

Production, Marketing, and Consumption of Organic Foods in the Federal District: A Case Study During the COVID-19 Pandemic

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Abstract

This article analyzes, through a mixed-methods (quantitative and qualitative) approach, the dynamics of the organic food production chain in the Federal District (DF), Brazil, during the COVID-19 pandemic, examining the perspectives of actors involved in production, commercialization, and consumption. Findings indicate that, despite the challenges and uncertainties generated by the public health crisis, stakeholders within the chain demonstrated resilience by adapting through social and technological innovations — such as the use of social media and *delivery* services — to sustain commercial activities. The pandemic also reinforced awareness of the importance of food security and environmental sustainability, thereby promoting more efficient production practices. Although focused on the Federal District, this analysis offers insights into the structural features that confer resilience to alternative agri-food systems, particularly in public health crisis contexts. The case illustrates how the interplay among social innovation, short food supply chains, and institutional support can constitute a model for sustainable territorial development, with potential for replication in other metropolitan regions of Brazil. The valorization of agroecological practices, combined with digital marketing strategies, emerges not only as an emergency response but also as a cornerstone for public policies aimed at ensuring food security and fostering inclusive regional development.

Keywords: Alternative Agri-food Systems. Resilience. Social Innovation. Food Security. Regional Development.

Produção, comercialização e consumo de alimentos orgânicos no Distrito Federal: estudo de caso durante a pandemia de COVID-19

Resumo



Este artigo analisa, por meio de uma abordagem metodológica mista (quantitativa e qualitativa), a situação da cadeia produtiva de alimentos orgânicos no Distrito Federal (DF) durante a pandemia da COVID-19, investigando as perspectivas dos elos de produção, comercialização e consumo. Os resultados indicam que, apesar dos desafios e incertezas gerados pela crise sanitária, os atores da cadeia demonstraram resiliência, adaptando-se por meio de inovações sociais e tecnológicas — como o uso de redes sociais e *delivery* — para manter a comercialização. A pandemia também reforçou a percepção sobre a importância da segurança alimentar e da sustentabilidade ambiental, impulsionando práticas produtivas mais eficientes. Embora centrada no Distrito Federal, esta análise permite refletir sobre as características estruturais que conferem resiliência aos sistemas agroalimentares alternativos, especialmente em contextos de crise sanitária. O caso evidencia como a articulação entre inovação social, circuitos curtos de comercialização e apoio institucional pode constituir um modelo de desenvolvimento territorial sustentável, com potencial de replicação em outras regiões metropolitanas do Brasil. A valorização de práticas agroecológicas, combinada com estratégias digitais de comercialização, emerge não apenas como resposta emergencial, mas como eixo de políticas públicas voltadas à segurança alimentar e ao desenvolvimento regional inclusivo.

Palavras-chave: Sistemas Agroalimentares Alternativos. Resiliência. Inovação Social. Segurança Alimentar. Desenvolvimento Regional.

Producción, comercialización y consumo de alimentos orgánicos en el Distrito Federal: estudio de caso durante la pandemia de COVID-19

Resumen

Este artículo analiza, mediante un enfoque metodológico mixto (cuantitativo y cualitativo), la situación de la cadena productiva de alimentos orgánicos en el Distrito Federal (DF), Brasil, durante la pandemia de COVID-19, investigando las perspectivas de los actores involucrados en la producción, comercialización y consumo. Los resultados indican que, pese a los desafíos e incertidumbres generados por la crisis sanitaria, los actores de la cadena demostraron resiliencia al adaptarse mediante innovaciones sociales y tecnológicas — como el uso de redes sociales y servicios de entrega a domicilio — para mantener sus actividades comerciales. La pandemia también reforzó la percepción sobre la importancia de la seguridad alimentaria y la sostenibilidad ambiental, impulsando prácticas productivas más eficientes. Aunque centrado en el Distrito Federal, este análisis permite reflexionar sobre las características estructurales que confieren resiliencia a los sistemas agroalimentarios alternativos, especialmente en contextos de crisis sanitaria. El caso evidencia cómo la articulación entre innovación social, circuitos cortos de comercialización y apoyo institucional puede constituir un modelo de desarrollo territorial sostenible, con potencial de replicación en otras regiones metropolitanas de Brasil. La valorización de prácticas agroecológicas, combinada con estrategias digitales de comercialización, emerge no solo como una respuesta emergencial, sino como un eje fundamental para políticas públicas orientadas a la seguridad alimentaria y al desarrollo regional inclusivo.

Palabras clave: Sistemas Agroalimentarios Alternativos. Resiliencia. Innovación Social. Seguridad Alimentaria. Desarrollo Regional.

1 Introduction

The emergence of COVID-19 in 2020, caused by the SARS-CoV-2 virus, triggered significant health and economic impacts worldwide, including in Brazil. The first cases were reported in Wuhan, China, and the rapid international spread reached Brazilian territory only a few months later (Yuan *et al.*, 2020; Lago, 2020). As noted by Campos (2020, p. 15), “the COVID-19 pandemic became a variable in political competition, with social and governmental movements in Western societies taking positions either against or in favor of the World Health Organization (WHO) guidelines, thus emerging as a threat to democracy and the political system.” This interpretation highlights the global political dimension of the crisis and reinforces the need to analyze its repercussions within the national context.

In Brazil, the effects of the pandemic went beyond the health dimension, exacerbating unemployment and economic contraction. The combination of structural and political factors contributed to amplifying these impacts. International studies had already identified the high transmissibility of SARS-CoV-2, including in asymptomatic cases, as one of the main challenges to disease control (Munster *et al.*, 2020). In the Brazilian context, the vast territorial extension and logistical limitations in border control facilitated the spread of the virus (Dourado, 2020; Pêgo *et al.*, 2017).

Ferraz (2020) notes that the crisis was also marked by political and institutional disputes that undermined the national coordination of response measures. From an epidemiological perspective, the spread of COVID-19 initially concentrated in state capitals, followed by rapid inland dissemination and pronounced regional disparities in incidence and mortality rates (Cavalcante *et al.*, 2020). This uneven dynamic helps explain part of the heterogeneous impacts on local agri-food chains.

The inland spread of the pandemic increased the exposure of rural workers, who are essential for maintaining food systems. Studies by the FAO (2020) and national authors (Dias & Bezerra, 2021; Futeemma *et al.*, 2021) indicate that logistical disruptions tend to worsen food insecurity in vulnerable communities, making the health protection of these farmers crucial.

Agribusiness plays a central role in the Brazilian economy, contributing to the generation of foreign exchange, employment, and trade balance surpluses (Figueiredo, Santos & Lima, 2012). In September 2021, the sector’s exports reached USD 93.6 billion, representing an increase of 20.6% compared to the same period of the previous year (CNA, 2021). The organic food market also showed significant growth: in 2020, it expanded by 30%, generating approximately BRL 5.8 billion in revenue, with an expected 10% increase in 2021 (ABRAS, 2021). In this context, it becomes necessary to strengthen public policies that ensure the sector’s competitiveness and sustainability. From a complementary perspective, Lindoso *et al.* (2009) — whose study focuses on the vulnerability of family farming to climate change — observe that institutional strengthening and the improvement of socioeconomic conditions enhance the adaptive capacity of rural communities to systemic shocks, a concept equally applicable to health crises.

In the Federal District, organic food production has shown an upward trend, driven mainly by family farmers and local marketing networks. In 2020, the Federal District recorded more than 120 producers registered with the Ministry of Agriculture, Livestock, and Food Supply (MAPA) and 38 direct sales outlets distributed across 11 administrative regions (Codeplan, 2015; Greenation, 2020).

The COVID-19 pandemic prompted swift responses across multiple levels of government. The WHO and national authorities adopted protocols for diagnosis, isolation,

and contact tracing, as indicated by Munster *et al.* (2020). At the local level, the Federal District was among the first federative units to react to the crisis: following the establishment of the Public Health Emergency Operations Center in February 2020, the Federal District Government (GDF) issued more than 700 executive measures to manage the situation (Federal District, 2020b).

The sanitary measures implemented had direct repercussions on the productive sector, particularly affecting the production and marketing of organic foods, with severe consequences for family farmers and short food supply chains (Federal District, 2020c). In the health field, national guidelines reinforced the use of Personal Protective Equipment (PPE) during high-risk procedures (Matte *et al.*, 2020). Ferraz (2020) highlights that the pandemic revealed an unprecedented relationship between public health and politics, exposing weaknesses in institutional coordination.

In this context, it becomes necessary to investigate the effects of the pandemic on the different actors within the organic food chain in the Federal District. According to Ponte (2003), scientific research must employ rigorous and appropriate methods suited to the phenomenon under study. Oliveira *et al.* (2019) point out that family farmers engaged in short marketing chains are more vulnerable to losses and damages in adverse situations, such as the recent health crisis.

