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Strategies to Overcome Local Family Farmers' Difficulties in Supplying Vegetables Through Short Food Supply Chains: A Brazilian Case Study

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Abstract

This study aimed to identify and analyse the main difficulties faced by family farmers in producing and supplying vegetables through short food supply chains. Semi-structured interviews were conducted with seven family farmers in a large city in southern Brazil. We sought to include at least one farmer supplying each of the main identified outlets: schools, restaurants, supermarkets, street markets, and consumer groups. Contacts were obtained through rural producer organisations. Data were recorded, transcribed, and analysed using thematic analysis. Three groups of difficulties emerged: (i) production—including seasonality, pest, and disease management, climate-related losses, and limited technical support; (ii) sales—such as price competition, logistical challenges, and inconsistent demand; and (iii) consumption—particularly low consumer habits regarding vegetable purchase and preparation, and preference for non-seasonal products. The study concludes that the main challenges to strengthening short food supply chains are the limited engagement of young people in farming, lack of specialised technical assistance, climate-related risks, bureaucratic barriers, and the high costs of organic certification. Farmers also reported logistic difficulties and constraints in supplying restaurants due to demand for a narrow range of products disregarding seasonality. At the consumer level, habits shaped by conventional food systems emerged as obstacles. Strategies such as alternative markets, farmer organisations, supportive public policies, and initiatives to promote cooking skills and consumer awareness are key to enhancing resilience and expanding the supply of healthy foods.

Keywords: sustainability; qualitative research; local production; vegetable supply; short food supply chains

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1. Introduction

Conventional agriculture and agroindustrial practices in the global agrifood system have well-reported limitations. Alternative approaches involving both food producers and consumers have been proposed [1]. The growing demand for markets in which producers and consumers can actively participate with greater decision-making power and economic

returns necessitates increased geographical and/or relational proximity between actors [2,3]. Short food supply chains are alternative food systems focused on reducing (or eliminating) intermediaries and decreasing the distance between production and consumption [4]. Furthermore, they can be distinguished by four interrelated characteristics that extend beyond distance-based definitions: First, they have the capacity to re-socialise and re-spatialize food, allowing consumers to assess its desirability through their own knowledge, cultural frames, experiences, and symbolic associations. Second, they redefine the producer–consumer relationships by providing clear signals regarding the origin of products. Third, they foster new forms of interaction between supply and demand, linking price to quality criteria and to the social construction of quality. In many cases, these products are identified with a particular farm or territory, thereby strengthening the image of both as sources of high-quality products. Fourth, they emphasise the relational dimension between producer and consumer as a central element in generating value and meaning, rather than focusing solely on the product itself. Altogether, these characteristics converge in the fundamental ability of short food supply chains to establish a meaningful connection between food producers and consumers [5].

Short food supply chains can create connections, add value, and increase trust between consumers and producers [5,6], and are emerging as more sustainable alternatives to industrialised and globalised food markets [7]. Their benefits include greater transparency in seller–buyer relationships, increased traceability, reduced environmental pollution and cost (due to shorter transport distances), increased employment opportunities for the local population, and greater support for small-scale and often family producers [8,9]. Thus, short food supply chains contribute to enhancing the economic, social, and environmental sustainability of the food system [9,10].

Studies show that short food supply chains can increase consumers' consumption of healthier foods such as fruits and vegetables [11–13]. The World Health Organisation recommends a daily intake of more than 400 g of fruits and vegetables, preferably fresh and seasonal produce, to maintain a healthy diet and reduce the risks of chronic non-communicable diseases [14]. Globally, fruit consumption has increased gradually since the late 1990s, but vegetable consumption is still below the recommended level in most countries [15,16]. A strategy to encourage consumption among the general population is to increase the accessibility and availability of a variety of fruits and vegetables, which can be more easily achieved when the production site is close to the consumption site.

Brazil has a large area available for agricultural production. Land concentration, however, has been a growing cause of inequality in rural communities. The most recent Brazilian Agricultural Census revealed that family farms represent 76.8% of the total number of farms in the country but occupy only 23% of the total agricultural land. Among vegetable producers, family farming systems account for 82.6% of registered establishments [17]. The criteria used to classify an agricultural enterprise as a family farm include farm size (which varies according to the region of the country), predominant use of family labour, and income mostly derived from food production [18]. In contrast to the agribusiness model, in which monoculture and production of food commodities predominate, family farming in Brazil is characterised by polyculture, with several types of crops grown side by side, and integration between farm and community [19]. Of note, about 75% of organic farms in Brazil are family farms [17]. Studies point to human health [20,21], environmental, and sustainable [22] benefits of organic and agroecological production compared with conventional production systems [23,24].

Direct purchase from family farms and local markets has increased both in frequency and popularity in Brazil, mainly as a result of public procurement policies adopted from 2003 onwards [25]. Evidence shows that these policies contributed to the development of

more sustainable food systems, reduced poverty and inequality [26]. They also increased the quality of food served in institutional environments [27,28], improved living and working conditions in rural areas [29,30], and promoted the diversification of family products [31]. This thereby helped to achieve goals related to food system sustainability and social equity [32,33]. Therefore, food procurement policies have supported the attainment of the sustainable development goals proposed by the United Nations for 2030 [34].

Despite incentives via federal programmes, several challenges affect the supply of produce through short food supply chains, such as a host of bureaucratic procedures to participate in procurement processes [35–37]; a lack of interest by farmers and farmers' organisations [38]; lack of planning regarding the type and quantity of food produced [39]; and delivery difficulties [36]. Although recent reviews have synthesised evidence on the challenges of short food supply chains [9,40,41], no empirical evidence has been found on how challenges and opportunities manifest across different institutional and commercial channels when analysed together in a single regional context. Addressing this gap, this study was guided by the following research question: what are the main difficulties faced by family farmers in producing and supplying vegetables through short food supply chains across diverse marketing channels? Accordingly, the objective was to identify and analyse such difficulties—considering both institutional and commercial arrangements—from the farmers' perspective. The main contributions of this work are twofold: (i) it provides empirical evidence based on first-hand qualitative data from farmers operating through diverse marketing channels; and (ii) it translates these experiences into policy- and practice-oriented recommendations for improving the functioning and resilience of short food supply chains across different contexts. The remainder of this article is structured as follows: Section 2 presents the materials and methods, including the study design, participants, and analytical approach; Section 3 reports the results; Section 4 discusses these findings in light of the literature, organised into three thematic areas (production, sales, and consumption), and concludes with the study's limitations and directions for future research; and Section 5 presents the main conclusions.

2. Materials and Methods

A qualitative study was carried out using a semi-structured interview guide with seven family farmers who produced vegetables for sale through different distribution channels in the metropolitan area of Florianópolis, Santa Catarina State, southern Brazil. This region, which includes the capital and surrounding municipalities, has a population of approximately one million inhabitants.

The sampling strategy was purposive, designed to capture the diversity of marketing channels within short food supply chains. Farmers were eligible if they supplied vegetables directly to final consumers or to commercial or institutional outlets without intermediaries, and if the distance between production and consumption was relatively short. We sought to include at least one farmer supplying each of the main identified outlets: schools, restaurants, supermarkets, street markets, and consumer groups. Contacts were obtained through rural producer organisations, and recruitment concluded once all targeted channels were represented in line with the predefined sampling criteria. This approach prioritised variation in marketing arrangements over demographic or geographic diversity, as the primary aim was to compare challenges across different short chain configurations. This purposive sampling strategy, by including a wide diversity of short food supply chains—both institutional and commercial—within the same metropolitan region, offers the opportunity to compare challenges and strategies across different marketing arrangements. While most previous studies have focused on public procurement channels, this approach may provide

additional insights into aspects of short supply chains that have not yet been extensively explored in the literature.

The selection sought to include farmers representing a diversity of marketing channels, although some of them sold their products through more than one. Producers were contacted by the research team (in person or by phone) and were informed of the purpose of the study. The anonymity of participants was guaranteed in accordance with research ethics protocols. The study was approved by the Human Research Ethics Committee under protocol number 1,769,344.

