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POTENCIAL DAS COMPRAS PÚBLICAS DE ALIMENTOS PARA PROMOÇÃO DE SISTEMAS ALIMENTARES CIDADE-REGIÃO: UM ESTUDO DE CASO DO PROGRAMA NACIONAL DE ALIMENTAÇÃO ESCOLAR NA METRÓPOLE DE CAMPINAS, SÃO PAULO

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ABSTRACT

Public food procurement from family farming has arisen as a powerful tool to transform food systems, by creating demands for healthy and sustainable foodstuffs. In urban centres, where a growing need for food is noted, this can play a vital role in connecting urban consumption with rural production, strengthening rural-urban associations. This study aimed to contribute to the discussion on the potential of public procurement as a policy tool to promote sustainable city-regions based on the city-region food systems approach. To this end, a descriptive study was carried out regarding public food purchases from family farming by the Brazilian School Feeding Programme in a representative Brazilian metropolis, Campinas, São Paulo, from 2013 to 2019, based on public databases provided by the Accountability Management System of the National Fund for the Development of Education (FNDE) and the Brazilian Ministry of Agriculture, Livestock and Supply (MAPA). The findings indicated that the programme's potential was not fully achieved in the metropolis of Campinas, given that the purchase of local, sociobiodiverse and organic food from family farming fell short of legislation incentives. This highlights the need for further improvements to better align this public policy with its sustainable objectives, not only in Campinas, but also in other urban centres seeking to strengthen their associations with rural producers.

Keywords: Public purchases. School meals. City-regions. Urban food.

RESUMO

As compras públicas de alimentos da agricultura familiar surgem como instrumento poderoso para transformar os sistemas alimentares, através da criação de demanda por alimentos saudáveis e sustentáveis. Nos centros urbanos, onde há necessidade crescente de alimentos, as compras públicas podem desempenhar um papel crucial na ligação entre o consumo urbano e a produção rural, reforçando as conexões rural-urbanas. Este estudo teve como objetivo contribuir para a discussão sobre o potencial das compras públicas como instrumento institucional para promover cidades-região sustentáveis, com base na abordagem dos sistemas alimentares cidade-região. Para isso, foi realizado um estudo descritivo sobre as compras públicas de alimentos da agricultura familiar pelo Programa Nacional de Alimentação Escolar em uma metrópole brasileira representativa, Campinas, São Paulo, de 2013 a 2019, com base em dados públicos fornecidos pelo Sistema de Gestão de Prestação de Contas do Fundo Nacional de Desenvolvimento da Educação (FNDE) e pelo Ministério da Agricultura, Pecuária e Abastecimento (MAPA). Os resultados indicaram que o potencial do programa não foi plenamente aproveitado na metrópole de Campinas, uma vez que a compra de alimentos locais, sociobiodiversos e orgânicos da agricultura familiar ficou aquém dos incentivos previstos na legislação. Esta observação ressalta a necessidade de novos avanços para melhor alinhar a política pública com seus objetivos sustentáveis, não apenas em Campinas, mas também em outros centros urbanos que buscam fortalecer seus vínculos com os produtores rurais.

Palavras-chave: Compras públicas. Alimentação escolar. Cidades-região. Alimentação urbana.

INTRODUCTION

Scholars have increasingly recognised the unsustainability and vulnerability of the conventional food system, both of which are inherent to the system itself (Marsden; Moragues Faus; Sonnino, 2019). The way food is produced and traded is closely associated to issues such as biodiversity loss, environmental degradation, greenhouse gas emissions, rural exodus and food and nutrition insecurity (Nodari; Guerra, 2015; Lever; Sonnino, 2022; Belik, 2018).

Within these debates, the city-region food systems (CRFS) approach has been employed as an alternative to the globalised food system. This system proposes food localisation and the strengthening of rural-urban associations in order to move towards locally based, more resilient and sustainable food systems (Lever; Sonnino, 2022). In this sense, public food procurement is seen as an interesting tool to advance policy objectives, promoting food system sustainability and fostering local economic development (Sonnino, 2019; Eckersley *et al*., 2022).