The pandemic exposed the vulnerability of organic farmers. According to Lindoso *et al.* (2009), this vulnerability corresponds to the susceptibility of a system to losses when facing adverse events, whereas adaptive capacity reflects its ability to respond and recover. In the Federal District, producers faced difficulties in the outflow of production, crop losses, and the suspension of local fairs and markets, resulting in income reduction and heightened food insecurity. In response, many turned to the sale of agroecological baskets, direct deliveries, and solidarity networks, revealing structural fragility but also a remarkable capacity for adaptation (Dias & Bezerra, 2021; Futemma *et al.*, 2021).

Considering the impacts of COVID-19 on the production and marketing of organic foods in the Federal District, this study analyzes the perceptions of producers, traders, and consumers regarding the changes that occurred in their productive, operational, and marketing activities.

The relevance of the topic is grounded in the scientific and social significance identified in the literature (Moresi, 2003). It is understood that examining the effects of the pandemic on the production and marketing of organic foods can provide valuable insights for public policies and strategies aimed at strengthening the sector.

As recommended by Barros (2011), a clear delimitation of the research object ensures analytical coherence and focus. Accordingly, this study focused on organic food producers as the main actors, taking the Federal District as the geographical scope and the period from March 2020 to September 2022 as the observation interval.

The questionnaires applied to producers, traders, and consumers were developed based on theoretical frameworks from rural sociology and studies on agri-food systems. The formulation of the questions was influenced by Bourdieu's (2002) approach to social practices and representations in food production and consumption, as well as by the perspective of Marsden, Banks, and Bristow (2000) on short food supply chains and trust among local actors. Additionally, the construction of the instruments was guided by the principles of participatory research proposed by Chambers (1994) and Thiollent (2011), seeking sensitivity to the sociocultural context of the respondents and valuing their perceptions of vulnerabilities and adaptive strategies.

The dimensions investigated — namely socioeconomic profile, production practices, and marketing channels — were established according to the typologies proposed by Wilkinson (2008) and Triches and Schneider (2010), which emphasize the contribution of local networks to sustainability. Accordingly, the questionnaires were structured to encompass both objective and interpretive variables, adopting the mixed-methods design of Creswell and Plano Clark (2018), thereby enabling the triangulation of empirical data and subjective perceptions.

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The research question formulated was: *What were the perceptions of organic food producers, traders, and consumers in the Federal District regarding the effects of the COVID-19 pandemic on their operational, productive, and marketing activities during the period from March 2020 to September 2022?*

Popper (1961) emphasized the importance of identifying gaps in existing sources of knowledge and properly formulating the research problem, as these steps are essential for conducting rigorous and high-quality research.

The general objective of this study is to understand the perceptions of organic food producers, traders, and consumers in the Federal District regarding the COVID-19 pandemic and its impacts on the production and marketing of these products. To achieve this objective, specific goals were established to characterize the perspectives of those involved and to provide an overview of the productive landscape in the region during the pandemic.

The specific objectives include: to characterize the socioeconomic profile of organic food producers and consumers in the Federal District; to analyze the changes that occurred in production from the producers' perspective and in marketing from the traders' perspective during the pandemic; to evaluate the changes in demand for organic foods as perceived by consumers; and to identify social innovations and strategies adopted in the marketing of organic foods in the DF during the pandemic period.

2 Theoretical Framework

2.1 Organic Foods

2.1.1 Contextualization

Organic agriculture has become increasingly valued by consumers, producers, and government authorities, standing out for its role in environmental preservation, the promotion of health, food security, and human well-being (Barbosa & Sousa, 2012). In Brazil, this production model has been regulated since 2003 by Law No. 10,831, which defines the organic agricultural production system as one aimed at economic and ecological sustainability, the strengthening of social benefits, and the reduction of dependence on non-renewable energy sources. It emphasizes cultural, biological, and

mechanical methods while prohibiting the use of genetically modified organisms and ionizing radiation (Brazil, 2003).

Given the continuous growth of the organic market in several countries — albeit with regional and methodological variations (Marini *et al.*, 2016) — the establishment of clear standards ensuring transparency in production and marketing processes becomes essential. In this regard, the Ministry of Agriculture, Livestock, and Food Supply (MAPA) has updated its regulatory framework, as demonstrated by Portaria [Ordinance] No. 52 of March 15, 2021, which established the Technical Regulation for Organic Production Systems, along with lists of permitted substances and practices (Brazil, 2021b). These measures aim to protect both producers and consumers while fostering knowledge, incentives, and practices that ensure healthy food and sustainable soil conservation (Medaets & Fonseca, 2005).

According to Law No. 10,831/2003 and Normative Instructions No. 19/2009 and No. 46/2011 issued by the Ministry of Agriculture, Livestock, and Food Supply (MAPA), the Brazilian organic production system adopts three certification modalities: auditing, Participatory Guarantee System (PGS), and Social Control Organization (OCS). Each of these modalities establishes distinct control responsibilities and ensures transparency throughout the production process.

These different modalities reflect the plurality of the Brazilian organic sector, integrating mechanisms of state control, community self-management, and social trust. Their coexistence reinforces principles such as transparency, shared responsibility between producers and consumers, and the inclusion of small farmers in certified product markets.

2.1.2 The Organic Production System in Brazil and in the Federal District

Following the national trend, the country's capital shows satisfactory performance both in organic food production and consumption. According to the Technical Assistance and Rural Extension Agency of the Federal District (EMATER-DF), more than 200 entities and organizations are currently involved in organic food production processes in the region (Santos & Silva, 2021). Data from 2020 indicate that approximately 89 varieties of organic foods are cultivated across an area of 598.36 hectares. The main crops include lettuce, tomatoes, kale, broccoli, and carrots, while strawberries, bananas, and lemons are the primary fruits grown. These products are currently marketed through specialized fairs, selected supermarkets, and digital platforms based on Information and Communication Technologies (ICTs).

The Federal District is a federative unit with a small geographical area but a significant role in Brazil's organic agriculture sector. Organic production began in the 1980s with the establishment of the Ecological Agriculture Association and the Organic Producers' Union. In 2005, a Local Productive Arrangement (LPA) for organic agriculture was created. Production and the number of producers have grown substantially in recent years, reaching 220 farmers in 2013, with 80% of production consumed within the Federal District itself. Several institutions, such as the Brazilian Micro and Small Business Support Service – Federal District (SEBRAE/DF), the Rural Union of the Federal District, the National Rural Learning Service – Federal District (SENAR/DF), the Technical Assistance and Rural Extension Agency of the Federal District (EMATER/DF), the Brazilian Agricultural Research Corporation (EMBRAPA), along with private companies, NGOs, and independent

professionals, provide support and assistance to rural producers. The Federal District is considered a hub for agroecological and organic production due to its population's high purchasing power, good infrastructure, favorable climatic conditions, and strong short supply chain markets (Leal, 2022).

2.1.3 The Organic Food Production Chain in the Federal District

The organic food production chain in the Federal District encompasses stages ranging from input production to processing, distribution, and marketing of final products, with a strong presence of small rural producers and recurring structural challenges. Studies indicate that this chain involves a multifaceted dynamic that combines productive, organizational, and market access aspects, with direct implications for profitability, product quality, and consumer trust (Oliveira *et al.*, 2019).

According to Oliveira *et al.* (2019), regional organic production is predominantly carried out by small farms and faces bottlenecks such as a lack of skilled labor, low profitability, and insufficient storage and transportation infrastructure. In addition, the low adherence to formal certification mechanisms limits access to more structured markets and may reduce consumer trust, especially outside direct sales circuits.

In Brazil, organic certification takes place through three modalities: by Organic Conformity Assessment Bodies (OAC), by Participatory Guarantee Systems (PGS), and by direct sales with social control, linked to the National Register of Organic Producers (CNPO) (Brazil, 2021b). Each pathway opens distinct opportunities: OAC certification generally enables entry into supermarket networks and export markets, while PGS and direct sales strengthen short marketing circuits and build trust-based relationships between producers and consumers. This configuration has proven strategic for the resilience of small producers in times of crisis, as evidenced during the pandemic, when proximity and the personalization of commercial relationships acted as risk buffers. In this regard, Khatounian (2001) highlights that farmers' markets, by prioritizing direct sales, tend to improve farmers' income while simultaneously reducing consumer prices, thereby reinforcing the socioeconomic efficiency of short supply chains.

Nevertheless, the limited dissemination of these mechanisms in the Federal District — particularly the Participatory Guarantee Systems (PGS) — remains a challenge. As argued by Ribeiro-Silva *et al.* (2020), certification is essential for sustaining quality and trust in organic products; its low adoption in the region goes beyond bureaucratic barriers and costs, also reflecting an incipient level of collective organization among producers. This scenario constrains the full development of the local production chain and highlights the need for public policies aimed at strengthening local guarantee systems, as well as training and technical assistance processes.