Data were collected between May and July 2019. The interviews were conducted at the participants' farms or by phone, and were guided by a semi-structured interview guide, based on a review of the literature from a baseline assessment and refined considering previous experiences of the research team. All interviews were conducted by members of the research team trained in qualitative research methods. The interviewers had no prior relationship with the participants, which minimised potential biases related to familiarity or social desirability.

The interview guide was organised within the following topics: characterisation of family farmers, participation in collectives, characterisation of production, vegetable production planning, sales planning and channels, delivery of products, capacity and interest in increasing the amount and variety of vegetables produced, and main difficulties and needs in supplying vegetables locally. The first questions within the guide aimed to characterise the respondents, while subsequent questions addressed their practices, challenges, and perspectives. In addition to the planned questions, specific prompts were included to stimulate discussion. The semi-structured interview guide was tested in a pilot interview with a farmer not included in the sample to assess timing, question clarity, and overall flow. This resulted in minor adjustments related to the wording of some questions and the ordering of themes to improve comprehension and conversational fluidity.

Interviews were recorded and transcribed verbatim. Data were analysed by thematic analysis [42] using NVivo 11 software (QSR International, Melbourne, Australia). After repeated readings, text fragments with the same meaning were coded and grouped into categories based on consensus by two researchers. Figure 1 presents the study design, sampling strategy, and the steps of data collection and analysis.

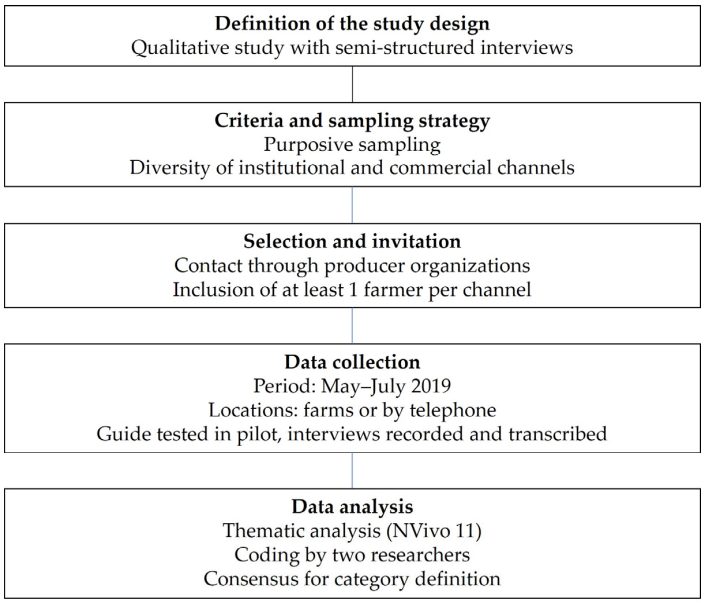

Figure 1. Study design and methodological steps.

3. Results

The seven interviewees included a former farmer who is now the owner of an agroindustry, a farmer who supplies the first interviewee's agroindustry, an agroforestry farmer who sells produce boxes, a farmer who sells products in a local fruit and vegetable market, a farmer who sells products in an itinerant fruit and vegetable market, a farmer who supplies a restaurant, and a farmer who supplies schools participating in the Brazilian National School Feeding Programme.

All participants lived on the farms with their families, who generally partook in harvesting. All evaluated farmers produced organic or agroecological products; this result is probably due to the type of chain analysed (i.e., short food supply chain) and/or the nature of the farmers' organisations that provided us with their contacts. A variety of foods were grown, including leafy and non-leafy vegetables, tubers, herbs, and fruits. Farmers produced at least 4 and at most 50 types (agroforestry farmer) of products throughout the year. The delivery distance was about 40 km, except for one producer, whose deliveries reached 160 km. It is important to highlight that the total area of Santa Catarina State is similar to that of countries such as Hungary and Portugal. The capital of the state is mostly located on an island and does not have much land available for growing foods, and a significant part of the produce consumed at the capital is grown and supplied by the 22 metropolitan municipalities [2]. Therefore, criteria proposed by the international literature for characterising short food supply chains may not be appropriate to Brazilian regions or other countries of continental proportions [2].

Figure 2 presents a diagram of the different distribution channels used by the interviewed family farmers. Foods processed by the agroindustry were supplied by individual farmers and then sold to markets or private events, such as weddings. Individual farmers and those participating in farmers' organisations (formal or informal) sold their products to restaurants, street markets, or final consumers in produce boxes. Farmer groups supplied schools supported by the Brazilian National School Feeding Program. Final consumers had access to such foods through local markets, street markets, or community-supported agriculture. Other access channels included consumption of meals at private events, schools, or restaurants.

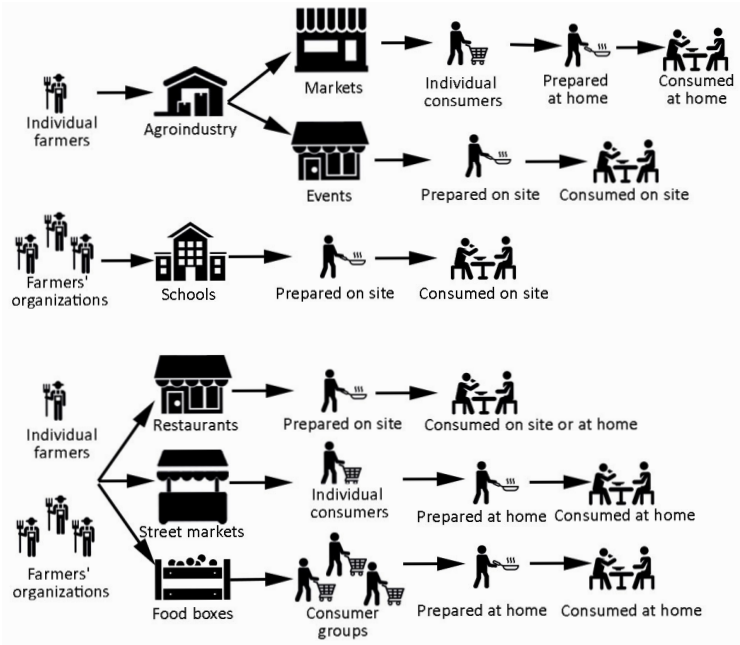

Figure 2. Scheme of the distribution channels used by the interviewed farmers. Note: Farmers can use one or more channels.

The interviews highlighted interconnected challenges that affect farmers' ability to supply vegetables locally, touching on aspects from farm management, market access, and consumer demand.

3.1. Difficulties Related to Production

Interviewed farmers strongly stressed the difficulty of dealing with workforce-related issues, such as maintaining children and young people in rural areas and hiring external employees. They also noted limited access technical assistance from trained professionals for crop production planning. Adverse weather conditions were reported as a frequent cause of substantial yield losses, generating economic consequences that threaten farm viability. Farmers emphasised the challenge of cultivating specific crops in certain seasons, for instance, growing leafy vegetables during the summer months. Particularly regarding organic production, they highlighted not only the elevated costs of certification and maintenance, but also the high costs of production itself, in addition to considerable bureaucracy involved in certification.

In this study, yield losses due to environmental adversities were compounded by the absence of financial aid or insurance. However, the agroforestry farmer reported that diversifying crop and cultivating unconventional food plants helped mitigate such losses. Finally, the awareness of restaurant managers regarding procurement requirements emerged as another factor influencing the use of organic foods in food service establishments.

3.2. Difficulties Related to Sales

Initially, respondents did not perceive major issues with product sales, as profits were generally seen as proportional to production levels. Over time, however, logistic challenges emerged as a significant concern, especially for farmers supplying several commercial channels or when they needed to deliver to each individual school in the National School Feeding Programme. These challenges were even greater when long-distance travel was required to reach delivery points or to sell all available products. Some interviewees reported difficulties supplying restaurants due to high demand for limited range of products (e.g., 100 kg of tomatoes). While many farmers expressed interest and capacity to increase vegetable production, some stated they were content with their current lifestyle and had no desire to increase production scale.

