation of natural resources; and
- d) observes the legal provisions that regulate fair labor relations among those who possess and cultivate it (Brasil, 1964).

Although the Land Statute Law addressed agrarian reform, the economic elite in Brazil were indeed against this policy and observed the matter as an advisory issue of economic development [6,7]. As a result, the agrarian reform was not effectively implemented and generated constant struggles for peasants and land tenure regularization that are still outstanding today. The caucus of agribusiness in the Congress and Senate Houses used a strategy to prevent the execution of the agrarian reform even with the new Brazilian Constitution of 1988 implemented after the dictatorship regime. When the offensive of the ruling classes against the movements was unleashed in 1985, three organizations struggled to establish themselves within the rural working class [7,10,11]. These organizations are the National Confederation of Workers in Agriculture (CONTAG), the Single Workers' Center (CUT), and the Landless Workers Movement (MST). However, programs for familiar agriculture are not exclusive to farmers from CONTAG and MST. Nevertheless, it is undeniable that the formulation of the Brazilian Constitution of 1988 brought about debates in which movements in the scope of familiar agriculture gained force.

The new Brazilian Constitution of 1988 galvanized the peasant's demands (e.g., the rules of agrarian reform) in public policies of social security based on citizens' rights and duties of the State [12,13]. Strong claims of social security were achieved in 1996 with the recognition of the economic importance of family farming for providing food for Brazilians. The implementation of the first public policy of family farming at the federal level is the National Program for Strengthening of Family Agriculture (PRONAF). PRONAF has a legal framework with Decree 1.946 of June 28, 1996, whose purpose of the program is described in its Art. 1st: "*To promote the sustainable development of the rural segment constituted by the family farmers in order to provide them with increased capacity production, job creation, and income improvement*" [14]. PRONAF is the result of the Program of Valorization of Small Rural Production (PROVAP) developed by President Itamar Franco in 1994 (3). PRONAF was institutionalized through the Decree 1946 of June 28, 1996 during the Fernando Henrique Cardoso administration.

Public policies for family farming gained an outstanding proportion between 2003 and 2011 during President Luis Inácio Lula da Silva. Several public policies for family farming were implemented, including the Price Guarantee Program of Family Agriculture (PGPAF), the Insurance of Family Agriculture (SEAF), the Harvest Guarantee Program, the Food Acquisition Program of Family Agriculture (PAA), National Policy for Technical Assistance and Rural Extension (PNATER), National Rural Housing Program (PNHR), Program for Sustainable Development of Rural Territories (PDSTR), Program for Agroindustrialization of Family Agriculture, and the Program National Land Credit (PNCF) [15,16].

Although the underlying policy goals of President Dilma Rousseff (2011–2016) were towards the continuity with previous governments (e.g., focus on poverty conditions among family farmers and traditional populations), there was a fiscal austerity that reduced the means of implementation of several policies, including family farming technical advice [17]. After Rousseff's

impeachment in 2016, Vice-President Michel Temer took the cabinet and terminated the Ministry of Agrarian Development which was responsible for family farming policies [18]. Michel Temer administration (2016–2018) ended programs carried out by the Ministry of Agrarian Development, however, the dismantling of family farming policies was done by President Jair Bolsonaro (2018–2022) [17].

Bolsonaro's administration centralized decision-making and policy implementation. An example is the centralized execution of policies for water access in semiarid regions of northeastern Brazil, where historically severe droughts caused deaths and huge migration since the beginning of the XX century [19,20]. In this region, local civil society organizations worked on the dissemination of rainwater catchment cisterns in rural areas. However, Bolsonaro's administration undermined the participation of these civil society organizations in policies for water access [19]. Furthermore, the implementation of rural policies by Bolsonaro's administration never had a stable body of civil servants, and most of the family farming programs had volatile budgets, constantly subject to cuts and contingencies [17]. The lack of civil servants in Bolsonaro's administration led to more than 1500 military officers being appointed to the sectoral ministries, ousting technical civil servants from these management positions [21]. President Bolsonaro was defeated in the 2022 Brazilian election, and his successor, the president Luiz Inácio Lula da Silva will face a predominantly conservative congress and senate houses that may hamper agrarian reforms and family farming policies.