In this context, institutional marketing channels — particularly the Food Acquisition Program (PAA) and the National School Feeding Program (PNAE) — gain relevance, as they play a strategic role both in the inclusion of organic producers and in the promotion of food and nutritional security (Brazil, 2021c; Schneider, 2016). These channels operate as mechanisms for stabilizing demand and valuing prices, fostering the outreach of local organic production and encouraging the formalization and qualification of processes, including certification and traceability. At the same time, they strengthen the connection with short supply chains and institutional markets, expanding opportunities for family farmers and cooperatives that meet conformity criteria.

The adoption of sustainable practices throughout the production chain — from soil and water conservation to ecological management and the responsible use of inputs — constitutes a central condition for ensuring the quality and environmental sustainability of organic production in the Federal District. Figueiredo and Soares (2012) emphasize that the dissemination of such practices is hindered by information gaps and a lack of government incentives, underscoring the importance of integrated policies that combine technical assistance, continuous training, access to certification, and integration into institutional channels such as the PAA and PNAE. Such measures are essential to strengthen the governance of the production chain and enhance its economic, social, and environmental resilience.

2.1.4 Factors Driving the Consumption of Organic Foods

The choice of organic foods is often associated with the pursuit of greater food safety and the reduction of exposure to pesticides. According to Suszek (2006), the perception that these foods are healthier is one of the main drivers of consumption. This concern dates back to the 1960s, particularly in industrialized countries, where criticism of the intensive use of chemical inputs in agriculture and food preservation gained prominence (Pimentel, 2005).

Although organic foods are produced without the use of pesticides, studies show that they are not entirely free from contaminating agents (De Lima, 2006). Furthermore, by choosing organic foods, consumers also contribute to environmental protection (Brazil, 2021; Briz & Ward, 2009), since the production of these foods does not cause chemical contamination of groundwater and has a reduced impact on local biodiversity and other aspects related to environmental preservation (Pimentel, 2005).

On the other hand, there are adverse factors that negatively affect the consumption of organic foods. Price remains one of the main obstacles to the development of organic food production in Brazil (Barbé, 2009; Pimentel, 2005). However, Cechin *et al.* (2021) argue that price does not necessarily have to be a barrier to the purchase of organic foods, since consumers' purchasing decisions are influenced by their preferences regarding food attributes such as health, well-being, and environmental benefits. Another factor that hinders the consumption of organic products is the lack of effective communication between producers and consumers (Briz & Ward, 2009; Silva, Câmara & Dalmas, 2005), which may lead to communication failures and negatively influence consumers' purchasing decisions (Suszek, 2006). It is worth noting that the high price of organic foods is related to the small scale of production, the low supply relative to the high market demand, and the added benefits these products offer compared to conventional foods (Silva, Câmara & Dalmas, 2005).

2.1.5 The Organic Product Consumer

The organic food market has grown in recent years due to consumers' increasing concern with health, the environment, and sustainability. According to Schleenbecker and Hamm (2013), taste and health are the main attributes that attract consumers to organic products, regardless of the country. Although there is still a general preference for lower-priced foods, evidence shows that food quality is becoming an increasingly important parameter in purchasing decisions (Cerveira & Castro, 1999).

Consumers' purchasing decisions are influenced by cultural, social, personal, and psychological factors. In the Federal District, for instance, the presence of citizens from various parts of Brazil and the world has contributed to a greater preference for organic foods, due to their lower toxicity and their role in maintaining environmental balance (Vilela *et al.*, 2006). According to Oliveira *et al.* (2019), most organic food consumers in the Federal District are women with higher education, single, with good income levels, and aged between 26 and 35 years. The main factors leading these consumers to choose organic foods include health, nutritional richness, taste, appearance/visual appeal, product origin, environmental responsibility certification, and product availability.

2.1.6 The Organic Food Producer

For the purposes of this study, the operational definition of an “organic producer” follows Law No. 10,831/2003 and related regulations (Brazil, 2003; 2021b), encompassing production units certified by OAC, PGS, or those engaged in direct sales registered in the CNPO. In this context, an organic producer is understood as one who employs an organic production system that utilizes natural resources sustainably, preserves the environment, respects local sociocultural characteristics, and protects workers' rights, while refraining from the use of genetically modified organisms and synthetic chemical inputs, as detailed by Mamede (2022).

According to Lago *et al.* (2018), in a study conducted with organic producers across Brazil, the majority of organic farmers participate in an association or cooperative (69%) and show a 68% participation rate in the production chain, compared to 18% in organic agribusiness, 11% in trade, and 3% in food services. Fruits are the most commonly cultivated products on organic farms (72%), followed by vegetables (64%), roots (49%), tubers (48%), grains (37%), processed products (24%), dairy (9%), meats (5%), fish (3%), and others (23%). In addition, about 40% of producers hold organic production certification, while 33% are linked to Participatory Organic Conformity Assessment Bodies/Participatory Guarantee Systems, and 20% have no form of control (Lago *et al.*, 2018).

Regarding marketing channels, organic food producers primarily rely on direct sales to consumers (72%) and organic fairs (55%), followed by small markets (43%), public procurement programs (26%), supermarkets (26%), online stores (14%), third-party agribusinesses (14%), and marketplaces (4%). In terms of annual revenue, 41% of producers earned up to BRL 60,000 per year, 22% between BRL 60,000 and BRL 360,000, 8% between BRL 360,000 and BRL 3,600,000, 3% more than BRL 3,600,000 per year, and 26% did not report their income (Lago *et al.*, 2018).

2.1.7 Social Innovation

Social innovation is a process aimed at providing lasting solutions to social problems and has been examined by several scholars. According to Bignetti (2011), social innovation results from the application of knowledge to improve society's quality of life, whereas the traditional concept of innovation focuses on market competitiveness, as stated by Juliani (2014). This interdisciplinary approach involves science, technology, culture, economics, politics, and other factors to develop innovative solutions to social issues, which are tested, implemented, and iteratively adjusted to ensure lasting results. Social innovation has

manifested historically, remaining present in various forms across different social challenges, as emphasized by Franzoni (2015).

Organic agriculture represents an emblematic case of social innovation by integrating social, economic, and environmental dimensions. Diogo (2010) emphasizes that this production model creates opportunities for the inclusion of family farmers, the development of market niches, and the strengthening of relationships between producers and conscious consumers. It can contribute to poverty reduction and promote greater equity in income distribution, while encouraging creativity, collaboration, and farmer participation through the development of cooperative networks and partnerships. In this sense, organic agriculture can be considered an important tool for social innovation, optimizing social, economic, and environmental outcomes and contributing to an improved quality of life for those involved. Reinforcing this perspective, Khatounian (2001) highlights that, compared to conventional agriculture, organic production depends less on material inputs but, in contrast, requires a much greater investment in an intangible resource: knowledge.

2.2 Agriculture in the Pandemic Context

According to Moreira (2020), prior to this global recognition, the WHO had already classified the outbreak as a Public Health Emergency of International Concern on January 30, 2020, and established key response measures such as early detection, isolation, immediate treatment, contact tracing, and, at the population level, social distancing measures. Ferraz (2020) notes that although social distancing was already a traditional containment measure, the unprecedented nature of a worldwide quarantine was decisive in shaping both the coverage and the social experience of the crisis. In Brazil, the health crisis exposed structural weaknesses in the supply chain, particularly affecting the most vulnerable segments, such as family farming and direct marketing systems (FAO, 2020; Dias & Bezerra, 2021).

Although large-scale agribusiness proved relatively resilient — maintaining exports and production — small producers, particularly those engaged in organic farming, faced critical challenges. The closure of street markets, the reduced flow in institutional markets, and the disruption of traditional sales channels directly affected the income and food security of these farmers (Copetti, 2020). Moreover, mobility restrictions and fear of contamination hindered transportation and distribution logistics, demanding rapid adaptations. From a comparative perspective, Campos (2020) notes that in Europe, social isolation was widely adopted from the onset of the pandemic, when stricter hygiene rules became part of daily life and the population, even without formal lockdown mandates, voluntarily remained at home.

In this context, technology emerged as a strategic tool for adaptation, reinforcing the notion that advances in information and communication technologies (ICTs) play an increasingly strategic and political role in the contemporary world (Massruhá & Leite, 2016). In response to the restrictions imposed, producers who had previously relied exclusively on in-person sales began using social media, messaging applications, and delivery platforms to maintain contact with consumers and ensure the distribution of their products (Silva *et al.*, 2021; Polacinski *et al.*, 2021). Although the adoption of digital technologies remains incipient among many family farmers — particularly older ones —

the pandemic accelerated processes of social innovation and digitalization, revealing their potential as drivers of resilience in alternative food systems.