3.3. Difficulties Related to Consumption

Farmers reported that low consumer habits around purchasing and preparing vegetables have hindered direct sales from producers. Consumers tend to expect the same variety of vegetables throughout the year, which is not feasible locally due to seasonality; for instance, in Brazil, growing leafy vegetables during summer months is particularly challenging. Another factor highlighted was the increasing trend of people eating out more and cooking less at home, which farmers explicitly linked to reduced vegetable consumption. Finally, farmers affirmed that greater awareness about the benefits of eating organic, locally grown foods could boost consumption among young adults, who sometimes seem unaware of how food is produced.

4. Discussion

The findings of this study reveal a set of interconnected challenges that constrain the capacity of family farmers to supply vegetables through short food supply chains. These challenges encompass difficulties in production, sales, and consumption, indicating that barriers occur not only at the farm level but also along the broader chain of relationships that links farmers to markets and consumers. Issues such as labour shortages, limited technical assistance, adverse weather events, and the costs and bureaucracy of organic

certification directly affect production viability. At the same time, logistic hurdles in distribution, combined with consumer expectations for year-round availability and low engagement in home cooking, further restrict market opportunities. Taken together, these findings underscore the complexity of sustaining local food supply and highlight the need to examine how these results align with and expand upon existing evidence in the literature.

The challenges identified among family farmers involved in short food supply chains reflect both local specificities and broader patterns described in the literature. The Brazilian PNAE is one of the most comprehensive school feeding programmes in the world. Since 2009, it has become mandatory for schools to use at least 30% of the financial resources provided by the National Education Development Fund to purchase food from family farms [43]. This policy provides an important market outlet for small producers, reinforcing local economies and promoting food security. However, despite this potential, farmers in this study faced multifaceted difficulties in production, logistics, and consumer demand, which may hinder full exploitation of such programmes.

Beyond institutional programmes, short channels can enable new relationships between producers and consumers [44,45]. The interviewed farmers were involved in short food supply chains, in which trust and authenticity are generated by proximity and personal interaction [5,46]. Products bought from street and local markets are generally prepared at home. Food boxes delivered at home are generally composed of seasonal products, requiring that consumers adapt to production seasonality. In some cases, it is possible to place specific orders. When supplying food to events, restaurants, and schools, farmers must fulfil the requirements of clients. It is necessary that farmers and menu planners agree on the type and quantity of products to be supplied. In this case, the choice of foods does not depend on consumers' preference but on the manager's decision. The biggest benefit of selling to restaurants is the convenience of delivering a large quantity to a single place. This same characteristic may be a drawback, as it might be difficult to meet large production volumes [13].

This scarcity of young people in rural areas, highlighted by farmers in this study, has also been identified in national statistics: in Brazil, 73% of family farmers are over 45 years old. The lack of young people in rural activities can generate food supply problems in the future. Strategies are needed to stimulate these individuals to remain in the food production business [17]. Although the country offers special credit lines, tariffs, and interest rates for people aged 16–29 years (mainly the daughters and sons of farmers) through government programmes such as the National Program for Strengthening Family Farming [47], attention must be improved and expanded [48]. Programmes such as the European Union's Common Agricultural Policy (CAP) for young farmers illustrate the need for integrated incentives (housing, services, training, access to credit and land) to align young people's skills with local opportunities. In order to make rural areas attractive to young people, CAP 2023-27 promotes secure and affordable food supply, provides support to income and resilience of the farming sector, fosters the transition to environmental and climate sustainability as well as the development of dynamic rural areas, that will create better working and living conditions and thus prevent rural youth exodus [49].

As our findings on logistic and marketing challenges suggest, a strategy to increase small-scale farmers' profits is to stimulate the use of short food supply chains, which reduce losses from long transport distances and allow the supply of fresh products [50]. Interacting with consumers via social media and other online technologies may improve information flow and exchange [51]. However, barriers to technology access still exist, as 19% of Brazilian agricultural establishments did not have internet access in 2023 [52]. Producers have to take on the additional roles of distributor, salesman, advertiser and public relations [53]. Promotion of entrepreneurship and technological development by qualifying and training

farmers and their families is another alternative to increase interest in agricultural activities. The literature highlights the importance of training for the adoption of more sustainable production practices [29] and development of skills to increase engagement [54,55] and confidence in short channels [56]. Young Italian farmers, for example, are achieving success as entrepreneurs because of their creativity, innovation, ability to collaborate with external agents, and ability to respond to the new societal demands and expectations related to agriculture and food [57].

The results discussed here suggest that training farmers in sustainable production, food processing, social networking, and entrepreneurship can potentially increase the interest in farming, as these actions may enhance family income, agricultural sustainability, and valorisation of rural workers. Awareness campaigns on the benefits of local and sustainable food production to health and the environment might increase the appreciation of small rural producers, stimulating their permanence in rural environments.

The importance of technical support also became evident in our results, as farmers reported limited access to trained professionals for crop production planning. Technical support and technological aid can help less-skilled farmers to produce food competitively [29]. In Brazil, public technical assistance and agricultural extension services have existed since 1948 [58]; nevertheless, the service is rarely used by older farmers, those with low education levels and per capita income, and those who sell directly to consumers [59]. Strengthening public technical assistance bodies may be an important governmental tool to help small producers plan their production and enter the local market. Hybrid models that combine field training with digital tools have expanded the reach of actions when there is institutional support and infrastructure of Information and Communication Technologies [60,61]. The use of knowledge and technical work generated by public universities, whether by undergraduate students or recent graduates, can be an important tool for providing assistance to farmers. The Brazilian government is the main provider of technical assistance to family farmers, although private companies also provide technicians to assist farmers in the field, especially industries that buy fresh foods for conventional food production or processing [59]. Such an industrial demand can encourage monoculture cropping, a practice that goes against the principles of food sovereignty and agricultural sustainability, which prioritises organic, local production [62]. Another possibility is to strengthen farmers' organisations to facilitate access to technical assistance.

Brazil has financial policies on family agriculture, such as the National Program for Strengthening Family Agriculture [47]. However, as pointed out by researchers and in line with our findings on small producers, credit policy is being directed towards intermediate, consolidated segments of the agricultural sector to the detriment of the most vulnerable actors (small-scale farmers) [63,64]. This situation is capable of maintaining, or even increasing, inequalities in rural areas [65]. Public policies aimed at guaranteeing the purchase of local, family farming products could strengthen food production in Brazil, particularly that of organic products and fruits and vegetables. Public policies on local food purchase showed potential in tackling rural poverty in Brazil [29] and enhancing the resilience of food systems.

Consistent with the experiences reported by the agroforestry farmer in our study, crop diversification is an important strategy to minimise risks associated with weather conditions [31,66–68]. Agroecological production seems crucial to strengthening farmers and rural communities. However, it is necessary to ensure agroecosystem diversification by promoting the adoption of polycultures, agroforestry, and mixed crop–livestock systems associated with organic soil management, water conservation, and biodiversity [69]. Agroforestry is a highly complex system that protects crops from large temperature fluctuations [70]. A previous study demonstrated the feasibility and potential of transitioning from

an intensive organic production system to an agroforestry system, increasing agricultural sustainability in Brazilian family farms [71]. Another strategy to avoid losses is to process or transform fresh products and surplus through agroindustrial processes, adding value and increasing product shelf life. The establishment of small, family agroindustries led by farmers may contribute to the permanence of family farmers in rural areas and the development of a new model of sustainable development [72].

Organic farms account for 1.3% of the total agricultural establishments in the country [17]. Participatory guarantee systems and co-certification are options to reduce the costs of organic certification [73]. Cooperation with suppliers is essential for ensuring the supply of foods that meet the demands of meal production [74].