In Brazil, CRFS has been applied as a strategy to transform the food system, as its guidelines combine productive inclusion, environmental sustainability and food and nutrition security (Grisa; Schneider; Vasconcellos, 2020). It is widely recognised for its ability to induce sustainable food production and consumption, also guaranteeing vulnerable producer access to institutional markets. One of the most important public food purchasing policies in Brazil encompasses the Brazilian School Feeding Programme (PNAE, in Portuguese). This programme is noteworthy as an integrated policy capable of promoting the articulation between local food production, school meals and nutrition education, improving vulnerable population access to healthier foods (Sidaner; Balaban; Burlandy, 2013; WFP; FNDE, 2019).

The prioritisation of locally produced, natural or minimally processed, agroecological and sociobiodiverse foods is particularly relevant among the legal mechanisms established by the PNAE to promote sustainability. Furthermore, the allocation of at least 30% of federal funds received by sub-national governments to food purchases from family farming is mandatory (Brazil, 2009).

Given its intersectoral nature and universal coverage[1], many studies focus on PNAE's potential to transform the Brazilian food system. However, no studies have focused on understanding school feeding as a potential tool within the city-region food systems approach[2]. In this context, this study aims to contribute to the discussion regarding the potential of public procurement within the city-region food systems approach. To this end, a descriptive study was carried out on public food purchases from family farming by the Brazilian School Feeding Programme in Campinas, a Brazilian metropolis in the state of São Paulo was conducted, in addition to a literature review on these topics.

With 1,138,309 inhabitants, Campinas is the 14th largest urban centre in Brazil and the 10th most urbanised city worldwide. When considering its metropolitan region, Campinas reaches 3,178,864 inhabitants and is the 10th largest Brazilian metropolis (IBGE, 2023). Therefore, although it displays certain specificities, the food supply in Campinas faces challenges common to large urban centres. Increasing food demands generally exceed rural producer capacity producers in dense urban centres such as Campinas (Siliprandi; Belik, 2012; Retière, 2022). Moreover, the long distances between urban and rural food production areas, combined with a high number of delivery points, become complex issues in

1 The programme is present in all 5,570 Brazilian municipalities and covers all students in all public basic education stages (FNDE, 2023).

2 A systematic search was carried out at the Scopus, Scielo and DOAJ databases for articles containing the words "city-region" and "food procurement" and "food systems" (or synonyms) simultaneously.

urban contexts (Grisa; Kato; Zimmerman, 2017; Retière, 2022). This creates a challenging scenario for the articulation of urban and rural realities and the integration of planning policies in municipality territories as a whole (Santana *et al.*, 2017). These considerations justify the need to investigate the sustainable institutional market food supply in Campinas, whose challenges are typical of large Brazilian metropolises.

In order to explore food procurement as a tool for building sustainable food systems through the CRFS approach, this study proceeded as follows. First, it reviews insights on CRFS, followed by a discussion of the Brazilian School Feeding Programme (PNAE). It then presents the research problem, data collection and methods employed herein, followed by a description of the research findings and a discussion of PNAE opportunities and challenges as a viable policy tool for transforming food systems in urban contexts.

CITY-REGION FOOD SYSTEMS

The city-region approach has received attention from regional economists and planners in recent decades, although it is now gaining renewed prominence, as cities and urban food security have become the focus of government and academic discourses (Battersby; Watson, 2019; Etherington; Jones, 2009). This concept is based on territorially integrated conglomerates whose socio-spatial architecture reconfigures associations between rural and urban aspects (Sonnino; Coulson, 2021). In other words, the city-region comprises the city and its surrounding area, and encompasses the social, spatial and economic relationship established between them (Parr, 2005; Davoudi, 2008). The term 'city-region' applies not only to megacities and vast agricultural hinterlands, but also to small and medium-sized towns linked to remote small-scale producers and their agricultural value chains (Blay-Palmer *et al.*, 2018).

According to Scott *et al.* (2001), progressive globalisation and the resulting production chain lengthening had led to even more central discussions regarding city regions. As a result, cities are becoming less isolated production units and more production relatioms networks in a regional context (Scott *et al.*, 2001). Within the urban food security and food policy debates, city-region food systems (CRFS) have emerged as a key approach to address urban food in the context of increasing demands and population growth (Battersby; Watson, 2019). These systems emphasises that more integrated food systems based on increased support for food localisation around urban centres and agricultural quality

food production are critical for a transition to sustainability (Lever; Sonnino, 2022).