2.2. Public policies for food security in Brazilian public schools

PNAE is the Brazilian national school feeding program that originated in the 1930s decade (Table 1). PNAE falls into the political policies of income redistribution because children from less privileged social groups obtain meals while they are enrolled in public schools [22,23]. This program is a reference model that inspired similar programs in other countries, for example, the Food for Peace funded by the United States Agency for International Development (USAID), the Food Program for Development serving the populations in poverty and feeding school-age children, and the Program Food World from the United Nations for Food and Agriculture (FAO/UN) [24–26]. Within the scope of the PNAE, the redistributive function is understood as the development of public actions based on the principle of equity, that is, the allocation of a greater volume of resources for schools and networks in disadvantaged situations of funds, regional inequality, poverty, etc. [25,26].

PNAE is a federal program that adds automatic resources to local budgets as resources not subject to political negotiation, whose amounts will be distributed to school populations under their responsibility [27]. According to the Manual for Food Supply in Brazilian

Table 1
Historical evolution of the National School Feeding Program (PNAE) in Brazil.

Year	Occurrence	Regulatory instrument
1930	The first government actions aimed at food and nutrition in Brazil	–
1940	The National Institute of Nutrition launched the Federal Government's proposal to offer food to students	–
1955	The School Lunch Campaign started the distribution of food to municipalities in poverty using funds mainly from international organizations	Decree 37,106 of March 31, 1955
1956	The School Lunch Campaign was renamed the National School Lunch Campaign (CNME), gaining national coverage.	Decree 39,007 of April 11, 1956
1965	The name is changed to National School Feeding Campaign (CNAE). Several programs in the United States of America emerged, including Food for Peace funded by the United States Agency for International Development (USAID); the Food Program for Development serving populations in poverty and school-age children; and the Program Food World from the United Nations for Food and Agriculture (FAO/UN)	Decree 56,886 of September 20, 1965
1979	The program was renamed the National School Feeding Program (PNAE).	–
1988	Promulgation of the Federal Constitution. Article 208 - Ensuring the right to education, carried out through the provision of school meals.	Brazilian Constitution of 1988
1994	School feeding administration is decentralized, strengthening the autonomy of Municipalities, States, and the Federal District. Incentives for local agriculture, the use of basic, fresh produce, and regional foods.	Law 8913 of July 12, 1994
1998	PNAE is now managed by the National Development Fund of Education. Beginning of the decentralization of resources through automatic transfer.	Law 9649 of May 27, 1998.
2000	Reformulation of the Composition of School Feeding Councils.	Provisional Measure 1979-19 of June 02, 2000
2001	It was established that 70% of the resources transferred from the federal government should be applied exclusively to local food products, strengthening regional eating habits and local agricultural production.	Provisional Measure 2.178–36 of August 24, 2001
2005	Publication of the Resolution of the Federal Council of Nutritionists that provides for the nutritionist's attributions within the scope of the school feeding program	CFN Resolution 358 of May 18, 2005
2006	Interministerial Ordinance for the Promotion of Healthy Eating in schools and institutes Collaborating Centers in Food and Nutrition of the School (CECANE's). Organic Law on Food Safety and Nutritional defines the human right to adequate food as a duty of the public power	Ordinance Interministerial 1010 of August 5, 2006. Law 11346 of September 15, 2006.
2009	National School Feeding Policy. At least 30% of resource funds transferred by the FNDE must be used in the purchase of foodstuffs from family farming and rural enterprises.	Law 11,947 of June 16, 2009, and Res. CD/FNDE 38 of July 16, 2009.
2010	Reformulation of the Resolution of the Federal Council of Nutritionists providing for the attributions of this professional and the parameters numbers to be met within the scope of the PNAE.	Amendment 64° of 2010 Res. CFN 465 of August 23, 2010
2010	Institution of the PNAE Management Committee, formed by representatives of the Government, and institution of the Consultative Board by representatives of civil society.	Ordinance 450 of October 29, 2010

Schools [28], PNAE serves all students enrolled in basic education in public, federal, and philanthropic communities in the country. PNAE follows the principles of the Human Right to Food Adequate Health (DHAA) and Food and Nutrition Security (SAN).

The initiatives of the PNAE began in 1930 when hunger and malnutrition were recognized as serious problems of public health in Brazil where the entire working population had precarious food conditions [29,30]. In 1955, the School Lunch Campaign launched a public policy for the distribution of food to municipalities through resources mainly from international organizations. This policy had centralized management in the Federal Government, which was responsible for the entire School Lunch Programs, from acquisition to distribution of food. The implementation of this policy was marked by a sequence of Decrees and Laws following the adaptation of eating habits peculiar to each region of Brazil (Table 1). However, the management of the fund resources of this policy was decentralized in 1994 to the States, Counties, and Municipalities.