Similarly to our results, studies conducted in Brazil and Italy also showed that transport costs and lack of intermediary agents are the main difficulties farmers face in short food supply chains [55]. The results of the present study showed that farmers had difficulties with delivery logistics, especially those who must travel to several different places on a single day. Foodservice establishments also reported logistic difficulties associated with the delivery of products purchased through short distribution channels [75]. Such problems can be overcome with the creation of family farming food reception centres, as occurs for the supply of schools in some Brazilian municipalities. To facilitate distribution, farmers can hire employees to deliver products from food reception centres or divide the tasks between member farmers [76] and optimise routes in the distribution phase [77]. Brazil does not have a national policy on food supply. Such a policy could minimise the negative impacts of the predominant supply model by supporting short production and consumption circuits for rural and urban populations [78]. Farmers' organisations (e.g., groups, associations, and cooperatives) can facilitate coordination and mediate exchanges between farmers and public authorities [79]. Dialogue between producers and public bodies, as well as support from technical assistance and agricultural extension agencies, are indicated to minimise difficulties in the distribution of family farming products [76].

Alternative food networks that guarantee purchase continuity might help to ensure production flow and diversity, contributing to meeting the demands of consumers. It is necessary to accept seasonality as a determinant of food availability. Consuming seasonal foods is an important aspect of a more sustainable and healthy diet [80–82]. It is suggested that consumer groups be created, consisting of both individual consumers and foodservice establishments. These groups hold the potential to organise the demand and absorb local production. These findings highlight that promoting short and local food supply chains is not only a matter of sustainability, but also a vital strategy to enhance resilience in the face of geopolitical and environmental shocks that threaten global food availability [83].

Brazilian public restaurants also have potential in supporting local, sustainable agrifood systems by requiring monthly deliveries. In Brazil, the Food Procurement Programme and the National School Feeding Programme, combined, constitute one of the largest institutional food purchase initiatives in the world that prioritise food from family farms. However, the need for food processing is a barrier to family farmers, which might limit farmers' access to large restaurants but also result in a potential gain for farmers who organise themselves. This barrier can be overcome with policies and actions aimed at structuring farmers' organisations [84]. Family agroindustries can help increase income through the processing of surplus production, ensuring sales in times of low production [72]. In commercial restaurants, the adoption of seasonal menus could reduce costs and enhance the sensory and nutritional quality of meals.

Our findings also highlighted consumer habits as a barrier to direct sales. This is consistent with literature showing that modifying food patterns and choices of the population is one of the greatest challenges associated with sustainable food production [85–87].

Individual and collective decisions about the type of foods consumed can greatly influence food systems and improve their ability to provide healthier and more sustainable diets [88]. Dietary modifications are necessary to increase food variety, favouring local and seasonal production. This implies changes in the planning of restaurant menus, the first step of which is to map local food production [89]. For consumers, it is necessary to develop cooking skills aimed at the inclusion and preparation of local, seasonal foods in their diets, considered a key aspect of sustainable food consumption [90]. Moreover, other key determinants of general food choice need to be analysed, including food-internal factor (sensory and perceptual features), food-external factors (information, social and physical environment), personal-state factors (biological features, psychological components, habits and experiences), cognitive factors (knowledge and skills, attitude, liking and preference, anticipated consequences, and personal identity), as well as sociocultural factors (culture, economic variables, political elements) [91]. Cultural heritage profoundly influences individuals' food preferences and consumption habits, with distinct culinary traditions and family influences shaping dietary behaviours within specific cultural contexts. Globalisation and urbanisation were found to impact food preferences, yet traditional dietary practices remained resilient. Additionally, socio-economic factors significantly influenced dietary behaviours, particularly in low-income communities [92]. Therefore, culture and socioeconomic factors of food choice should be taken into account when formulating evidence-based public policies.

In Brazil, compared to urban areas, rural areas show lower consumption of fruit and vegetables five days or more per week (74.6% vs. 86.4%) and greater adequate salt intake (96.8% vs. 92.1%). Considering the food environment, rural areas have lower fruit and vegetable availability in the neighbourhood (41.2% vs. 88.3%) and higher self-production of food (38.2% vs. 13.2%), although a lower consumption of fruit and vegetables is still observed in rural areas with neighbourhood availability but without self-production of food [93]. These data reinforce that consumption patterns are not determined solely by physical availability, but also by cultural norms, habits, and socio-economic contexts. Understanding these underlying drivers is essential, and further research from the consumer perspective could strengthen the evidence base for designing public policies and interventions that align consumer preferences with local and seasonal food systems.

The increase in fruit and vegetable consumption among users of short food supply chains is due to their greater access to foods or knowledge, attitudes, and positive beliefs about healthy eating [94,95]. Farmers have the potential to improve access to fruits and vegetables because they can provide high-quality products at lower prices compared with supermarkets [12].

Short food supply chains and strategies to connect food production and consumption have the potential to support farmers in the search for a more sustainable production system [96]. Such actions can be positively influenced by the exchange of information between producers and consumers [55,97] and the greater profitability of short channels compared with long channels [50,56]. Alternative food networks can bring social innovation, diversity, and associated values, stimulating proximity between production and consumption as well as valorising local markets and facilitating the transition to more sustainable production and consumption systems [98,99]. It is also important to stimulate rural tourism to enhance human and social development. Favouring rural work can enhance the awareness, co-responsibility, and appreciation of organic and local products [100].

Table 1 summarises the phases of the food supply framework, the difficulties reported by farmers, and the possible actions and related benefits identified from the literature and the authors' analysis.

Table 1. Summary of main difficulties reported by the farmers, along with potential actions and related benefits.

Phase of the Food Supply Frame-Work	Difficulty Reported	Potential Action Identified in the Literature	Expected Associated Benefits
Production	Maintenance of family labour and hiring of external employees	Expand special lines of credit for young farmers [48,49]	Stimulate farmers to continue in the activity and invest in production
		Encourage short food supply chains to enable fair payment to producers [50]	Increased producers' income, decreased transport losses, fresher food
		Promote the integration of young farmers with consumers, especially the youngest, through social networks [51,57]	Improvement of the flow and exchange of information, approximation between producer and consumer
		Promote training courses for farmers and rural workers to improve sustainable agricultural practices [29,54,55]	Increased interest in the job, maintaining work in the field, increasing family income, more sustainable agricultural practices
		Enable access to technology in production so that young people have an interest in continuing in the family activity [57]	Decrease in rural exodus and modernisation of activities
		Campaigns on the health and environmental benefits of local and agroecological production	Valuing workers and increasing interest in continuing in the business
	Little technical assistance to small producers for vegetable production	Strengthen the government service of Technical Assistance and Rural Extension linked to the Brazilian Ministry of Agriculture, Livestock, and Supply [29]	Increased assistance for production planning
		Bringing knowledge generated at the university closer to rural producers	Applicability of production knowledge in practice
		Strengthen farmers' organisation to facilitate access to technical assistance [41]	Strengthen relations between producers and create more cooperatives
	Loss of production due to adverse weather conditions	Government insurance for climate imbalances [101]	Approximation with the final consumer and greater awareness of the importance of preserving the environment
		Diversification of production to avoid major losses [67,68]	Increased variety produced; biodiversity
		Minimal processing (sanitised, packaged, chopped, peeled) or processing (juices, jellies, jams, pastes) [40]	Adds value and increases durability; allows accessing other marketing channels that require prior processing (e.g., institutional restaurants).
	Organics: bureaucracy and high costs for production, certification, and maintenance	Participatory guarantee system [73]	Partnership with other producers, valorisation of organic foods, avoidance of contact with pesticides, added value for products, higher credibility
Sales	Logistics for travel to different delivery points	Organise central delivery points [41]	Facilitate delivery for farmers
		Encourage delivery to alternative markets (baskets, fairs) [41]	Reduce costs for the end consumer and the number of intermediaries
		Create sales groups (producers and consumers) to avoid intermediaries [41]	Reduce distances travelled by the supplier and CO_2 emissions
	Sell to restaurants due to the high demand for a small variety of products	Create producer groups to meet demands and facilitate delivery [41]	Strengthening relations between producers and creating more cooperatives
		Encourage restaurants to use a greater diversity of foods, based on local and seasonal production [102]	Improve the nutritional and sensory quality of the food offered
			Increased variety of foods offered
			Greater respect for seasonality
Consumption	Consumer expectations to buy the same foods every time of the year, despite difficulties in cultivating specific food in different seasons (e.g., growing leafy vegetables during summer)	Encourage consumers to consume greater food diversity, considering local and seasonal production [41]	Reduction of environmental and social impacts on consumption
			Increased variety of foods consumed
			Improve the nutritional and sensory quality of the foods offered
	Little habit of buying and preparing vegetables	Stimulating the population, especially young adults, to develop their cooking skills and the habit of cooking at home [41]	Improve the quality of food, reduce the consumption of ultra-processed foods, increase the consumption of vegetables, increase the confidence of people in preparing their own food
	Distancing from consumers in relation to production, unfamiliarity with the reality of production	Stimulating community-based tourism as a tool for human and social development and valuing work in the countryside [41]	Proximity, co-responsibility, awareness, valorisation of organic and local products