Thus, the pandemic scenario not only exposed vulnerabilities but also drove transformations in production, marketing, and consumption practices, reinforcing the importance of short supply chains, supportive public policies, and the innovative capacity of local actors — central elements for the analysis developed in this study. Epidemiological studies also indicate that the dynamics of COVID-19 in Brazil initially showed strong concentration in state capitals, followed by inland dissemination, with marked regional differences in incidence and lethality, which helps explain the unequal impacts on local food chains (Cavalcante *et al.*, 2020).

2.3 The Federal District

The Federal District is the smallest federative unit in Brazil, located in the Central-West region between parallels 15°30' and 16°03' south latitude and meridians 47°18' and 48°17' west longitude. Its territorial area is 5,779 km², corresponding to only 0.06% of the national territory. The natural boundaries of the Federal District are defined by the Descoberto River to the west and the Preto River to the east, while its northern and southern limits are marked by straight lines forming a quadrilateral. Politically, the Federal District borders the states of Goiás and Minas Gerais, sharing boundaries with several municipalities from both states. Its political and administrative structure is composed of administrative regions instead of municipalities, as is the case in other federative units, and it holds a special administrative status with legislative powers typically reserved for both states and municipalities (Federal District, 2020a).

Figure 1 presents the political map of the Federal District, showing the division of its administrative regions. This cartographic representation makes it possible to visualize the territorial distribution and spatial relationships between urban and rural areas, highlighting the population concentration in central regions — particularly Plano Piloto, Taguatinga, and Ceilândia — and the recent expansion toward peripheral areas such as São Sebastião, Planaltina, and Sobradinho II.

Figure 1 – Political Map of the Federal District (Administrative Regions)



Source: Codeplan (2022), adapted by the authors.

The population of the Federal District has one of the highest population densities in the country, with 3,094,325 inhabitants in 2021, representing a density of 534.95 inhabitants per square kilometer. Despite its high population density, the Federal District has the highest nominal monthly household income per capita in Brazil, amounting to BRL 2,513.00 in 2021. The urban population accounts for 96.5% of the total, or 2,985,751 inhabitants in 2021, reflecting a population growth of 25% between 2010 and 2021. The administrative region of Ceilândia is the most populous in the Federal District, concentrating 16% of the urban population, according to data from the 2010 Census released by the Federal District Planning Company (Codeplan, 2015).

The rural population of the Federal District represents only 3.5% of the total population. According to IBGE data from 2010, the rural population comprises 86,714 inhabitants, distributed across various rural areas of the Federal District. Despite its small territorial area compared to other federative units in Brazil, the Federal District hosts a diverse and steadily growing population, presenting both challenges and opportunities for the region's social, economic, and urban development (Farias, 2020).

3 Research Methodology

In this study, a mixed-methods approach — combining quantitative and qualitative methods — was adopted with the aim of understanding how the COVID-19 pandemic was experienced by organic food farmers in the Federal District. The research sought to describe, with accuracy and sensitivity, the real conditions under which these producers operated during this period marked by uncertainty.

To this end, two questionnaires were developed and administered, in addition to conducting one in-depth interview. Each stage was carefully planned and guided by well-established methodological references, such as those of Triviños (1987), Gil (2008), Minayo

(2014), Zanella (2006), Günther (2006), Creswell and Plano Clark (2018), and Matias-Pereira (2019).

The research adopted a descriptive approach, aiming to portray the experiences lived by farmers during the pandemic period. According to Triviños (1987), this type of approach allows the observation and recording of reality in a faithful manner, without distortions — an essential aspect in contexts of rapid transformation and uncertainty, such as that experienced during the COVID-19 pandemic.

In addition, the research was given an exploratory character, as it was not limited to description alone: it also sought to deepen concepts, understand relationships, and reveal how agricultural practices, marketing networks, and daily routines were adapted in the face of the crisis. In this regard, the study followed the guidelines of Gil (2008), who emphasizes the importance of research capable of interpreting and giving meaning to social transformations rather than merely recording them.

A direct survey with farmers was chosen based on the understanding that their voices should be at the center of the investigation. As emphasized by Günther (2006), listening to the social actors themselves allows access to their perceptions, strategies, and forms of resistance in an authentic way. Therefore, questionnaires were used to obtain a broader and comparable overview, and an interview was conducted to capture stories, emotions, and nuances that quantitative data cannot reveal. The combination of these instruments enabled a comprehensive understanding of the reality of organic producers in the Federal District within the context of the pandemic.

3.1 Research Population

According to Vergara (2009), a “population” is a set of elements that share characteristics to be studied. This research focuses on organic food producers in the Federal District during the COVID-19 pandemic. However, after a more in-depth analysis of the local production chain — understood here as the set of agents and activities involved in the stages of production, processing, distribution, and consumption of a good (Batalha, 2021) — it was determined that additional elements of the organic food production chain should be included. Thus, the study came to encompass producers, traders, and consumers. The objective of the study was to investigate how the pandemic affected the organic food production chain in the Federal District, aiming to minimize the impact of potential future crises. The inclusion of these three different perspectives provided a comprehensive understanding of the issue.

To obtain representative data, the study employed a non-probabilistic sampling method, specifically the “convenience” and “snowball” types. This strategy was adopted due to the health restrictions imposed by the pandemic and the recruitment process carried out through digital invitations and approaches at points of sale. As established by Matias-Pereira (2019), a sample consists of a portion of the population selected according to a defined criterion and may adopt either a probabilistic or non-probabilistic nature. In this context, Barbetta (2019) reinforces that the sample must constitute a finite yet representative subset of the population of interest.

The study included 12 producers, selected based on accessibility criteria and to represent regional diversity. The sample was designed to encompass the variety of productive profiles in the region, although the exact proportion relative to the total

number of organic producers in the Federal District cannot be determined precisely — an inherent difficulty explained by the dynamic nature of producer registries and the existence of multiple marketing arrangements, such as direct sales, PGS, and OAC certification systems. Finally, predefined inclusion criteria were applied, and diverse regional coverage was ensured, which is considered a factor contributing to the validity of the results.

3.2 Data Collection: Questionnaires and Interviews

The development of the questionnaires and interview guides used in this research was grounded in classical references of applied social research, which emphasize the need for coherence between objectives, hypotheses, and observable variables (Lakatos & Marconi, 2017; Gil, 2019). Data collection constitutes an essential stage of any scientific investigation, as it enables the acquisition of information that will later be analyzed and interpreted. In this regard, as Chizzotti (2018) notes, the quality of data collection is a determining factor for the success and credibility of the results.

Among the various available techniques, questionnaires and interviews were chosen due to their breadth and versatility, allowing for the collection of information regarding participants' behaviors, perceptions, and preferences. According to Zanella (2006), the use of questionnaires is particularly suitable for gathering data of a descriptive and behavioral nature, enabling complementary quantitative and qualitative analyses. Thus, structured questionnaires with closed and multiple-choice questions were administered to producers, traders, and consumers of organic foods, facilitating the collection of accurate and tabular data, as recommended by Cervo, Bervian, and Silva (2006).

Due to the restrictions imposed by the COVID-19 pandemic, data collection was adapted to a mixed format, combining electronic correspondence, videoconferences, and the use of instant messaging applications to ensure participants' safety. When in-person interaction proved indispensable, all biosafety measures were observed, including the use of personal protective equipment (Matte, 2020). This methodological adaptation ensured the continuity of the study without compromising the integrity of either the respondents or the researchers.

The research instruments were developed based on the theoretical constructs of “short food supply chains” (Oliveira *et al.*, 2019) and “social innovation” (Bignetti, 2011; Diogo, 2010), which guided the definition of three analytical axes: (i) socioeconomic profile, (ii) operational impacts of the pandemic, and (iii) marketing strategies and the use of digital technologies. This structure made it possible to empirically test the hypothesis that short supply chains and social innovations function as drivers of resilience for actors within the organic production chain.

The formulation of the questions was carried out to ensure content validity — that is, the correspondence between theoretical constructs and the empirical indicators collected. To achieve this, principles of content analysis were incorporated, following Bardin (2016) approach, which allowed for the identification of emerging categories in open-ended responses and for understanding the meanings attributed by participants to the observed phenomena. This procedure enhanced the interpretive depth of the data and contributed to the triangulation between qualitative and quantitative results.

Additionally, the research incorporated a consumer-oriented perspective, seeking to understand how purchasing habits and perceptions of organic products were affected during the pandemic period. In this regard, Levitt (1960) emphasizes that marketing should be customer-oriented in order to meet consumers' needs and ensure the sustainability of market relationships. This approach was adapted to the context of short supply chains, highlighting how the appreciation of conscious consumption and trust in product origin contributed to strengthening the local organic production chain.

Thus, the methodological instrument was conceived not only as a means of data collection but also as a stage for the theoretical operationalization of the concepts of resilience, social innovation, and food security, which underpin the conceptual framework of this study.