Since 1990, family farming has gained recognition in Brazil as a social and productive category, thus, more policies emerged to foster family farming through the PRONAF program [31]. The connection between PRONAF and PNAE was established by Law 11,947 of June 16, 2009, which sought to adopt healthy eating habits for schoolchildren, at the same time when it proposed to be an agent of sustainable development and became a public policy to promote family farming regulated by Resolution CD/FNDE n. 38 of July 16, 2009. Both, the Law and Resolution from 2009 enforced that **at least 30% of the funds transferred by the PNAE should be used to purchase foodstuffs from family farming and rural family businesses**. Thus, these regulation instruments fostered the production of food in the settlements of the agrarian reform, traditional indigenous communities, and *quilombolas* communities. For effective administration purposes, the PNAE was included in the agenda of territorial management actions of the Ministry of Agrarian Development which ensured the acquisition of foodstuffs from local agriculture which corroborates the local food culture. Also in 2009, Brazil signed a cooperation agreement with the Food Agriculture Organization (FAO) to open up the experience with the PNAE which reinforced food programs in the Zero Hunger initiative in Latin America and the Caribbean.

The cooperation with FAO stands out that lessons learned in Brazil from school feeding are underpinned by nine aspects (1): the large territorial coverage of the program (2); the systematization and continuity of food supply (3); the quality of the food offered in schools (4); the comprehensive regulations of the program (5); nutritional recommendations (6); the acquisition of food from local family farming (7); the monitoring and evaluation program (8); decentralized management; and (9) the mechanisms and educational tools for food and nutrition through vegetable gardens schoolchildren [32]. The report from the World Food Program (i.e. the world's largest humanitarian organization for food assistance) considers school feeding powerful support for the achievement of educational goals and points to the experience of the PNAE as successful in which the food production of family farmers brings positive outcomes for both schools and the local economy [33].

Importantly, there are few requirements for municipalities to receive funds from PNAE. The Ministry of Education (MEC) only requires what states and municipalities should already be doing to comply with the binding spending budget and create school feeding councils [27]. Despite the few requirements for the adhesion to PNAE, we highlight that during Bolsonaro's administration (2018–2022), the number of students served by the PNAE in 2021 was lower than in 2019 (FNDE portal: <https://www.fnde.gov.br/dadosabertos/dataset>). In total, there were 664,671 fewer (−2%) students served by free-meal programs in 2021 compared to 2019. The decrease in student enrollment was partially due to the demographic transition movement, as well as school dropouts in the context of the economic crisis and the Covid-19 pandemic [26]. This phenomenon exposes the urgency of implementing more effective measures to prevent school dropouts and ensure the provision of meals to school-age children in Brazil.

The temporal evolution of Federal funds transferred to schools through the PNAE shows a significant decline in the period 2014–2021 (Fig. 1). The decrease in the volume of funds between 2014 and 2016 was not recovered in the following years to return to the levels of the series' first two years. From 2014 to 2021, **there was a decrease of R\$ 2.33 billion (−34%) dedicated to meals for school-age children** [26]. The decrease in PNAE resources (−34%) was much greater than that of student enrollment (−2%), in a context that there is still a need to expand the coverage of basic education. Also, the per capita values of the PNAE never reached levels compatible with a properly supplementary Federal financial assistance policy [26].