Note. Difficulties reported were derived directly from farmers' accounts. Potential actions were identified in the literature, while the associated benefits represent the authors' analytical interpretation based on both empirical data and the reviewed literature.

While the results have been presented under the thematic areas of production, sales, and consumption for clarity, these dimensions are intrinsically interconnected within short food supply chains. Challenges in production—such as limited planning capacity or infrastructure constraints—directly influence sales performance and the ability to meet consumer expectations, which in turn affect demand and feedback into production decisions. Likewise, market dynamics and consumer preferences shape farmers' choices regarding crop diversity, production methods, and delivery arrangements. The strategies often address multiple dimensions simultaneously; for instance, strengthening collective organisation

not only facilitates access to markets but also supports knowledge exchange for improved production planning and enhances the reliability of supply for consumers. By analysing these interdependencies, it becomes evident that interventions aimed at strengthening short food supply chains should adopt an integrated approach, targeting the systemic nature of challenges and opportunities rather than treating them as isolated issues.

This study offers insights into the challenges faced by family farmers engaged in short food supply chains, with implications for policies promoting local production and healthy eating. A key strength lies in its focus on farmers operating through diverse institutional and commercial channels within the same metropolitan region, allowing for a grounded comparison of experiences across different marketing arrangements. However, some limitations should be acknowledged. First, the small sample size and the restriction to a single geographic area limit the generalisability of the findings to other contexts. Second, the perspectives captured are those of farmers only, meaning that the views of other actors in the supply chain—such as intermediaries, retailers, consumers, and policymakers—remain unexplored. Finally, the cross-sectional design does not capture seasonal variations or long-term changes in challenges and strategies. Future research should expand to other regions and production systems, adopt longitudinal approaches to observe changes over time, and include the perspectives of multiple stakeholders to provide a more comprehensive understanding of the dynamics in short food supply chains. Comparative studies across regions and market structures, as well as mixed-method designs integrating qualitative and quantitative data, could further enhance the evidence base for effective policies and interventions.

5. Conclusions

This study discussed the main difficulties of food production and supply via short channels from the perspective of family farmers. Strategies to improve the supply of organic vegetables were also addressed. The major challenges in crop production were the low interest of younger populations in rural work, lack of specialised technical assistance, losses due to adverse weather conditions, and high bureaucracy and costs for organic food production and certification. Although being able to sell all their products, farmers reported that the logistics of delivering to several locations was a major difficulty. The demand for a small variety of products without accounting for seasonality hindered the supply of vegetables to restaurants. According to the interviewed farmers, the fact that individual and collective consumers are accustomed to standards set by traditional production systems, which are not based on local production or seasonality, is an obstacle to the strengthening of short food supply chains.

Alternative food markets characterised by a lack of intermediaries and short delivery distances seem to contribute more directly to environmental, economic, and social sustainability, promoting relationships of trust and credibility between producers and consumers. This is even more true when farmers' organisations supply food to consumer groups. Development of cooking skills for the preparation of locally grown, fresh, seasonal foods, as well as attitudes of co-responsibility and awareness of the impacts of consumption on the food system, are necessary to increase consumers' involvement in short channels. To achieve this, public policies are needed to ensure the production and sale of family farming products. Government strategies aimed at training producers, strengthening public technical assistance agencies, providing insurance and financing, ensuring public purchase, and promoting the development of cooking skills may strengthen the sector in the country and enhance the supply of healthy foods to the population.

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References

1. FAO; IFAD; UNICEF; WFP; WHO. The State of Food Security and Nutrition in the World 2023. In *Urbanization, Agrifood Systems Transformation and Healthy Diets Across the Rural–Urban Continuum*; FAO: Rome, Italy, 2023. [CrossRef]
2. Gelbcke, D.L.; Rover, O.J.; Brightwell, M.d.G.S.L.; Silva, C.A.d.; Viegas, M.d.T. A "proximidade" nos circuitos de abastecimento de alimentos orgânicos da Grande Florianópolis—SC. *Estud. Soc. Agric.* **2018**, *26*, 539–560. [CrossRef]
3. González-Azcárate, M.; Cruz Maceín, J.L.; Bardají, I. Why buying directly from producers is a valuable choice? Expanding the scope of short food supply chains in Spain. *Sustain. Prod. Consum.* **2021**, *26*, 911–920. [CrossRef]
4. Deverre, C.; Lamine, C. Les systèmes agroalimentaires alternatifs. Une revue de travaux anglophones en sciences sociales. *Économie Rural.* **2010**, *317*, 57–73. [CrossRef]
5. Marsden, T.; Banks, J.; Bristow, G. Food Supply Chain Approaches: Exploring their Role in Rural Development. *Sociol. Rural.* **2000**, *40*, 424–438. [CrossRef]
6. Jarzębowski, S.; Bourlakis, M.; Bezat-Jarzębowska, A. Short Food Supply Chains (SFSC) as Local and Sustainable Systems. *Sustainability* **2020**, *12*, 4715. [CrossRef]
7. Carbone, A. Food supply chains: Coordination governance and other shaping forces. *Agric. Food Econ.* **2017**, *5*, 3. [CrossRef]
8. Malak-Rawlikowska, A.; Majewski, E.; Wąs, A.; Borgen, S.O.; Csillag, P.; Donati, M.; Freeman, R.; Hoàng, V.; Lecoeur, J.-L.; Mancini, M.C.; et al. Measuring the Economic, Environmental, and Social Sustainability of Short Food Supply Chains. *Sustainability* **2019**, *11*, 4004. [CrossRef]
9. Jia, F.; Shahzadi, G.; Bourlakis, M.; John, A. Promoting resilient and sustainable food systems: A systematic literature review on short food supply chains. *J. Clean. Prod.* **2024**, *435*, 140364. [CrossRef]
10. El Bilali, H.; Strassner, C.; Ben Hassen, T. Sustainable Agri-Food Systems: Environment, Economy, Society, and Policy. *Sustainability* **2021**, *13*, 6260. [CrossRef]
11. Hanson, K.L.; Volpe, L.C.; Kolodinsky, J.; Hwang, G.; Wang, W.; Jilcott Pitts, S.B.; Sitaker, M.; Timeon, E.; Ammerman, A.S.; Seguin, R.A. Knowledge, attitudes, beliefs and behaviors regarding fruits and vegetables among cost-offset community-supported agriculture (csa) applicants, purchasers, and a comparison sample. *Nutrients* **2019**, *11*, 1320. [CrossRef]
12. Rossi, J.J.; Woods, T.A.; Allen, J.E. Impacts of a Community Supported Agriculture (CSA) Voucher Program on Food Lifestyle Behaviors: Evidence from an Employer-Sponsored Pilot Program. *Sustainability* **2017**, *9*, 1543. [CrossRef]
13. Drejerska, N.; Sobczak-Malitka, W. Nurturing Sustainability and Health: Exploring the Role of Short Supply Chains in the Evolution of Food Systems—The Case of Poland. *Foods* **2023**, *12*, 4171. [CrossRef]
14. World Health Organization (WHO). Healthy Diet. Available online: https://www.who.int/news-room/fact-sheets/detail/healthy-diet (accessed on 3 August 2024).
15. Kalmpourtzidou, A.; Eilander, A.; Talsma, E.F. Global Vegetable Intake and Supply Compared to Recommendations: A Systematic Review. *Nutrients* **2020**, *12*, 1558. [CrossRef]
16. Rippin, H.L.; Maximova, K.; Loyola, E.; Breda, J.; Wickramasinghe, K.; Ferreira-Borges, C.; Berdzuli, N.; Hajihosseini, M.; Novik, I.; Pisaryk, V. Suboptimal intake of fruits and vegetables in nine selected countries of the World Health Organization European region. *Prev. Chronic Dis.* **2023**, *20*, E104. [CrossRef] [PubMed]