Schmitt (2011) adds that emerging food localisation processes are complex phenomena, involving not only the simple restructuring of market circuits, but also the development of multiscalar strategies for the socio-economic and cultural transformation of the current agri-food system. Therefore, the "place-based" approach should not be framed in its purely territorial dimension, as this cannot capture all the -political determinants that affect local food systems (Sonnino; Milbourne, 2022). In this context, the CRFS approach seeks to build locally based food systems that simultaneously increase access to quality healthy food, generate decent jobs and incomes, increase a certain region's resilience to supply chain shocks, foster rural-urban associations, promote ecosystem and natural resource management and, finally, support participatory governance (Blay-Palmer *et al*., 2018).

However, Lever and Sonnino (2022) warn that the CRFS approach is not without its problems. Food localisation does not necessarily lead to desirable outcomes in terms of food security and sustainability, and can, therefore, blind planners to the most effective strategy for achieving desired goals (Born; Purcell, 2006). In this sense, Jennings *et al*. (2015) argue that local and global food production integration is paramount for designing city-regions that can realistically contribute to improved food security. Planning research should, thus, consider other scalar options that may be more effective, as this 'local trap' can confuse ends with means (Born; Purcell, 2006)

Institutional structures operating at specific sub-national levels are highlighted as important means to promote integrated urban food strategies. The political and economic power of cities is required to improve rural-urban associations within a more inclusive governance context that addresses the demands of both rural and urban populations (Jennings *et a*l., 2015). One of the key challenges is the organisation of administrative and political food planning responsibility, as different areas and sectors may be required in charting a course towards sustainable and resilient food systems (Dubbeling *et al.,* 2017). As an intersectoral policy tool, public procurement in urban centres can be employed as a food strategy to achieve objectives highlighted by the CRFS approach. Therefore, a public procurement analysis of supply chains and their guidelines is necessary to understand how and to what extent it indeed comprises an interesting tool for this purpose.

PUBLIC FOOD PROCUREMENT: THE BRAZILIAN SCHOOL FEEDING PROGRAMME

Public procurement has emerged as a powerful tool to address the challenges of an unsustainable globalised food system, supplying social, economic, environmental and health benefits to multiple beneficiaries (Sonnino, 2019; Parsons; Barling, 2022). The purchasing power of the state allows it to increase demands for sustainable, diverse and healthy products, ensuring the ability to guide production, supply and consumption towards a more sustainable food system (Sambuichi *et al*., 2014). Within this debate, school meals are increasingly recognised as a huge market, capable not only of triggering food production system changes, but also of promoting healthier eating habits among students (Morgan; Sonnino, 2007), highlighting the extreme importance of nutrition during childhood and adolescence (BURKE, 2002).

In Brazil, the National School Feeding Programme (PNAE) was created in 1955, although it gained the status of a transformative policy tool towards a sustainable food system in the 2000s. This programme became the longest-running public policy initiative to promote country-wise food and nutrition security (Kitaoka, 2018). It is based on the idea that all public network students are entitled to meals throughout the school year. The programme provides free school meals and food and nutrition education to students in all public basic education stages (FNDE, 2023).

As a national policy operating in a federal state, the Union's PNAE budget is transferred through the National Fund for Education Development (FNDE, in Portuguese) to sub-national governments responsible for supplementing federal funds with their own resources. Once federal funds have been distributed, it is up to the states and municipalities to implement the programme according to guidelines established by the federal law. Failure by sub-national governments to comply with the federal law implies the loss of the national transfers. The control of the federal funds received by the implementing entities is the responsibility of the School Meals Councils (CAEs, in Portuguese). These CAEs are advisory bodies set up in Brazilian states and municipalities whose main function is to monitor the implementation of school meal quality as defined by law (FNDE, 2023). The top-down PNAE operationalisation, therefore, articulates both national, sub-national and local institutions and relies on civil society participation in its supervision. In addition, purchase implementation requires an integrated political-administrative organisation that allows for the

interaction of different actors, such as education, health and agriculture experts (Marques *et al*., 2017).

The programme's guidelines are increasingly outlined to support sustainable food system development of in Brazil (Constanty; Zonin, 2016). This is explicitly stated in the guideline established in Law 11,947 of 2009, which provides for sustainable development promotion through incentives for the purchase of diverse food products, sourced locally and preferably from family farming and rural family enterprises. The law also gives priority to supporting purchases from indigenous communities and quilombo descendants (Brazil, 2009).