3.3 Data Collection Strategy and Fieldwork Period

The strategy used for data collection in this research was based on the development of an effective questionnaire capable of extracting relevant information from the field of study. Oliveira *et al.* (2016) state that it is essential for the questionnaire to align with the research problem, hypotheses, and investigated facts, and to be formulated clearly and objectively to avoid misunderstandings by respondents. Furthermore, the questions must be organized in a logical and coherent order to prevent interference in the responses.

The construction of the questionnaires went through several stages, including the adjustment of initial questions to the research objectives, refinement of the formulated questions based on discussions held during the master's program qualification process and advisory meetings, pre-testing and subsequent revisions, printing of the final questionnaires and interview materials, and field visits/interviews at commercial outlets, organic producers, and organic food consumers.

Data collection was carried out from August 1 to September 15, 2022, taking into account both logistical aspects and the health conditions related to the COVID-19 pandemic. All ethical research protocols were observed, including obtaining participants' free and informed consent, guaranteeing anonymity in responses, and strict compliance with the provisions of the General Data Protection Law (LGPD). As highlighted by Oliveira *et al.* (2016), considering contextual factors that may affect data quality and participant safety is essential to ensuring the validity of the research.

It is worth noting that, despite the limitations imposed by the pandemic, the use of digital resources such as the internet made it possible to carry out data collection within the established timeframe, without major complications in conducting the study. In this regard, technological tools have proven to be increasingly important for conducting research across various fields of knowledge, facilitating access to participants and streamlining the data collection process (Gil, 2010). Therefore, the use of these resources can be considered a viable alternative for conducting research during periods of restrictions and limitations imposed by exceptional circumstances, such as the COVID-19 pandemic.

4 Data Analysis

This study analyzed the organic food production chain in the Federal District during the COVID-19 pandemic (March 2020 to September 2022) based on the application of three

distinct questionnaires administered to producers (n=12), traders (n=12), and consumers (n=120). The multi-actor approach provided a systemic view of the sanitary crisis’s impacts on each link of the chain, as summarized in Chart 1.

Chart 1 – Summary of the Main Impacts of the Pandemic on the Links of the Organic Food Chain in the Federal District

Supply Chain Link	Main Impacts	Adaptation Strategies	Observed Results
Producers	Logistical difficulties; shortage of inputs; loss of institutional channels (PAA, PNAE)	Expansion of direct sales; use of social media; home delivery	Strengthening of short supply chains; loyalty of local customers
Retailers	Reduction in the flow of in-person consumers; interruption of markets	Creation of digital channels and WhatsApp groups; partnerships with producers	Diversification of sales channels and partial maintenance of revenues
Consumers	Price increases; mobility restrictions; search for healthy foods	Purchases via delivery; support for local producers	Reinforcement of food security and sustainability awareness

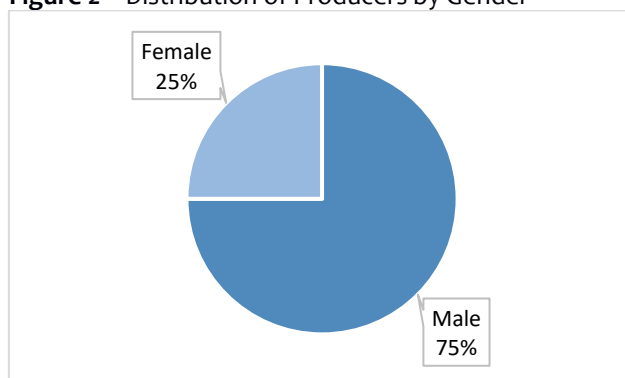
Source: Authors (2025), based on data collected in the research (2020–2022).

A hybrid format was adopted in the data collection process, and challenges such as some respondents’ difficulties with digital platforms were encountered, requiring adaptations in the wording of the instruments. Nevertheless, the reliability of the data obtained was ensured, and the analysis was organized into three subsections corresponding to the actors investigated.

4.1 Organic Food Production in the Federal District

Organic food production in the Federal District was analyzed based on a questionnaire administered to 12 producers. The instrument was structured into three main constructs: The Producer, The Production Unit, and The Pandemic. Comprising 35 questions, it sought to collect information on socioeconomic profile, production characteristics, financial figures, and strategies adopted during the COVID-19 pandemic.

Figure 2 – Distribution of Producers by Gender

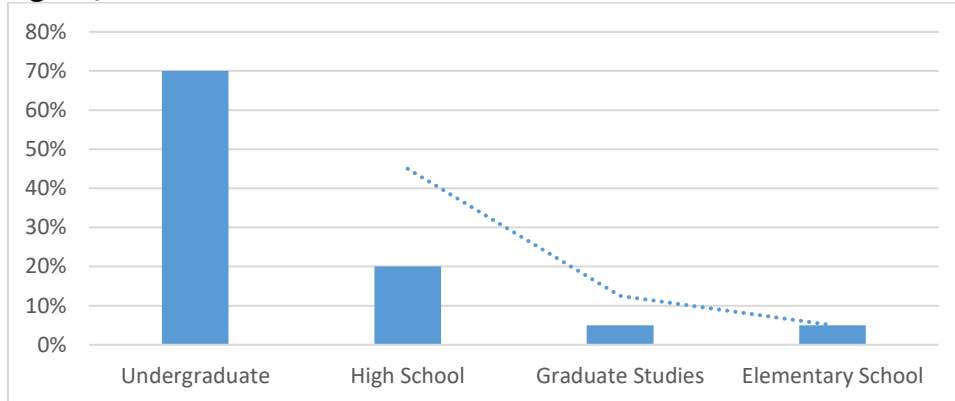


Source: Authors (2025), based on data from the survey with organic food producers in the Federal District.

The analysis reveals that 75% of producers are men and 25% are women, indicating low female participation in the sector (Figure 2). In addition, the majority are older individuals (59%), which may pose challenges to the adoption of innovative technologies.

Regarding education, higher education predominates (70%), followed by secondary education (20%), with a small share of producers holding postgraduate degrees or having completed only elementary education (Figure 3).

Figure 3 – Educational Level of Producers

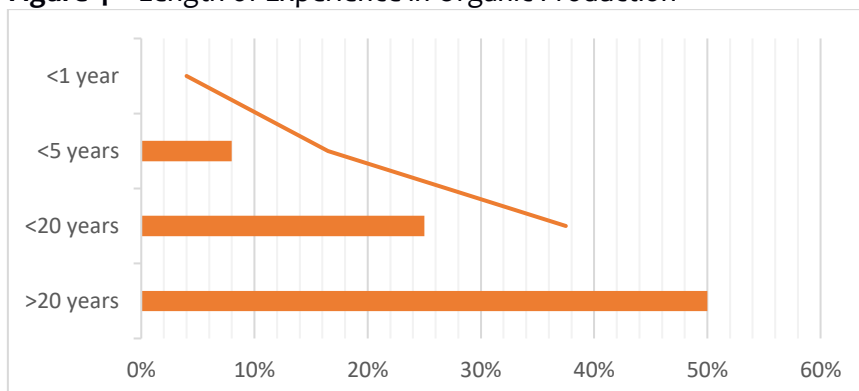


Source: Authors (2025), based on data from the survey with organic food producers in the Federal District.

Regarding the time in operation, half of the producers reported working with organic products for more than 20 years, while only 8% started less than five years ago, suggesting a well-established activity in the region (Figure 4). As for annual revenue, the results reveal significant heterogeneity: 43% reported earnings of up to BRL 50,000; 28% fell within the range of BRL 50,000 to BRL 200,000; and 29% reported values equal to or greater than BRL 500,000 (Figure 5). This distribution highlights the coexistence of small producers in more vulnerable situations alongside larger and better-structured establishments.

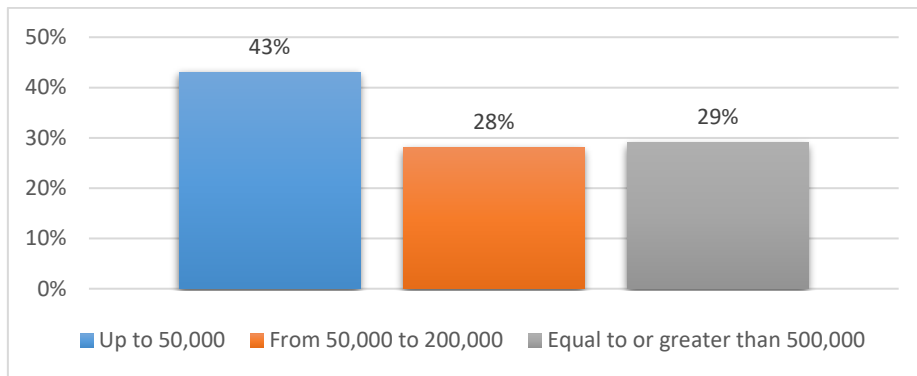
The results also indicate that production is strongly concentrated in fruits and vegetables, with no reports of animal protein production among the respondents. Marketing takes place primarily at organic and open-air markets, with a significant increase in delivery services and online sales during the pandemic period.