17. Brasil. Censo Agropecuário 2017. Resultados Definitivos. Available online: https://sidra.ibge.gov.br/pesquisa/censo-agropecuario/censo-agropecuario-2017 (accessed on 20 March 2022).
18. Brasil. Lei nº 11.326, de 24 de julho de 2006. Estabelece as diretrizes para a formulação da Política Nacional da Agricultura Familiar e Empreendimentos Familiares Rurais. *Diário Oficial da União*, Brasília, DF, 2006. Available online: http://www.planalto.gov.br/ccivil_03/_ato2004-2006/2006/lei/l11326.htm (accessed on 3 September 2025).
19. Graeub, B.E.; Chappell, M.J.; Wittman, H.; Ledermann, S.; Kerr, R.B.; Gemmill-Herren, B. The State of Family Farms in the World. *World Dev.* **2016**, *87*, 1–15. [CrossRef]
20. Poulia, K.A.; Bakaloudi, D.R.; Alevizou, M.; Papakonstantinou, E.; Zampelas, A.; Chourdakis, M. Impact of organic foods on health and chronic diseases: A systematic review of the evidence. *Clin. Nutr. ESPEN* **2023**, *58*, 506–507. [CrossRef]
21. Rahman, A.; Baharlouei, P.; Koh, E.H.Y.; Pirvu, D.G.; Rehmani, R.; Arcos, M.; Puri, S. A Comprehensive Analysis of Organic Food: Evaluating Nutritional Value and Impact on Human Health. *Foods* **2024**, *13*, 208. [CrossRef] [PubMed]
22. Tuomisto, H.L.; Hodge, I.D.; Riordan, P.; Macdonald, D.W. Does organic farming reduce environmental impacts?—A meta-analysis of European research. *J. Environ. Manag.* **2012**, *112*, 309–320. [CrossRef] [PubMed]
23. Çakmakçı, S.; Çakmakçı, R. Quality and Nutritional Parameters of Food in Agri-Food Production Systems. *Foods* **2023**, *12*, 351. [CrossRef]
24. Boschiero, M.; De Laurentiis, V.; Caldeira, C.; Sala, S. Comparison of organic and conventional cropping systems: A systematic review of life cycle assessment studies. *Environ. Impact Assess. Rev.* **2023**, *102*, 107187. [CrossRef]
25. Brasil. Lei nº 10.696, de 2 de julho de 2003. Dispõe sobre a repactuação e o alongamento de dívidas oriundas de operações de crédito rural, e dá outras providências. *Diário Oficial da União*, Brasília, DF, 2003. Available online: http://www.planalto.gov.br/ccivil_03/leis/2003/L10.696.htm (accessed on 3 September 2025).
26. FAO. *Superação da Fome e da Probreza Rural-Iniciativas Brasileiras*; FAO: Rome, Italy, 2016; p. 270.
27. Soares, P.; Martinelli, S.S.; Melgarejo, L.; Cavalli, S.B.; Davó-Blanes, M.C. Using local family farm products for school feeding programmes: Effect on school menus. *Brit. Food J.* **2017**, *119*, 1289–1300. [CrossRef]
28. de Souza, S.R.G.; Vale, D.; do Nascimento, H.I.F.; Nagy, J.C.; da Silva Junior, A.H.M.; Rolim, P.M.; Seabra, L.M.A.J. Food Purchase from Family Farming in Public Institutions in the Northeast of Brazil: A Tool to Reach Sustainable Development Goals. *Sustainability* **2023**, *15*, 2220. [CrossRef]
29. Berchin, I.I.; Nunes, N.A.; de Amorim, W.S.; Alves Zimmer, G.A.; da Silva, F.R.; Fornasari, V.H.; Sima, M.; de Andrade Guerra, J.B.S.O. The contributions of public policies for strengthening family farming and increasing food security: The case of Brazil. *Land Use Policy* **2019**, *82*, 573–584. [CrossRef]
30. Borsatto, R.S.; de Camargo Macedo, A.; de Lima Santos, L.; Junior, W.F.A.; Souza-Esquerdo, V.F. Food procurement as an instrument to promote local food systems: Exploring a Brazilian experience. *Int. J. Food Syst. Dyn.* **2021**, *12*, 177–191. [CrossRef]
31. Valencia, V.; Wittman, H.; Blesh, J. Structuring Markets for Resilient Farming Systems. *Agron. Sustain. Dev.* **2019**, *39*, 25. [CrossRef]
32. Wittman, H.; Blesh, J. Food Sovereignty and Fome Zero: Connecting Public Food Procurement Programmes to Sustainable Rural Development in Brazil. *J. Agrar. Change* **2017**, *17*, 81–105. [CrossRef]
33. Grisa, C. Chapter 8—Public policies, food and nutrition security, and sustainable food systems: Convergences from the Food Acquisition Program. In *Food Security and Nutrition*; Galanakis, C.M., Ed.; Academic Press: Cambridge, MA, USA, 2021; pp. 181–207.
34. United Nations. Transforming Our World: The 2030 Agenda for Sustainable Development. 2015. Available online: https://sdgs.un.org/2030agenda (accessed on 12 September 2023).
35. Soares, P.; Martinelli, S.S.; Melgarejo, L.; Davó-Blanes, M.C.; Cavalli, S.B. Strengths and weaknesses in the supply of school food resulting from the procurement of family farm produce in a municipality in Brazil. *Ciência Saúde Coletiva* **2015**, *20*, 1891–1900. [CrossRef]
36. Assis, T.R.d.P.; França, A.G.d.M.; Coelho, A.d.M. Agricultura familiar e alimentação escolar: Desafios para o acesso aos mercados institucionais em três municípios mineiros. *Rev. Econ. Sociol. Rural* **2019**, *57*, 577–593. [CrossRef]
37. Soares, P.; Martinelli, S.S.; Davó-Blanes, M.C.; Fabri, R.K.; Clemente-Gómez, V.; Cavalli, S.B. Government Policy for the Procurement of Food from Local Family Farming in Brazilian Public Institutions. *Foods* **2021**, *10*, 1604. [CrossRef]
38. Saraiva, E.B.; Silva, A.P.F.d.; Sousa, A.A.d.; Cerqueira, G.F.; Chagas, C.M.d.S.; Toral, N. Panorama da compra de alimentos da agricultura familiar para o Programa Nacional de Alimentação Escolar. *Ciência Saúde Coletiva* **2013**, *18*, 927–935. [CrossRef]
39. Agapto, J.P.; Borsatto, R.S.; Esquerdo, V.d.S.; Bergamasco, S. Avaliação do Programa de Aquisição de Alimentos (PAA) em Campina do Monte Alegre, Estado de São Paulo, a partir da percepção dos agricultores. *Informações Econômicas* **2012**, *42*, 13–21.
40. Bayir, B.; Charles, A.; Sekhari, A.; Ouzrout, Y. Issues and Challenges in Short Food Supply Chains: A Systematic Literature Review. *Sustainability* **2022**, *14*, 3029. [CrossRef]
41. Herzig, J.; Zander, K. Determinants of consumer behavior in short food supply chains: A systematic literature review. *Agric. Food Econ.* **2025**, *13*, 21. [CrossRef]
42. Braun, V.; Clarke, V. Using thematic analysis in psychology. *Qual. Res. Psychol.* **2006**, *3*, 77–101. [CrossRef]