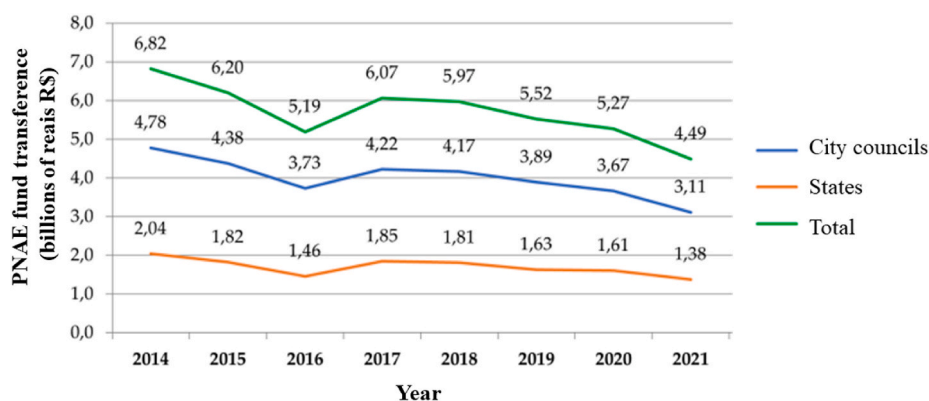


Fig. 1. PNAE resources transferred to schools in Brazil between 2014 and 2021. Total funds destined to meals at Brazilian schools decreased R\$ 2.33 billion (−34%) in 2021 compared to 2014. The amounts paid are updated by the inflation index IPCA Food and Beverages for Dec/2021. Data from FNDE (<https://www.fnde.gov.br/sigefweb/index.php/liberacoes>). Figure from [34].

3. Materials and methods

The study area is the state of Paraíba, northeastern Brazil (Fig. 2). Paraíba state is composed of 223 municipalities organized into four mesoregions: Sertão Paraibano; Borborema; Agreste Paraibano, and Zona da Mata Paraibana [35]. According to the last Demographic Censuses of the Brazilian Institute of Geography and Statistics, the state had a total population of 3,974,495 habitants in an area of 56,469,744 km² [35]. The population in rural areas is 927,832 habitants.

We obtained data on the number of student enrollments that received free meals purchased using the PNAE funds during the years between 2011 and 2017. We also gathered data on the percentage of food that the school councils purchased from family farmers. We used information from the *Fundo de Manutenção e Desenvolvimento da Educação Básica e de Valorização dos Profissionais da Educação* (FUNDEB). We obtained data from the Management and Accountability System (SIGPC) which provides the questionnaires applied to PNAE managers for accountability of foodstuffs purchased from family farming. The fiscal years 2015–2017 were used as a reference period because data from 2018 to present have not been published.

The data reported here are from the municipal management (SIGPC – Access to the Public) and contain the following quantitative information: a) the total value of projects approved in municipal public calls; b) the number of beneficiary individuals and legal entities in the family segment; and c) the percentage of purchases of foodstuffs from family farming. Our research is based on quantitative analysis [36]. We used these datasets to address the following research questions: a) How many municipalities in Paraíba state perform the minimum of 30% of PNAE funds in the acquisition of food products from family farming? B) what are the reasons and justifications of the program managers for the non-compliance with the minimum investment in purchasing food products from family farming?

4. Results

4.1. Student enrollments and investments in food acquisition from family farmers

The number of student enrollments is the criterion used to determine the amounts of PNAE funds transferred to municipalities and states for the purchase of food. Students’ enrollments are distributed between infant education (early childhood), elementary education, high school, adult education, native and quilombola education, and other institutions (Table 2). The municipal schools are responsible for a higher number of students than the state network, except for the years 2016 and 2017 (Table 2 and Fig. 3). This information directly involved a relative increase in the number of municipalities that applied at least 30% of PNAE funds to purchase food from family farmers (Fig. 3). However, the average number of municipalities that did not reach the minimal 30% investment in family farming products remained above 40%, especially in 2012 (52%) which consisted of 117 municipalities in the total Paraíba state. Also, more than 20% of the municipalities did not buy any products from family farming.

Regional differences were observed in the application of PNAE funds to purchase foodstuffs from family farmers (Fig. 4). No municipality in the Mata da Paraíba mesoregion met the target of 30% investment of PNAE funds to buy food from family farmers. On the other hand, the municipalities of Coxixola (Borborema mesoregion) and Quixaba (Sertão Paraibano) exceeded 100% of PNAE funds to acquire food from family farming (Fig. 4). These municipalities offered county funds to buy food from family farmers. For instance, Coxixola applied extra funds of R\$ 5051.67 and R\$4271.55 from city hall resources in 2013 and 2014, respectively. The municipalities of Bananeiras and Boa Vista in Agreste Paraibano mesoregion stand out for keeping the percentage of investment in