This guideline emphasises food origin as a key aspect of the policy's sustainable development promotion objective. The support of local family farming as a strategy to promote sustainable productive inclusion is at the centre of the proposed mechanisms, reinforced by the mandatory allocation of at least 30% of federal funds received by sub-national governments towards family farming food purchases (Brazil, 2009). The incentive to purchase locally produced food is strengthened by the mandatory prioritisation of family suppliers from the same municipality, followed by the immediate geographical region, the intermediate geographical region, the state and, finally, national suppliers (Brazil, 2020).

In Brazil, food supply through family farming encompasses multiple functions, such as (1) income and employment generation in rural areas, contributing to the socio-economic reproduction of rural families; (2) food security promotion in rural families and in society, given its capacity to contribute decisively to the country's food supply; (3) social and cultural structure maintenance in rural areas; and (4) natural resource and rural landscape conservation (Maluf; Bonnal; Cazella, 2008). Moreover, family farming has the potential to guarantee local market supplies, thus contributing to the reconnection between production and consumption (Schmitt, 2011; Aguiar; Delgrossi; Thomé, 2018). It is, therefore, a strategic sector for building local and sustainable food systems in Brazil.

The programme's legislation also emphasises food quality as a strategy for food system transforming in Brazil, based on the assumption that it is an important aspect in building sustainable systems. Food quality is particularly relevant in public purchasing for school meals, where school children health and nutrition education are explicit objectives. Public purchasing also gives public authorities the political and economic power to improve the qualification process and transform the way food chains operate (Sonnino, 2009).

The law recognises the importance of quality food based on sociobiodiverse[3] products from local regions, representing a strategic resource for sociobiodiversity protection (Rossetti; Silva; Winnie, 2016). Additionally, the PNAE favours the adoption of family farming agroecological practices (Constanty; Zonin, 2016), by establishing the prioritisation of organic and/or agroecological food products and opening up the possibility for executing agencies to value agroecological or organic products at 30% more than the prices established for conventional products (Brazil, 2020).

Finally, the programme stipulates that at least 75% of total purchases (from family farming or not) must be fresh or minimally processed foods (Brazil, 2020), based on the idea that high processing levels can pose risks to healthy and sustainable diets (Martinelli; Cavalli, 2019). Moreover, the production of ultra-processed foods is generally associated with industrial production, contrary to the cultural, environmental and social aspects valued by the programme.

It is important to note that family farming food processing often operates as a strategy to (1) add final product value, (2) allow access to new markets, (3) diversify and differentiate family production, and (4) ensure food preservation and storage for longer periods (Martinelli; Cavalli, 2019; Medina; Gosh; Delgrossi, 2021; Schneider; Ferrari, 2015). Small-scale processed foods are usually produced locally, through the appropriate provenance of raw materials, local cultural artisanal processes and family labour (Cruz, 2020). Thus, the acquisition of processed products by family farmers, as long as it respects the programme's nutritional guidelines and restrictions, can improve regional diets and promote productive inclusion and sustainable local development.

Given its robust guidelines and the purchasing power of local governments, PNAE operationalisation displays enormous potential to influence Brazilian urban centre food systems, where demands are concentrated but food suppliers are often from remote rural areas. School meals can, therefore, be used as a tool to strengthen rural-urban associations, fostering greater geographical proximity that enables family farmers to access local markets and guaranteeing the circulation of healthy, regional and diverse foods produced in a sustainable manner by family businesses in local commercial circuits (Constanty; Zonin, 2016; Aguiar; Delgrossi; Thomé, 2018).

3 The Interministerial Decree No. 284 of 30 May 2018 defines the sociobiodiverse species of each state for marketing purposes (Brazil, 2018), and is used as a reference for the prioritisation of public food purchases.

RESEARCH PROBLEM

As the literature suggests, the Brazilian School Feeding Programme plays an important role in increasing the demands for family farming food items and, consequently, in creating more sustainable food systems. Both local and national actors are articulated to carry out food purchases according to an integrated set of guidelines through the PNAE, the design of which has been used as a guide for other countries' attempts to improve public procurement practices and transform them into policy tools for sustainable development promotion.

As cities and urban food security gain public discourse prominence, understanding how and to what extent public procurement can comprise an interesting policy tool for building sustainable city-region food systems is paramount to the development of integrated urban food strategies. To contribute to this discussion, a case study is proposed on school feeding food procurement carried out by the Brazilian metropolis of Campinas between 2013 and 2019.