43. Brasil. Lei n° 11.947 de 16 de junho de 2009. Dispõe sobre o Atendimento da Alimentação escolar e do Programa Dinheiro Direto na Escola aos alunos da Educação básica; altera as Leis nº 10.880, de 9 de junho de 2004, 11.273, de 6 de fevereiro de 2006, 11.507, de 20 de julho de 2007; Revoga dispositivos da Medida Provisória nº 2.178-36, de 24 de agosto de 2001, e a Lei nº 8.913, de 12 de julho de 1994; e dá Outras Providências. *Diário Oficial da União*, Brasília, DF, 2009. Available online: http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2009/lei/l11947.htm (accessed on 2 September 2021).
44. Sonnino, R.; Marsden, T. Beyond the divide: Rethinking relationships between alternative and conventional food networks in Europe. *J. Econ. Geogr.* **2005**, *6*, 181–199. [CrossRef]
45. Gori, F.; Castellini, A. Alternative Food Networks and Short Food Supply Chains: A Systematic Literature Review Based on a Case Study Approach. *Sustainability* **2023**, *15*, 8140. [CrossRef]
46. Vittersø, G.; Torjusen, H.; Laitala, K.; Tocco, B.; Biasini, B.; Csillag, P.; de Labarre, M.D.; Lecoeur, J.-L.; Maj, A.; Majewski, E.; et al. Short Food Supply Chains and Their Contributions to Sustainability: Participants' Views and Perceptions from 12 European Cases. *Sustainability* **2019**, *11*, 4800. [CrossRef]
47. BNDES. Pronaf—Programa Nacional de Fortalecimento da Agricultura Familiar. Available online: https://www.bndes.gov.br/wps/portal/site/home/financiamento/produto/pronaf (accessed on 15 July 2025).
48. Marin, J.O.B. Pronaf Jovem: As disjunções entre o ideal e o real. *Rev. Econ. Sociol. Rural* **2020**, *58*, e194778. [CrossRef]
49. Balezentis, T.; Ribasauskiene, E.; Morkunas, M.; Volkov, A.; Streimikiene, D.; Toma, P. Young farmers' support under the Common Agricultural Policy and sustainability of rural regions: Evidence from Lithuania. *Land Use Policy* **2020**, *94*, 104542. [CrossRef]
50. Soria-Lopez, A.; Garcia-Perez, P.; Carpena, M.; Garcia-Oliveira, P.; Otero, P.; Fraga-Corral, M.; Cao, H.; Prieto, M.A.; Simal-Gandara, J. Challenges for future food systems: From the Green Revolution to food supply chains with a special focus on sustainability. *Food Front.* **2023**, *4*, 9–20. [CrossRef]
51. MacPherson, J.; Voglhuber-Slavinsky, A.; Olbrisch, M.; Schöbel, P.; Dönitz, E.; Mouratiadou, I.; Helming, K. Future agricultural systems and the role of digitalization for achieving sustainability goals. A review. *Agron. Sustain. Dev.* **2022**, *42*, 70. [CrossRef]
52. Brasil. PNAD Contínua—Pesquisa Nacional Por Amostra De Domicílios Contínua. Available online: https://www.ibge.gov.br/estatisticas/sociais/saude/17270-pnad-continua.html?edicao=40866&t=resultados (accessed on 10 June 2023).
53. Rucabado-Palomar, T.; Cuéllar-Padilla, M. Short food supply chains for local food: A difficult path. *Renew. Agric. Food Syst.* **2018**, *35*, 182–191. [CrossRef]
54. Charatsari, C.; Kitsios, F.; Lioutas, E.D. Short food supply chains: The link between participation and farmers' competencies. *Renew. Agric. Food Syst.* **2020**, *35*, 643–652. [CrossRef]
55. Sellitto, M.A.; Vial, L.A.M.; Viegas, C.V. Critical success factors in Short Food Supply Chains: Case studies with milk and dairy producers from Italy and Brazil. *J. Clean. Prod.* **2018**, *170*, 1361–1368. [CrossRef]
56. Aubry, C.; Kebir, L. Shortening food supply chains: A means for maintaining agriculture close to urban areas? The case of the French metropolitan area of Paris. *Food Policy* **2013**, *41*, 85–93. [CrossRef]
57. Milone, P.; Ventura, F. New generation farmers: Rediscovering the peasantry. *J. Rural Stud.* **2019**, *65*, 43–52. [CrossRef]
58. Castro, C.N.d. *Desafios da Agricultura Familiar: O caso da Assistência Técnica e Extensão Rural*; IPEA: Brasília, Brazil, 2015; pp. 49–59.
59. Rocha Junior, A.B.; Freitas, J.A.d.; Cassuce, F.C.d.C.; Costa, S.M.A.L. Análise dos determinantes da utilização de assistência técnica por agricultores familiares do Brasil em 2014. *Rev. Econ. Sociol. Rural* **2019**, *57*, 181–197. [CrossRef]
60. Mungai, L.M.; Messina, J.P.; Zulu, L.C.; Chikowo, R.; Snapp, S.S. The role of agricultural extension services in promoting agricultural sustainability: A Central Malawi case study. *Cogent Food Agric.* **2024**, *10*, 2423249. [CrossRef]
61. Antwi-Agyei, P.; Stringer, L.C. Improving the effectiveness of agricultural extension services in supporting farmers to adapt to climate change: Insights from northeastern Ghana. *Clim. Risk Manag.* **2021**, *32*, 100304. [CrossRef]
62. Martinelli, S.S.; Cavalli, S.B. Healthy and sustainable diet: A narrative review of the challenges and perspectives. *Ciência Saúde Coletiva* **2019**, *24*, 4251–4262. [CrossRef]
63. Machado, B.d.S.; Neves, M.d.C.R.; Braga, M.J.; Costa, D.R.d.M. Access and impact of Pronaf in Brazil: Evidence on typologies and regional concentration. *Rev. De Econ. Sociol. Rural* **2024**, *62*, e273994. [CrossRef]
64. Zeller, M.; Schiesari, C. The unequal allocation of PRONAF resources: Which factors determine the intensity of the program across Brazil? *Rev. De Econ. Sociol. Rural* **2020**, *58*, e207126. [CrossRef]
65. Aquino, J.R.d.; Gazolla, M.; Schneider, S. Dualismo no Campo e Desigualdades Internas na Agricultura Familiar Brasileira. *Rev. Econ. E Sociol. Rural* **2018**, *56*, 123–142. [CrossRef]
66. Ozaki, V.A. Em busca de um novo paradigma para o seguro rural no Brasil. *Rev. Econ. E Sociol. Rural* **2008**, *46*, 97–119. [CrossRef]
67. Kurdyś-Kujawska, A.; Strzelecka, A.; Zawadzka, D. The Impact of Crop Diversification on the Economic Efficiency of Small Farms in Poland. *Agriculture* **2021**, *11*, 250. [CrossRef]
68. Vernooy, R. Does crop diversification lead to climate-related resilience? Improving the theory through insights on practice. *Agroecol. Sustain. Food Syst.* **2022**, *46*, 877–901. [CrossRef]
69. Altieri, M.A.; Nicholls, C.I.; Henao, A.; Lana, M.A. Agroecology and the design of climate change-resilient farming systems. *Agron. Sustain. Dev.* **2015**, *35*, 869–890. [CrossRef]