Figure 4 – Length of Experience in Organic Production



Source: Authors (2025), based on data from the survey with organic food producers in the Federal District.

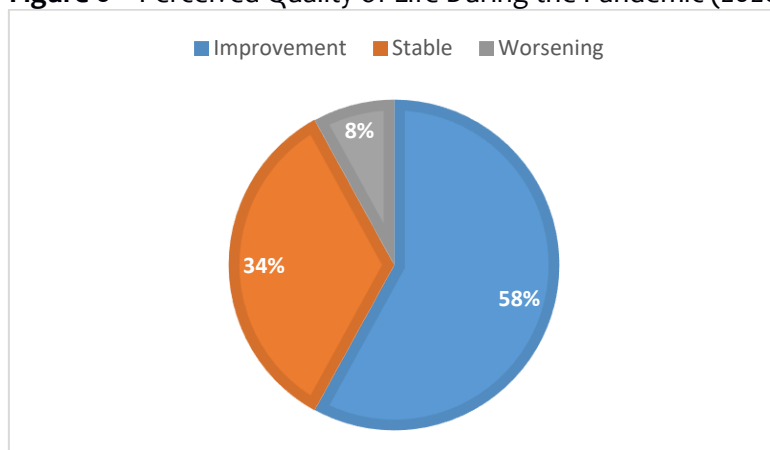
Figure 5 – Annual Revenue of the Farms



Source: Authors (2025), based on data from the survey with organic food producers in the Federal District.

Regarding the impacts of COVID-19, 58% reported an improvement in quality of life, 34% stability, and only 8% a decline — possibly associated with the increased demand for healthy and safe foods (Figure 6). Most producers did not interrupt food supply, although some faced restrictions imposed by local public policies. Furthermore, 91.7% observed a rise in demand for organic products, reinforcing the significance of this sector in the pandemic context.

Figure 6 – Perceived Quality of Life During the Pandemic (2020–2022)



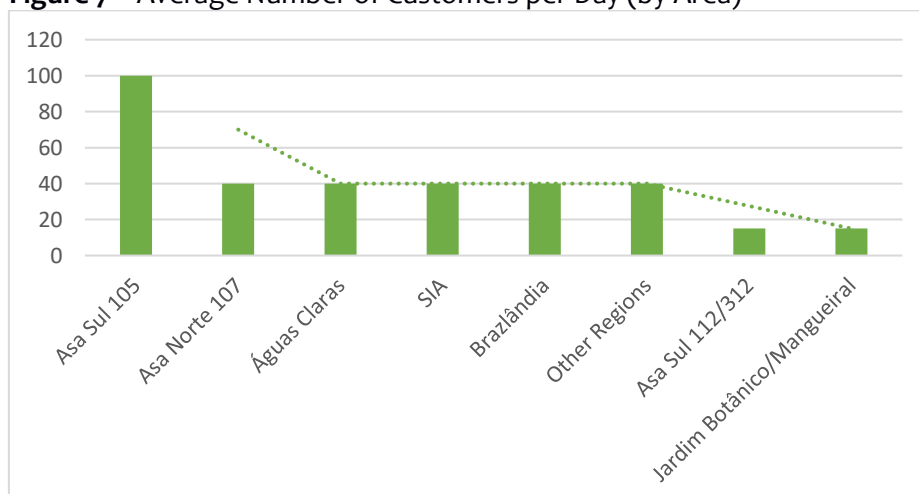
Source: Authors (2025), based on data from the survey with organic food producers in the Federal District.

4.2 The Marketing of Organic Foods in the Federal District

The research evaluated the impact of the COVID-19 pandemic on the marketing of organic foods in the Federal District through in-person interviews with 12 traders distributed across different administrative regions. The objective was to understand consumer behavior during the pandemic period and to provide insights for stock management and pricing strategies.

The results showed that the average number of customers per sales point was 40 per day, with strong variation across areas: Asa Sul (Block 105) had the highest flow (100 customers/day), while Asa Sul (Blocks 112/312) and Jardim Botânico/Mangueiral registered only 15 customers/day (Figure 7).

Figure 7 – Average Number of Customers per Day (by Area)



Source: Authors (2025), based on data from the survey with organic food traders in the Federal District.

Table 1 presents an overview of organic food marketing in the Federal District during the COVID-19 pandemic, highlighting regional differences in the average number of customers served per day, the average spending per customer, and observations on the performance of sales points. The data reveal significant variations among the regions

analyzed, with Asa Sul, Asa Norte, Águas Claras, and Jardim Botânico standing out for higher sales volumes and average purchase values, while areas such as Mangueiral showed lower activity. These discrepancies reflect not only the pandemic’s impact on consumption habits but also the consumers’ socioeconomic profiles and the structural accessibility of marketing channels, revealing patterns of resilience and adaptation within the organic market of the Federal District.

Table 1 – Marketing of Organic Foods in the Federal District During the COVID-19 Pandemic

Area / Location	Average Customers/day	Average Spending per Customer (BRL)	Observations
Asa Sul – Block 112/312	15	100	Low movement
Asa Sul – Block 105	100	150	Higher flow and higher spending
Jardim Botânico / Mangueiral	15	50	Lower average spending
Asa Norte – Block 107	40	150	High purchase value
Águas Claras	40	150	High purchase value
SIA	40	100	Average consumption
Brazlândia	40	100	Average consumption
Other regions (Ceilândia, Lago Norte, etc.)	40	80–100	Regional variations

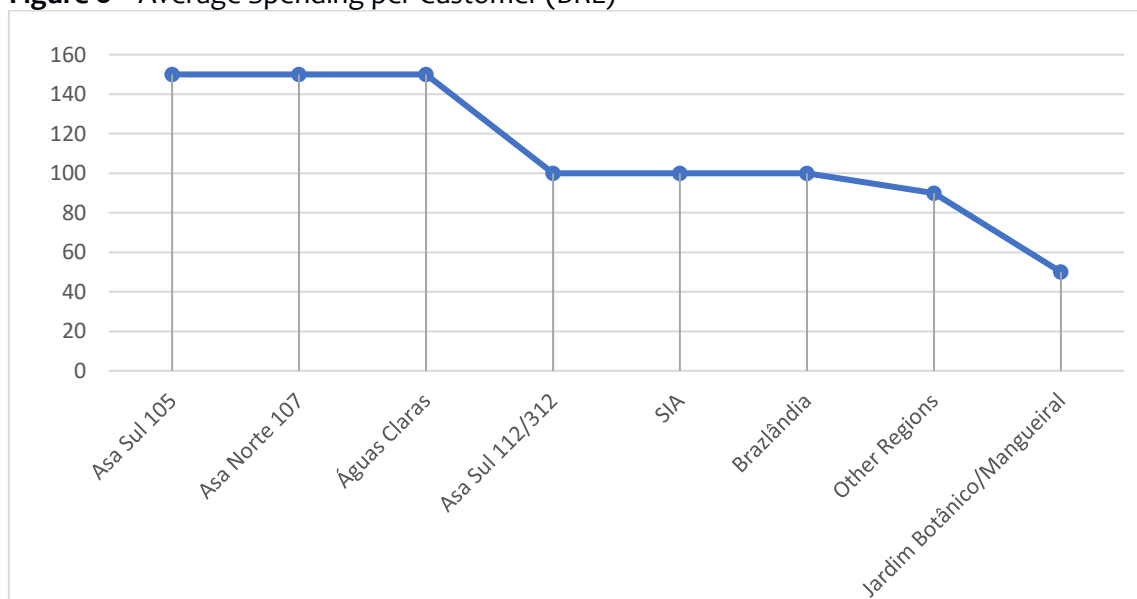
General Statistics:

- Average number of customers per day: 40.0 (SD = 26.2; range = 85; n = 12 points).
- Average spending per customer: BRL 113.33 (SD = BRL 35.24; median = BRL 100.00; n = 12 points).

Source: Authors (2025).

Regarding the average spending per customer, higher expenditures were observed in Asa Sul (Block 105), Asa Norte (Block 107), Águas Claras, and Jardim Botânico, with an average of BRL 150 per purchase, while Mangueiral showed the lowest performance (BRL 50 per customer). This variation may be associated with the socioeconomic profile of consumers and the location of sales points (Figure 8).