Located in the state of São Paulo, Campinas is the 5th most populous city in the state and one of the 20 most populous cities in Brazil, with an estimated population of 1,14 million (IBGE, 2023). The municipality is predominantly urban, with only 1.7% living in rural areas (SEADE, 2020). The city is also the largest in its immediate geographical region (RGI), and concentrates 37.5% of the RGI's population, which is also predominantly urban, with only 2.4% of people living in rural areas (IBGE, 2023; SEADE, 2020).

Given the strong urban dynamics influence on rural sociability and economic integration, the rural areas of Campinas must be considered in a metropolitan context (Miranda; Pastre; Porto, 2020). The low rural population percentage in Campinas and in the RGI can, therefore, be associated to its socio-economic characteristics, where urban activities such as industry and services represent 90.4% of the municipality's GDP, while the agricultural and livestock sector represents only 0.3% (SEADE, 2020). Of the total number of people employed in rural areas of Campinas and its RGI, only 27.2% and 28.3%, respectively, are employed in family farming, while this percentage increases to 67% in Brazil as a whole (IBGE, 2017). The main agricultural products produced by family farming in the Campinas RGI are grapes, lettuce, sugar cane, oranges and guavas (IBGE, 2017).

Population growth and urban area expansion have led to a decline in rural areas and increased land prices, displacing rural communities. This raises issues concerning the availability and accessibility of locally produced food. Considering this, we aim to contribute to the discussion on the potential of public procurement as a policy tool to promote sustainable city-regions, assessing whether or not the public food purchases made in Campinas within the selected time frame encompass the characteristics associated with the fostering of more sustainable food systems.

MATERIAL AND METHODS

This study presents a three-step research approach to examine family farming product purchases by the PNAE in Campinas. First, the percentage allocated to family farming product purchases by Campinas from 2013 to 2019 was identified in relation to the total federal funding received by the municipality for the execution of purchases related to school feeding. The results were descriptively analysed in order to investigate family farming purchase participation.

Next, the purchased food was classified according to the location of its suppliers - from the municipality of Campinas itself, from its immediate geographical region (IGR), from its intermediate geographical region (INTRG), from the state of São Paulo, or from other states[4]. This was carried out to determine the value percentage of family agriculture products from each locality allocated by the municipality of Campinas during the study period.

Finally, the food purchased by Campinas between 2013 and 2019 was classified to assess the quality of food purchased t family farming by the municipality of Campinas. The percentage value allocated to family farming products in each of the following quality categories was obtained.

- Processing level, according to the extent and purpose of industrial processing, as proposed by the Food Guide for the Brazilian Population (Brazil, 2014), categorized as fresh, minimally processed, processed and ultra-processed foods.
- If the item is sociobiodiverse or not, according to the list of sociobiodiverse species for marketing purposes, as defined by Interministerial Decree No. 284 of 30 May 2018 (Brazil, 2018).

4 The applied classification was not cumulative, *i.e.*, food purchased from the municipality was not classified as from the immediate region, the intermediate region or the state.

- If the employed agricultural production system was conventional or organic[5], according to the PNAE definition provided in the Organic Law of 2003 (Brazil, 2003).

The information was obtained from public databases provided by the Accountability Management System of the National Fund for the Development of Education (FNDE)[6]. Information on item descriptions and their suppliers was not available for 2016. Supplier origin was obtained from National Register of Family Farming data provided by the Brazilian Ministry of Agriculture, Livestock and Supply (MAPA)[7].

RESULTS AND DISCUSSION

Between 2013 and 2019, Campinas allocated an average of 35.14% of received funds to family production food purchases from by the PNAE. The municipality met the minimum percentage of 30% established by Law No. 11,947, generating significant demands for family production during the study period. However, the municipality's efforts fell short of the legal provision in 2017 and 2018, at 27.6% and 25.9%, respectively. In 2015, Campinas' performance was exceptional, with 49.5% of resources allocated to family segment purchases. This illustrates the municipality's potential to support local family farming and encourages continued efforts towards this goal.

Along with the inclusion of family farmers in supplier networks, the relocalisation of school meal supply chains is also a critical PNAE component as a tool food system transformation. Although Campinas was successful in purchasing from family farmers, it did not prioritize suppliers from the municipality itself or its immediate (IGR) or intermediate geographical (INTRG) regions, as required by the programme's legislation.

Table 1 depicts the low average participation of purchases from the municipality itself and the absence of purchases from the IGR beyond the municipality. The median values also suggest a general tendency to not buy at all from nearby suppliers in most years.