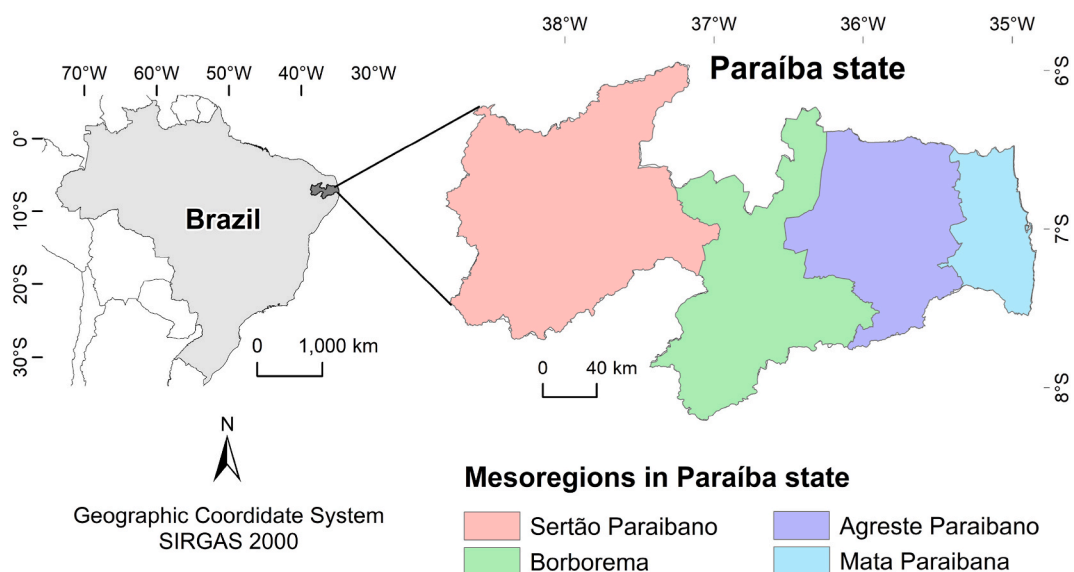


Fig. 2. Location of the study area in Paraíba state composed of 4 mesoregions.

Table 2

Number of students enrolled in the state of Paraíba considered by FUNDEB to estimate annual revenue and distribution of PNAE resources to all municipalities.

	Year						
	2011	2012	2013	2014	2015	2016	2017
State schools							
Infant Education	–	–	–	–	–	96658	99492
Elementary School	186234	178127	159821	144127	111160	330453	332809
High School	119611	114549	113948	111444	110348	5801	1014
Special Education	3015	4020	3479	3108	2646	538	5554
Adult Education	66995	69068	64349	63324	61945	67858	59422
Native and Quilombola Education	3827	2463	3091	1764	1451	6932	5543
Other Institutions	94	1325	36	71	116	–	–
Total	379776	369552	345993	325116	288962	508240	503732
Municipal schools							
Infant Education	84734	84953	87505	93551	95512	–	–
Elementary School	369547	302121	345119	340158	355537	121436	122504
High School	–	–	–	–	–	113104	123382
Special Education	8281	10647	11875	11736	12119	1717	1941
Adult Education	60158	60618	65195	73877	76487	60728	68453
Native and Quilombola Education	5549	5621	5289	5503	4407	3279	3403
Other Institutions	1242	560	1952	2128	1646	–	–
Total	529511	464520	516935	526953	545708	300264	319683

Source: data from FNDE [34].

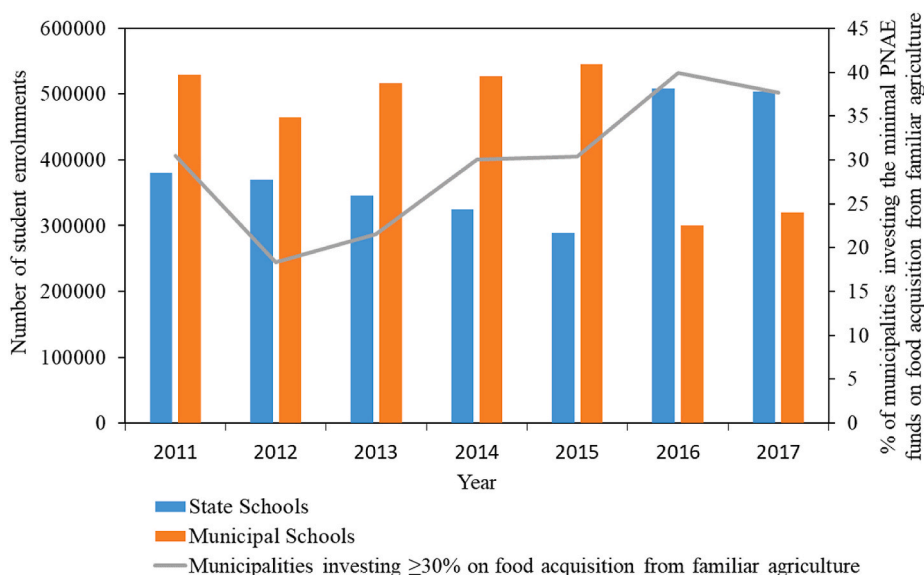


Fig. 3. Total number of student enrollments (bars in the graph) in State and Municipal schools within Paraíba state. The line in the graph shows the percentage of municipalities that applied the minimal of 30% on food acquisition from family farming. Data source is FNDE [34] and it shows a historical series between the years 2011–2017.