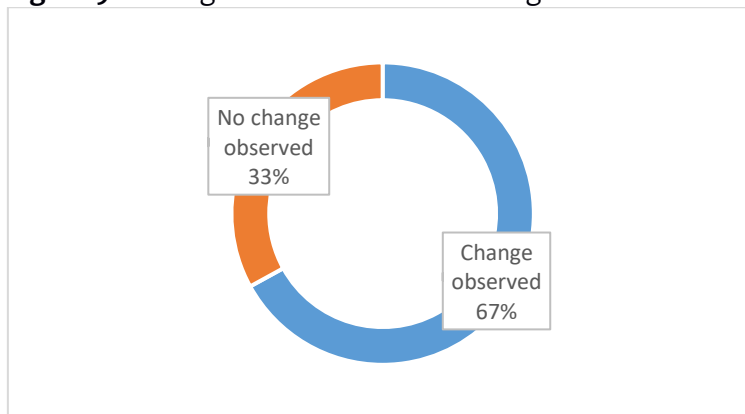
Figure 8 – Average Spending per Customer (BRL)



Source: Authors (2025), based on data from the survey with organic food traders in the Federal District.

Regarding changes in customer traffic, 67% of traders reported significant variations during the pandemic, mainly attributed to social distancing measures and lockdowns — cited by all interviewees as a determining factor (Figure 9). More than 60% reported a recovery or even improvement in customer flow after the restrictions were lifted, although they also pointed out the lack of government support during the critical period.

Figure 9 – Change in Customer Flow During the Pandemic



Source: Authors (2025), based on data from the survey with organic food traders in the Federal District.

It is observed that the pandemic had an uneven impact on the marketing of organic foods in the Federal District. Despite the initial difficulties, especially during the lockdown period, traders reported increased demand in the post-pandemic phase, indicating the sector's resilience and growing consumer interest in organic products.

4.3 The Consumption of Organic Foods in the Federal District

The investigation into organic food consumers sought to understand their perceptions and behaviors during the COVID-19 pandemic, recognizing them as the “third actor” in the production chain under analysis. To this end, a questionnaire with 19 questions was applied, structured around three main axes: respondent profile, relationship with organic food, and pandemic context.

Data collection was carried out using a hybrid approach: in person at fairs and markets (18 interviews) and digitally through online invitations and forms (102 responses). In total, 120 consumers participated in the research, representing 18 of the 33 Administrative Regions of the Federal District. The sample revealed a predominance of women (73%), individuals aged 20 to 35 years (47%), a high level of education (75% with postgraduate degrees), and a monthly household income above BRL 10,000 in 46% of cases. These results indicate a young adult demographic with high educational attainment and income levels — factors that may influence more conscious and health-oriented consumption habits.

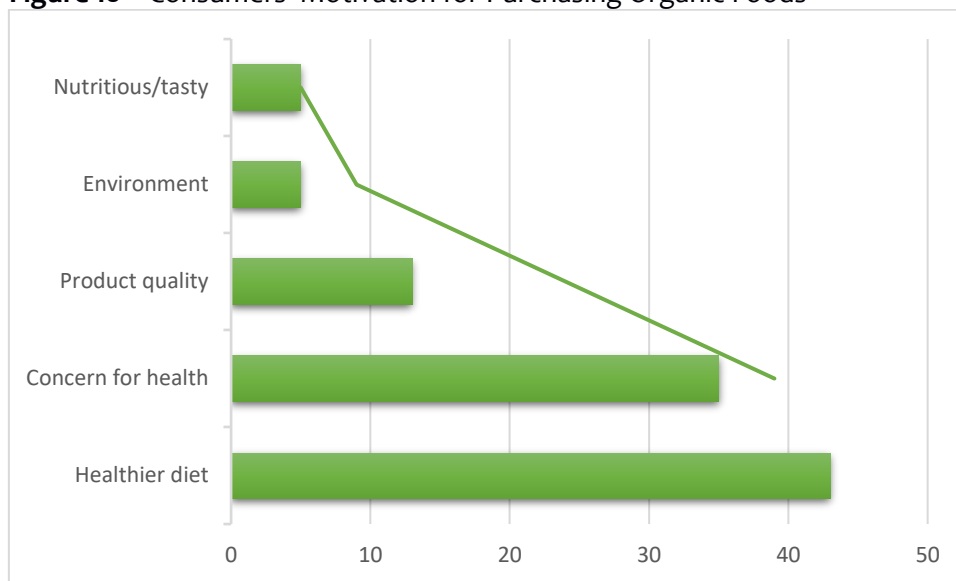
Table 2 – Profile and Perceptions of Organic Food Consumers in the Federal District During the COVID-19 Pandemic

Indicator	Main Result	Details (%)
Number of respondents	120 consumers	102 online; 18 in-person
Age	Predominantly 20–35 years old	47% between 20 and 35 years old
Education level	Postgraduate degree	75% postgraduate; 17.5% undergraduate; 9% high school
Gender	Predominantly female	73% women; 27% men
Race/color	Mostly white	61% white; 30% brown/mulatto; 8% black; 1% yellow; 0% indigenous
Household income	Above BRL 10,000.00	46% above BRL 10,000; 28% between BRL 6,000–10,000; 16% between BRL 2,425–6,000; 7% between BRL 1,213–2,424; 4% up to BRL 1,212
Marital status	Married/stable union	59% married/stable union; 30% single; 13% divorced/separated; 0% widowed
Consumption motivation	Health and well-being	43% for being healthy food; 35% health concern; 13% quality; 5% environment; 5% nutritious/tasty
Preferred products	Vegetables	75% vegetables; 15% fruits; other products rarely cited
Place of purchase	Open-air markets	48% markets; 33% supermarkets; 10% internet; 5% phone; 5% doorstep; 5% Ceasa
Payment method	Cash	60% cash; 23% debit; 14% Pix; 3% credit
Purchase frequency	Predominantly biweekly and monthly	35% biweekly; 32.5% monthly; 32.5% weekly; 0% daily
Average spending per purchase	BRL 100.00	67.5% up to BRL 100; 25% up to BRL 200; 5% up to BRL 300; 2.5% above BRL 300
Consumption during the pandemic	Stable for the majority	62.5% did not increase; 37.5% increased
Price perception	No change for most	60% noticed no increase; 40% noticed a difference
Acquisition difficulty	No difficulty for most	65% without difficulty; 35% with difficulty
Reasons for difficulty	Lack of supply and sales points	35.71% lack of supply; 35.71% lack of sales points; 28.57% high prices
Availability during the pandemic	Maintained	62.5% not affected; 37.5% affected
Future consumption outlook	Tendency to increase	60% intend to increase; 40% to maintain consumption

Source: Authors (2025), based on data from the survey with organic food consumers in the Federal District.

With respect to purchasing motivations, the data show that the pursuit of a healthier diet (43%) and concern for personal health (35%) were the main factors driving the purchase of organic foods, followed by product quality (13%) and, to a lesser extent, environmental and nutritional concerns (5% each), as shown in Figure 10.

Figure 10 – Consumers’ Motivation for Purchasing Organic Foods



Source: Authors (2025), based on data from the survey with organic food consumers in the Federal District.

Regarding consumption habits, a preference for vegetables (75%) was observed, followed by fruits (15%), while grains and other organic products were not mentioned. The main purchasing channel was farmers’ markets (48%), followed by supermarkets (33%) and online purchases (10%). As for payment methods, cash transactions predominated (60%), revealing a still traditional practice in commercial exchanges despite the growing use of Pix and credit or debit cards.

The average expenditure was concentrated at up to BRL 100 per purchase (67.5%), while 25% reported spending up to BRL 200. Purchasing frequency was regular, with 35% making biweekly purchases and the remaining 65% divided between weekly and monthly purchases.

The pandemic influenced consumption in a heterogeneous manner: 37.5% increased their purchases of organic products, while 62.5% maintained their previous patterns. Regarding prices, 60% did not perceive any difference compared to conventional products, whereas 40% reported higher costs. Additionally, 35% mentioned difficulties in obtaining organic products, attributed to limited supply (35.71%), lack of sales outlets (35.71%), and high prices (28.57%).

Future prospects reveal optimism for the sector: 60% of respondents stated that they intend to increase their consumption of organic products, while 40% indicated that they plan to maintain their current level, signaling potential growth and the consolidation of the organic market in the Federal District.

The data analysis revealed recurring patterns among the different groups interviewed, showing how producers, traders, and consumers of organic foods responded to the impacts of the pandemic. To clarify the comparison between the perceptions and strategies observed, a summary chart is presented below, systematizing the main results obtained according to the thematic categories that emerged from the research.

Chart 2 – Summary of the Perceptions and Strategies of the Actors in the Organic Food Chain During the COVID-19 Pandemic in the Federal District

Actor Group	Main Perceived Impacts	Adopted Strategies and Innovations	Identified Results and Trends
Producers	Reduction of in-person markets; difficulties in distribution and temporary income decline; increase in logistics costs.	Creation of direct sales groups via social networks (WhatsApp, Instagram); strengthening of agroecological basket systems and solidarity partnerships; adoption of home delivery.	Greater digital integration and strengthening of conscious consumption networks; expansion of the territorial reach of sales.
Retailers	Instability in supply and demand flow; need to adapt sanitary protocols.	Implementation of hybrid channels (physical stores + online platforms); reorganization of working hours and shifts; partnerships with local producers.	Diversification of marketing channels; appreciation of agroecological-based suppliers.
Consumers	Mobility restrictions; greater awareness of health, diet, and product origin.	Increase in direct purchases; preference for local and traceable products; intensification of collective purchases.	Consolidation of responsible consumption practices and loyalty to short supply chains.