5 The definition of organic employed herein includes ecological, biodynamic, natural, regenerative, biological, agroecological and permaculture

6 Available at: <https://www.fnde.gov.br/fnde_sistemas/sigpc-contas-online>.

7 Available at: <https://dados.agricultura.gov.br/pt_PT/dataset/declaracao-de-aptidao-ao-pronaf-dap>.

Table 1 | Descriptive statistics - Percentage of local purchases relative to total purchases of family farming foods for school feeding in Campinas (2013-2019).

	Purchases from the municipality	Purchases from the IGR	Purchases from the INTRG	Purchases from the state	Purchases from other states
Mean	7.19%	0.00%	0.004%	61.13%	31.67%
Median	0.00%	0.00%	0.00%	60.35%	36.84%

Source: SiGPC - FNDE's Accountability Management System. Elaborated by the authors.

This indicates that the municipality of Campinas relied on distant family farmer organisations to meet the minimum requirement of allocating 30% of PNDE resources to food purchases from family farmers. During the study years, the municipality spent, on average, a higher amount proportion of received funds on purchases from other states compared to purchases from the municipality and its immediate and intermediate regions combined.

It is important to note that purchases from suppliers in other states came exclusively from the southern region of the country, which is known for its developed family farming practices, higher cooperativism rates and better family farmer credit access (Aquino; Gazolla; Schneider, 2018; IBGE, 2017).

Regarding the quality of the purchased food, Table 2 indicates that fresh product purchases from suppliers in the municipality and intermediate region accounted for 97.54% and 100%, respectively, while the amount of fresh products was lower concerning purchases from state suppliers (53.59%) and from other states, where no fresh food was purchased. This suggests the existence of a niche for fresh local purchases, with school meals in Campinas generating demands mainly for fresh products.

To strengthen the local food system and add value to local purchases, it may be beneficial to stimulate demands for minimally processed and processed products. By diversifying the range of products purchased from local suppliers and promoting higher value-added products, Campinas can expand the localisation of school meal supply chains, creating new opportunities for local producers.

Table 2 | Average amount by supplier origin - Percentage of purchases according to processing level relative to family farm purchases for school meals in Campinas (2013-2019)

Processing level	Purchases from the municipality	Purchases from the INTGR	Purchases from the state	Purchases from other states	Total
Fresh	97.54%	100.00%	53.59%	0.0%	40.68%
Minimally processed	0.00%	0.00%	29.77%	83.89%	26.23%
Processed	2.46%	0.00%	30.37%	16.11%	33.09%
Ultraprocessed	0.00%	0.00%	0.00%	0.00%	0.00%

Source: SiGPC - FNDE's Accountability Management System. Elaborated by the authors.

Moreover, an average of 4.64% per year of the total value of family supplier purchase was allocated to sociobiodiverse food purchases. However, Campinas did not purchase any sociobiodiverse family farming products in 2013 and 2019, when these items were mostly purchased from suppliers from municipalities in the state of São Paulo, beyond the immediate and intermediate geographical regions[8]. However, the diversity of sociobiodiverse foods was low, consisting only of fresh guava, passion fruit, and cassava.

Organic purchases were only carried out in 2018, representing 13.98% of the total amount spent that year. All items were minimally processed and purchased from suppliers in other states, indicating that Campinas has not promoted local agroecological production to supply its school meals.

These findings indicate that, despite its success in purchasing from family farmers, Campinas struggles to prioritise local, sociobiodiverse and organic food from family farming for school meals. This suggests that current legal guidelines are not sufficient for the PNAE to effectively localise its supply chains, and that the city government is facing difficulties in operationalising public procurement in accordance with the law.

8 In 2015, exceptionally, fresh passion fruit was purchased from the municipality itself.

Marques *et al*. (2017) revealed some of the difficulties faced by Campinas in implementing local family farming purchases, including (1) ineffective dissemination of public calls to farmers in the region; (2) under-representation of local family farmers in the CAE; and (3) lack of training of those responsible for public calls, whose lack of knowledge of local agricultural realities has a decisive impact on local producer access to the policy (Marques *et al.,* 2017; Retière, 2014).