purchases by family farming above 30% of the values transferred by the PNAE (Fig. 4).

4.2. PNAE funds in Paraíba state

Between 2011 and 2015, most municipalities in the state of Paraíba received R\$ 51k to R\$100k annually from PNAE funds. The volume of funds in this range decreased over the years, while increasing the number of municipalities that did not receive any PNAE funds (Fig. 5). In the evaluated years, the number of municipalities that received up to R\$ 100k varied from 42 to 69%. According to the PNAE Evaluation Seminar of 2016, there were 903 farmers that benefited with a volume of resources of R\$ 6,034,403.57 [37]. This number increased to 1738 farmers in 2012 with an investment of R\$ 7,235,885.03. However, the number of family farmers that benefited from PNAE decreased to 1,058, 988, and 908 in the years 2013, 2014, and 2015, respectively, while the investment in purchasing food from family farmers reached R\$ 9,179,832 in 2015 [37]. We did not find data on the amount of PNAE resources invested to buy food from family farmers for the following years, which is a limitation of our analysis.

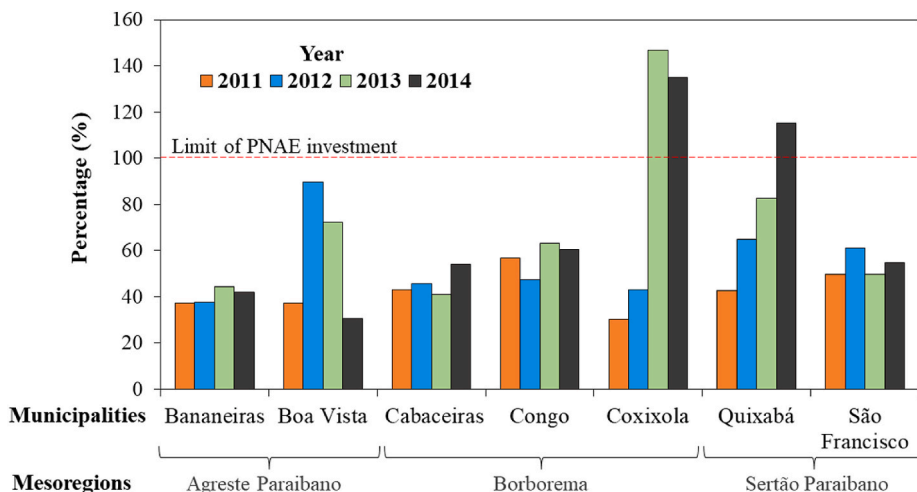


Fig. 4. Municipalities and associated mesoregions in Paraíba state that stand out for keeping the percentage of investment in purchases by family farming above 30% of the values transferred by the PNAE. The municipalities of Coxixola and Quixaba exceeded 100% of acquisition of foodstuffs from family farming since they offered an addition, with its own resources, to the resources transferred by the PNAE.

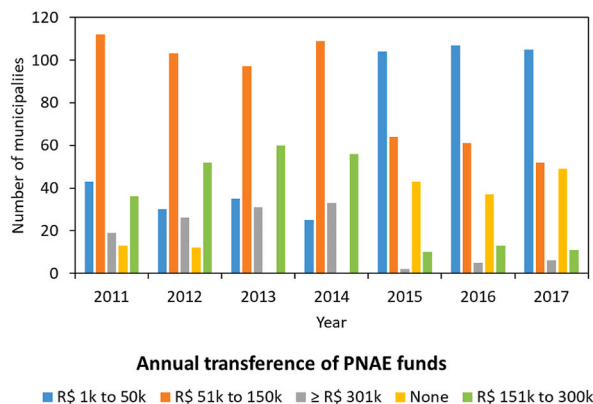


Fig. 5. Number of municipalities that received PNAE funds distributed in ranges in the currency Brazilian real (R\$). Current exchange rate indicates that USD 1 equals R\$ 5.