70. Lin, B.B. Resilience in Agriculture through Crop Diversification: Adaptive Management for Environmental Change. *BioScience* **2011**, *61*, 183–193. [CrossRef]
71. Bezerra, L.P.; Franco, F.S.; Souza-Esquerdo, V.F.; Borsatto, R. Participatory construction in agroforestry systems in family farming: Ways for the agroecological transition in Brazil. *Agroecol. Sustain. Food Syst.* **2019**, *43*, 180–200. [CrossRef]
72. Silochi, R.M.; De Souza Lima, R.; Oliveira, I. Agroindústria familiar: Experiência profissionalizante da Cooperativa da Agricultura Familiar Integrada (COOPAFI) em Francisco Beltrão-PR. *ELO* **2015**, *2*, 1. [CrossRef]
73. Sabourin, E. A Construção social dos mecanismos de qualificação e certificação entre reciprocidade e troca mercantil. *Rev. Espaço Diálogo Desconexão* **2012**, *4*, 1–22.
74. Risku-Norja, H.; Løes, A.-K. Organic food in food policy and in public catering: Lessons learned from Finland. *Org. Agric.* **2017**, *7*, 111–124. [CrossRef]
75. Harrison, B.; Foley, C.; Edwards, D.; Donaghy, G. Outcomes and challenges of an international convention centre's local procurement strategy. *Tour. Manag.* **2019**, *75*, 328–339. [CrossRef]
76. Elias, L.P.; Belik, W.; da Cunha, M.P.; Guilhoto, J.J.M. Socioeconomic impacts of the National School Feeding Program on family farming in Santa Catarina. *Rev. Econ. Sociol. Rural* **2019**, *57*, 215–233. [CrossRef]
77. Paciarotti, C.; Torregiani, F. The logistics of the short food supply chain: A literature review. *Sustain. Prod. Consum.* **2021**, *26*, 428–442. [CrossRef]
78. Pereira, D.S.; Recine, E. Environmental, social and health dimensions of food supply policies and proposals in Brazil. *Rev. Nutr.* **2018**, *31*, 501–508. [CrossRef]
79. de Paula Assis, T.R.; de Melo Franca, A.G.; de Melo Coelho, A. Family farming and school feeding: Challenges for access to institutional markets in three municipalities of minas gerais. *Rev. Econ. Sociol. Rural* **2019**, *57*, 577–593. [CrossRef]
80. Garnett, T. *Cooking Up A Storm: Food, Greenhouse Gas Emissions and Our Changing Climate*; Food Climate Research Network, Centre for Environmental Strategy, University of Surrey: Guildford, UK, 2008.
81. Willett, W.; Rockström, J.; Loken, B.; Springmann, M.; Lang, T.; Vermeulen, S.; Garnett, T.; Tilman, D.; DeClerck, F.; Wood, A.; et al. Food in the Anthropocene: The EAT—Lancet Commission on healthy diets from sustainable food systems. *Lancet* **2019**, *393*, 447–492. [CrossRef]
82. Vargas, A.M.; de Moura, A.P.; Deliza, R.; Cunha, L.M. The Role of Local Seasonal Foods in Enhancing Sustainable Food Consumption: A Systematic Literature Review. *Foods* **2021**, *10*, 2206. [CrossRef]
83. FAO; IFAD; UNICEF; WFP; WHO. The State of Food Security and Nutrition in the World 2024. In *Financing to End Hunger, Food Insecurity and Malnutrition in All Its Forms*; FAO, IFAD, WFP: Rome, Italy; UNICEF: New York, NY, USA; WHO: Geneva, Switzerland, 2024.
84. Martinelli, S.S.; Soares, P.; Fabri, R.K.; Campanella, G.R.A.; Rover, O.J.; Cavalli, S.B. Potencialidades da compra institucional na promoção de sistemas agroalimentares locais e sustentáveis: O caso de um restaurante universitário. *Segurança Aliment. Nutr.* **2015**, *22*, 558–573. [CrossRef]
85. Macdiarmid, J.I. Is a healthy diet an environmentally sustainable diet? *Proc. Nutr. Soc.* **2013**, *72*, 13–20. [CrossRef]
86. Fróna, D.; Szenderák, J.; Harangi-Rákos, M. The Challenge of Feeding the World. *Sustainability* **2019**, *11*, 5816. [CrossRef]
87. Rampalli, K.K.; Blake, C.E.; Frongillo, E.A.; Montoya, J. Why understanding food choice is crucial to transform food systems for human and planetary health. *BMJ Glob. Health* **2023**, *8*, e010876. [CrossRef] [PubMed]
88. HLPE. *Nutrition and Food Systems. A Report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security*; FAO: Rome, Italy, 2017.
89. Bianchini, V.U.; Martinelli, S.S.; Soares, P.; Fabri, R.K.; Cavalli, S.B. Criteria adopted for school menu planning within the framework of the Brazilian School Feeding Program. *Rev. Nutr.* **2020**, *33*, e190197. [CrossRef]
90. FAO. biodiversity. In *International Scientific Symposium Biodiversity and Sustainable Diets United Against Hunger*; FAO: Rome, Italy, 2010.
91. Chen, P.-J.; Antonelli, M. Conceptual Models of Food Choice: Influential Factors Related to Foods, Individual Differences, and Society. *Foods* **2020**, *9*, 1898. [CrossRef] [PubMed]
92. Lindsey, M. Cross-Cultural Differences in Food Preferences and Consumption Patterns. *J. Food Sci.* **2024**, *5*, 30–42. [CrossRef]
93. Ygnatios, N.T.M.; Moreira, B.S.; Lima-Costa, M.F.; Torres, J.L. Urban-rural differences in food consumption and environment and anthropometric parameters of older adults: Results from ELSI-Brazil. *Cad Saude Publica* **2023**, *39*, e00179222. [CrossRef]
94. Santacoloma, P.; Telemans, B.; Mattioni, D.; Puhac, A.; Scarpocchi, C.; Taguchi, M.; Tartanac, F. *Promoting Sustainable and Inclusive Value Chains for Fruits and Vegetables-Policy Review*; FAO: Rome, Italy, 2021.
95. Goryńska-Goldmann, E.; Murawska, A.; Balcerowska-Czerniak, G. Consumer Profiles of Sustainable Fruit and Vegetable Consumption in the European Union. *Sustainability* **2023**, *15*, 15512. [CrossRef]
96. Schmutz, U.; Kneafsey, M.; Sarrouy Kay, C.; Doernberg, A.; Zasada, I. Sustainability impact assessments of different urban short food supply chains: Examples from London, UK. *Renew. Agric. Food Syst.* **2017**, *33*, 518–529. [CrossRef]

97. Mastronardi, L.; Marino, D.; Giaccio, V.; Giannelli, A.; Palmieri, M.; Mazzocchi, G. Analyzing Alternative Food Networks sustainability in Italy: A proposal for an assessment framework. *Agric. Food Econ.* **2019**, *7*, 21. [CrossRef]
98. Darolt, M.R.; Lamine, C.; Brandenburg, A.; Alencar, M.d.C.F.; Abreu, L.S. Redes alimentares alternativas e novas relações produção-consumo na França e no Brasil. *Ambiente Soc.* **2016**, *19*, 1–22. [CrossRef]
99. Sacchi, G.; Stefani, G.; Romano, D.; Nocella, G. Consumer renaissance in Alternative Agri-Food Networks between collective action and co-production. *Sustain. Prod. Consum.* **2022**, *29*, 311–327. [CrossRef]
100. Gálvez Nogales, E.; Puntsagdavaa, A.; Casari, G.; Bennett, A. *Linking Agriculture and Tourism to Strengthen Agrifood Systems in Asia and the Pacific*; FAO: Rome, Italy, 2023.
101. Sun, J.-L.; Tao, R.; Wang, J.; Wang, Y.-F.; Li, J.-Y. Do farmers always choose agricultural insurance against climate change risks? *Econ. Anal. Policy* **2024**, *81*, 617–628. [CrossRef]
102. Tasca, C.G.; Martinelli, S.S.; Cavalli, S.B. Sustainability practices in public institutional restaurants: Definition of criteria using the Delphi technique. *J. Foodserv. Bus. Res.* **2024**, *27*, 632–649. [CrossRef]