Source: Authors (2025), based on data collected in the research (2020–2022).

The systematization presented in Chart 2 shows that the pandemic acted as a catalyst for social innovation processes within the organic food chain of the Federal District. Producers and traders demonstrated a high adaptive capacity, while consumers reinforced the importance of short supply chains and trust-based exchange relationships. These results are consistent with the literature on the resilience of alternative agri-food systems (Marsden, Banks & Bristow, 2000; Wilkinson, 2008; Dias & Bezerra, 2021), underscoring the role of collaborative practices in maintaining food security in times of crisis.

5 Discussion of Results

Based on a study of the organic food production chain in the Federal District, this article provides a systemic view of the behavior of this chain — comprising producers, traders, and consumers — over a 30-month period, from March 2020 to September 2022. The research interviewed organic food producers, most of whom did not formally identify as belonging to the family farming category, although some operated with family labor on properties of up to 10 hectares — equivalent to two fiscal modules, considering that the fiscal module in the Federal District is 5 hectares, as defined by INCRA (2013). According to Law No. 11,326/2006, which classifies properties of up to four fiscal modules as family farms, these producers can be included in that category.

These producers use mobile applications to maintain communication with their clients and promote their activities and products through social media. The use of such technologies demonstrates their adaptation to the ongoing technological transformations of contemporary society and contributes to the expansion of the organic food market.

Table 3 – Comparative Summary of the Links in the Organic Food Production Chain of the Federal District (2020–2022)

Variable	Producers (n=12)	Retailers (n=12)	Consumers (n=120)
Predominant gender	Male (75%)	Male (65%)	Female (73%)
Average age	> 60 years	40–50 years	20–35 years
Education level	Higher education (70%)	Higher education (80%)	Postgraduate (75%)
Average annual revenue	BRL 200,000	—	—
Customers/day / Spending (BRL)	—	40 / BRL 113.33	—
Predominant marketing channel	Farmers’ markets and direct sales	Farmers’ markets and delivery	Farmers’ markets and supermarkets
Perception of the pandemic	Improvement (58%)	Initial decline followed by recovery	Stability (62.5%)
Future trend	Expansion of production	Increased demand	Higher consumption (60%)

Source: Authors (2025), based on data collected from the three groups interviewed.

The pandemic exposed the vulnerability of organic farmers. According to Lindoso et al. (2009), this vulnerability corresponds to a system's susceptibility to losses when facing adverse events, whereas adaptive capacity reflects its ability to respond and recover. In the Federal District, producers faced difficulties in the outflow of production, crop losses, and the suspension of local fairs and markets, resulting in income reduction and heightened food insecurity. In response, many turned to the sale of agroecological baskets, direct deliveries, and solidarity networks, revealing structural fragility but also a remarkable capacity for adaptation (Dias & Bezerra, 2021; Futemma et al., 2021).

The results observed in this research align with previous studies that highlight the resilience of short supply chains and the role of family farming in maintaining food supply during the pandemic (Dias & Bezerra, 2021; Futemma et al., 2021).

The COVID-19 pandemic imposed unprecedented challenges on the organic food production chain, requiring its actors to adapt rapidly. This study confirms recent findings by showing that producers turned to self-management and solidarity networks to cope with the closure of farmers’ markets — a behavior also identified by Dias and Bezerra (2021) in settlements of the Federal District. Likewise, an acceleration in the digitalization of rural activities was observed, with the widespread use of social media and delivery services, a phenomenon described by Polacinski et al. (2021). The resilience of short distribution chains, anticipated by the FAO (2020), materialized in the maintenance and even expansion of demand for organic foods during periods of social isolation. In this context, Massruhá and Leite (2016) emphasize that the integration among producers, research institutions, and the information and communication technology sector — through collaborative platforms — is essential for technical capacity building, stronger communication, and the dissemination of digital solutions in rural areas.

The data collected reveal that the organic producers interviewed maintain consolidated and well-structured business models. Most are men, predominantly older adults (59%), with higher education and extensive experience in the activity — many having worked in organic production for more than two decades. These farms, generally covering up to 10 hectares, are directly managed by the producers themselves, reinforcing the family-based nature of production.

The administrative regions of Plano Piloto and Águas Claras concentrate most of the product distribution, with annual revenues reaching up to BRL 200,000. Production is

primarily focused on fruits and vegetables, which are delivered directly to sales points, fostering close relationships between producers and consumers. The accumulated experience of these farmers stands out as a distinguishing factor that contributes both to the quality of the food supplied and to the strengthening of the organic market in the region.

The analysis of the strategies adopted by the different links in the production chain in the Federal District makes it possible to identify both good practices and public policy gaps. Despite the challenges imposed by the pandemic — such as the lack of institutional support and mobility restrictions — the sector maintained its activities by adjusting marketing channels and exploring direct sales alternatives. Nevertheless, the impacts on profitability varied among the actors and should be interpreted with caution, given the non-probabilistic nature of the sample surveyed.

The pandemic also brought about significant changes in consumer behavior, leading to greater appreciation for food safety and health. Increased time spent at home and the pursuit of a balanced diet drove demand for fresh foods of known origin and sustainably produced. This new attitude reinforced the importance of organic foods and contributed to the market's growth, raising awareness of the social and environmental benefits associated with responsible consumption.

These transformations have had positive effects on the organic production chain in the Federal District. Producers have been adapting to the new demand by investing in sustainable production practices and quality certifications that strengthen consumer trust. At the same time, the expansion of marketing channels — such as delivery apps and digital platforms — has facilitated access to products and consolidated new forms of interaction between producers and consumers.

Throughout the observation period, this study provided an in-depth understanding of the behavior and strategies of the actors involved in the organic food production chain during the COVID-19 pandemic. It was found that producers maintain solid management models, with significant experience and adaptability to technological transformations. The increase in demand for organic products, combined with investment in sustainable practices and certifications, reinforces the consolidation of this sector in the Federal District. Understanding the responses adopted by producers, traders, and consumers contributes to the formulation of public policies that promote greater resilience and sustainability in the sector during times of crisis.

6 Final Considerations

This study conducted an integrated analysis of the three links in the organic food value chain in the Federal District—production, commercialization, and consumption—during the COVID-19 pandemic, covering the period from March 2020 to September 2022. The findings showed that, despite sanitary and economic restrictions, the actors in the organic chain—producers, traders, and consumers—demonstrated remarkable adaptive capacity, grounded in social and technological innovations and in the strengthening of short food supply chains. This dynamic was observed not only in the Federal District but also in other contexts examined in the literature, indicating that the pandemic acted as a catalyst for structural changes in the agri-food system.

The adoption of digital technologies, intensive use of social media, organization of delivery systems, and creation of agroecological food baskets were identified as key

strategies for maintaining productive and commercial activities. These actions contributed to sustaining food supply and fostering closer relationships between producers and consumers, strengthening trust and increasing the visibility of local products. This accelerated digitalization of productive and commercial routines reinforces the view that information and communication technologies serve as drivers of resilience and territorial reorganization in alternative food systems.

Empirical results also revealed an expansion in demand for organic products during the health crisis: 37.5% of consumers reported having increased their consumption of such products during the pandemic, and 60% expressed their intention to continue increasing purchases in the future. These findings suggest a consolidation and maturation process of the organic market in the Federal District, driven by growing awareness of food security, sustainability, and health. However, structural challenges persist, notably the low uptake of formal certification, limited institutional support, and the elitization of consumption, which remains concentrated among groups with higher education and income levels.

These findings underscore the need for integrated public policies aimed at strengthening family farming, expanding participatory certification, and providing logistical support for proximity-based marketing channels. Such policies may promote greater equity in access to healthy foods, reduce regional disparities, and consolidate territorially grounded agroecological practices. From a methodological standpoint, the study reaffirms the appropriateness of a mixed-methods approach and source triangulation for understanding complex phenomena, particularly in public health crisis contexts. Although limited by a non-probabilistic sample and a specific time frame, this research provides empirical contributions to the debate on sustainability, social innovation, and the resilience of short food supply chains.

It is concluded that the interplay between social innovation, producer-consumer proximity, and integrated public policies can constitute a sustainable and replicable model of territorial development. This model is capable of strengthening local agri-food systems, fostering productive inclusion, and expanding equitable access to organic food. Finally, it is recommended that future research deepen comparative analyses between different commercialization models and incorporate economic and environmental indicators to enhance the understanding of the adaptive capacity of agri-food chains in scenarios of crisis and transition towards more sustainable economies.

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