5. Discussion

Public policies that foster school feeding programs can generate a synergetic effect to improve human wellbeing by strengthening family farming and conservation practices (e.g., non-tillage, biological control, terraces for erosion control, agroforestry systems etc.) (Fig. 6). School feeding programs (e.g., PNAE) support family farmers by ensuring the purchase of their local agronomical produce and by facilitating the logistics/distribution of food from “farm to table”. As family farmers adopt conservation practices (e.g., pest control with biological agents and agroforestry systems), it is expected more nutritious and healthier food available for school-age children since fewer pesticides and herbicides are applied to crops [38]. Furthermore, non-tillage practices and the use of terraces to control erosion may increase soil and water conservation [39,40]. Therefore, we highlight the importance of creating and maintaining public policies that enhance the engagement of institutions (public and private) involved in the relationship between school feeding programs and family farming. Although public policies like PNAE have a great potential to benefit family farmers (e.g., via income promotion) and students (e.g., healthy food and improved learning conditions), we found that such benefits do not reach all municipalities in Paraíba state. Below we discuss the extent to which the municipalities in Paraíba state comply with PNAE and the causes of non-compliance.

5.1. To what extent does Paraíba state comply with PNAE?

Approximately 40% of the municipalities do not apply the minimum investment to purchase food from family farmers during the evaluated period (2011–2017). However, the number of municipalities that reached the minimum of 30% PNAE invested in family farming products varied over the years of observation. According to the PNAE Evaluation Seminar of 2016, a total of R\$ 9 million

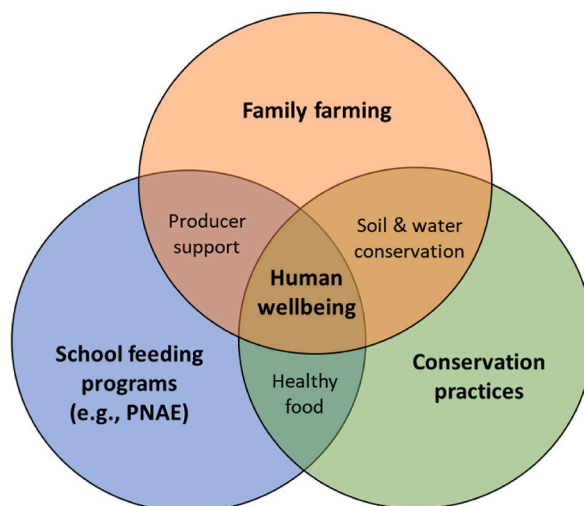


Fig. 6. Conceptual framework of the benefits of public policies such as the PNAE to strengthen the synergy between family farming, school feeding programs, and conservation practices (e.g., non-tillage, biological control, terraces for erosion control, agroforestry systems etc.).

(nearly 1 million USD) was invested in purchasing food from family farmers in Paraíba state. Our analysis of PNAE in Paraíba state indicates an increase from 2012 to 2017 in the total volume of funds used to buy food from family farmers. However, the number of farmers who benefited from PNAE decreased over time. As a result, future investigations are necessary to evaluate the causes of the decline in the number of farmers included in the PNAE. For instance, rural migration and peasant movements in Paraíba state may determine the total number of farmers' beneficiaries of PNAE. Also, the extent of rural organizations among family farmers collaborating in the implementation of the Law 11,947 of 2009 (requirement of $\geq 30\%$ of PNAE funds to purchase food from family farmers) is still unknown. Finally, we identified the need for future quantitative analysis on the impact of PNAE on rural conservation practices of soil and water as well as on the quality of food served in schools of Paraíba state.

5.2. What are the causes of non-compliance with PNAE?

The challenges to implement the PNAE are related to poor communication between managers of the program (e.g., school feeding councils) and family farmers [41]. For instance, farmers are often unaware of the opportunities of the PNAE in which they were inserted even though they provided food to school managers. Also, previous studies point out that there is an increased need to promote the participation of farmers as beneficiaries of public policies which requires the decentralization execution of the program [30,41].