The challenges faced by Campinas in localising the PNAE's supply chains are not only related to municipal administration difficulties in operationalising demands, but also to supply problems faced by local family farmers. These include (1) logistical difficulties due to the decentralisation of product delivery points in Campinas; (2) lack of documentation required to participate in public calls; (3) impossibility of regular supplies of the requested foodstuffs due to technical and seasonal limitations; (4) incompatibility between the prices charged by local producers and the prices set in public calls; (5) and lack of farmer organisation in cooperatives (Marques *et al.,* 2017; Souza-Esquerdo; Bergamasco, 2015).

The difficulties faced by family farmers to respond to the PNAE's public calls due to the technical and socio-economic conditions of their businesses have been recognised as one of the main obstacles to the programme's potential for productive inclusion (Silva; Dias; Amorim Júnior, 2015). Furthermore, in highly urbanised regions such as Campinas, family farmers face additional technical and socio-economic vulnerabilities linked to rural exodus, high land prices, transport difficulties and high competitiveness with products from other regions. Therefore, the strengthening of rural-urban relations is paramount, especially in metropolitan contexts, where greater constrictions for the articulation between local food supply and high demands are noted. Overcoming these difficulties is essential to reduce the vulnerability of food systems and to make the food sourcing process more endogenous.

To increase the effectiveness of public procurement policies and promote the inclusion of local family farming, local governments must take strategic initiatives. A critical step is to include local family farming representatives in the CAE and establish effective communication channels between local producers and government professionals (Chaves *et al*., 2020). This can also aid in promoting public calls among local producers, inform them of the income gains linked to public demands, increase producers' trust in the government and encourage them to participate in PNAE purchases. This effort

is particularly important for producers in the immediate geographical region, who were not included in purchases during the study period.

Another key action to support local production is to increase the coverage and effectiveness of rural support provided by the Rural Technical Assistance Entities (EMATER, in Portuguese). By providing this support, EMATER can contribute to greater family producer formalisation and help ensure a regular supply of food to meet public demand. Strengthening rural assistance can also help promote sustainable agricultural practices and improve rural community economic and social conditions (Vieira; Bernardo; Lourenzani, 2015). The construction of supply centres at strategic points in the city is another important initiative to optimise food delivery logistics to schools. This is particularly important in Campinas, where urban areas are dispersed and transport costs, high.

Finally, initiatives that strengthen the link between municipality demands and local producer supplies are also required. Including foods that are most produced by local family farmers in menus, such as grapes, lettuce, and guava, considering their production cycles, can increase local purchases. Similarly, increasing demands for minimally processed and locally produced foods can add value to purchases and encourage the local production of these items, increasing local purchases of sociobiodiverse items. Regarding organic foodstuffs, overall demand, local or not, should be increased, given their very low share in the analysed data. Such an effort is consistent with the promotion of healthy student diets and displays the potential to promote agroecological production in the region itself.

Despite the required institutional efforts, constraints such as seasonality and climatic challenges inevitably arise for the local production of certain foods that are part of the healthy diet of schoolchildren. It is, therefore, necessary to integrate more distant supply chains to make public purchases feasible. The integration of local and global scales in the formation of food supply chains is, thus, crucial to promote viable city-regional food systems, as well as the articulation of different institutional instruments in the construction of urban food strategies.

CONCLUSIONS

The PNAE encompasses a set of guidelines that demonstrate its intention to promote more sustainable food systems. One of the most notable measures is the prioritisation of local purchases from family farming, which can serve as an interesting tool to promote city-region food systems in Brazilian metropolises. By promoting the localisation of school meal supply chains, this programme can strengthen the links between consumption in cities and agricultural production in surrounding rural areas.

Additionally, the PNAE guidelines for sourcing high-quality food, including sociobiodiverse, fresh, minimally processed and organic options, play a key role in creating healthy food chains. By encouraging the purchase of such products, the programme contributes to the establishment of more sustainable and responsible food production and consumption.

However, the findings reported herein indicate that the programme's potential is not being fully realised in the metropolis of Campinas, as no local purchase prioritisation was noted during any of the study years. Additionally, the amount of sociobiodiverse and organic food purchased by the municipality fell short of the incentives outlined in the law.

This performance is linked to municipal administration difficulties in operationalising public demand and addressing the supply problems of local family farmers. In addition, highly urbanised municipalities such as Campinas display inherent challenges that make supply chain localisation a complex task requiring careful planning, research and the integration of different strategies in different public administration sectors. These challenges justify the importance of analysing the implementation of sustainable public food procurement in urban centres, where the construction of resilient city regions is all the more urgent.

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