The decentralized management of the school feeding programs improved the technical and operational of the PNAE with good outcomes with flexibility, efficiency, and effectiveness [30]. However, decentralized management does not translate into benefits. For instance, in Bahia state, the decentralization process seems to have generated a new modality of "centralization" of power held by city mayors at the local level which jeopardized the benefits of the program to family farmers [42]. In Santa Catarina state (southern Brazil), intersectoral action is a challenge because of the absence of articulation between PNAE managers and health agents. On the other hand, the purchase of food from family farming appears effective [43]. In Minas Gerais state, the decentralization of PNAE facilitated the destination of a great volume of resources to large food acquisition centers [44]. However, the complexity of the logistics (distribution) of food from producers to schools and the required standards of products hamper the benefits of the program to family farmers.

Previous studies have analyzed the implementation of PNAE in northeast Brazil. For example, in the Serra do Araripe region of Ceará state, a recent regulation by the PNAE requires coordination, organization, and planning between the agricultural sector and implementing entities of school settings [45]). Hence, many family farmers are already organized within cooperatives since 2007 via the Food Acquisition Program (PAA) [45]. However, beneficiary family farmers often complain about delays in payment, the physical structure of the shelters that receive and store fresh produce, and the fewer transport options to deliver food to schools [45].

In Bahia state, the implementation of PNAE to support food security measures and family farming covers a large geographical coverage of PNAE actions across many municipalities [46]. Aside from the support of food distribution, PNAE fosters the work of nutritionists, family farmers, school managers, and counselors [46]. The traditional quilombola communities of Bahia state and from elsewhere are among the priority groups for the supply of foodstuffs, considered an advance in the PNAE. Accordingly, the PNAE promotes (a) the improvement, qualification, and monitoring of the execution of food security in schools located in quilombola communities; (b) the expansion of participation of farmers – quilombola families – in the markets institutional; (c) the guarantee of land tenure regularization and the certification of quilombola communities; and (d) the protection and stimulation of agrobiodiversity and sustainable local development [47].

In Pernambuco state, PNAE has a strong engagement between municipal management and community participation, which enhances the use of local resources in favor of the program [48]. However, it has been observed a fragility of the intersectoral articulation and deficient professional qualifications of family farmers [48].

The volume of resources from the PNAE towards organic-grown food and agroecological certification of products improved the quality of school meals [34,49]. As a challenge, the study conducted by Tardin ([49]) highlighted (1) the difficulty in accessing PRONAF funds; (2) the absence or insufficiency of technological assistance for family farmers; and (3) the deficiency or absence of infrastructure in school settings. Such situations are aggravated by weak or non-existent land tenure regularization and limited rights to social minorities.

6. Conclusions

The goal of public policies such as PNAE and PRONAF has been to improve social justice and the rights of evolving family members in rural and urban areas in Brazil. These programs intensify and serve as agents that promote income and social inclusion of agricultural families in Brazilian territories. However, the implementation of these programs in several Brazilian states is constrained by the massive reduction in PNAE funds (−34%) to school feeding councils. Combined with recent cuts in PNAE investments, the logistics and the transportation of food from producers to schools may hamper the geographical coverage of these programs. The implementation of the PNAE in schools is under the responsibility shared by private and public sectors with strong engagement of the civil organizations, which requires decentralization of the execution of the program. Here, we provide an overview of the acquisition of foodstuffs from family farming for the PNAE in the state of Paraíba, as determined by Art. 14 of Law 11,947 of 2009. Our analysis encompasses the period from 2015 to 2017 because no data were available for the upcoming years, which implies a limitation of our study.

Despite the increase in the application of PNAE funds to purchase food from family farmers in Paraíba state, we found a decrease in the number of farmers who benefited from this program. Nearly 40% of the municipalities in Paraíba state did not reach the minimal execution of 30% of PNAE funds to obtain foodstuff from family farming. In addition, the PNAE is an important instrument for the effectiveness, social inclusion, and income of family farming. As we revisit the chronology of these public policies for food security in school settings and family farming, we anticipate that from now on a new mobilization of social movements and networking will be necessary for the application of Brazilian laws and public rights.

Author contribution statement

All authors listed have significantly contributed to the development and the writing of this article.

Data availability statement

Data will be made available on request.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

We thank the members of the Outreach and Territorial Development Group of the Federal University of Paraíba (NEDET/UFPB) who promoted this work. We thank the farmers and rural youth partners. We thank the extinct Ministry of Agrarian Development (MDA) for strengthening the National Territorial Development Program which generated the creation of NEDET. This research was partially funded by the Brazilian National Council for Scientific and Technological Development (CNPq), proc. 165394/2020-0.

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