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Cassava flour production, COVID-19 and Food Security: the repercussions for family farmers in the Recôncavo Baiano Region

Produção de farinha de mandioca, COVID-19 e Segurança Alimentar: as repercussões para agricultores familiares do Recôncavo Baiano

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Abstract: The pandemic generated one of the biggest crises in the world, with a reduction in the population's purchasing power and difficulties in accessing food. In this context, this study aimed to analyze the conditions of flour production and its relation with the food security of family farmers in the cassava chain, in the Recôncavo Baiano Region, during the COVID-19 pandemic. A cross-sectional study was carried out, with data collection using a questionnaire and treatment using descriptive statistics and association tests. Of the total number of participants (n=86), 64% indicated changes in flour production volume and income. There was a reduction in monthly production, in the number of workers and hours worked in the flour houses, in addition to a reduction in the diversity of buyers. The increase in income from flour was associated with small number of more experienced producers (p=0.047). Despite the maintenance of fairs in the cities studied, there were changes in customer behavior. Online commerce and delivery were not very representative. Of those interviewed, 50% reported concern that food would run out. Government measures to support family farmers did not have a satisfactory reach among the participants. Most received emergency aid, and were also beneficiaries of social programs, which highlights vulnerabilities in the sector.

Keywords: Family farming, COVID-19 pandemic, Public policy, Food Security.

Resumo: A pandemia gerou uma das maiores crises mundiais, com redução do poder aquisitivo da população e dificuldades no acesso aos alimentos. Neste contexto, este estudo objetivou analisar as condições de produção da farinha e a relação desta com a segurança alimentar de agricultores familiares da cadeia da mandioca, do Recôncavo Baiano, durante a pandemia da COVID-19. Realizou-se estudo transversal, com coleta de dados por meio de questionário, tratamento por estatística descritiva e testes de associação. Do total de participantes (n=86), 64% indicaram alterações no volume de produção de farinha e na renda. Registrou-se redução na produção mensal, no número de trabalhadores e nas horas trabalhadas nas casas de farinha, além da redução na diversidade de compradores. O aumento na renda advinda da farinha foi associado a um pequeno número de produtores, mais experientes (p=0,047). Apesar da manutenção das feiras dos municípios estudados, houve alterações no comportamento dos clientes. O comércio *online* e por *delivery* foram pouco representativos. Dos entrevistados, 50% relataram preocupação de que os alimentos acabassem. As medidas governamentais de apoio aos agricultores familiares não tiveram alcance satisfatório junto aos participantes. A maior parte recebeu auxílio emergencial, sendo também beneficiários de programas sociais, o que evidencia vulnerabilidades no setor.

Palavras-chave: Agricultura familiar, Pandemia de COVID-19, Políticas Públicas, Segurança Alimentar.



Introduction

The health crisis caused by the SARS-CoV-2 virus reached, in May 2020, all Brazilian states, including rural and remote territories, deeply affecting the social and economic dynamics of the population (Brasil, 2020a). Given the epidemiological aspects of the disease such as a high rate of contagion, a high number of cases and deaths, governments adopted social distancing measures as a way to mitigate the contagion of COVID-19, reduce human losses and avoid the collapse of health systems (World Health Organization, 2022).

In the rural segment, in addition to the illness of workers, some of the effects of pandemic included: the shortage of manpower, the change in conditions and working hours and impacts on production volumes, which encompass social relations and economic (Malanski et al., 2021; Salazar et al., 2020). Especially in family chains, there was a reduction in income (Del Grossi, 2020), difficulty in accessing markets, lower consumer demand and rising food prices (Schneider et al., 2020).

It is important to point out that family farming, especially in recent years, has recorded losses in public policies and reduced access to investments for improvements in productivity, infrastructure, logistics and technological innovation (Grisa et al., 2018). Family farmers face economic and financial risks. They are among those most affected by poverty and social vulnerability (Food and Agriculture Organization of the United Nations, 2020a) that, in the pandemic, have become even more disparate, considering regional, ethnic and socioeconomic issues related to COVID-19 itself (Rede PENSSAN, 2022a).

In the state of Bahia, the production of cassava flour is an important social activity to guarantee work and economic income for many families (Sena, 2019). In the Recôncavo region, this production is based on traditional know-how in flour houses, where Copioba flour is also produced, in the geographic region of Vale do Copioba (Branco et al., 2015). This flour is recognized for its prime quality: well roasted, thin and slightly yellowish, in which the characteristics confer notoriety to the place of origin (Matos et al., 2012). Most of the commercialization of this flour, historically occurs in local fairs and markets.

In this scenario, the pandemic revealed the multiple weaknesses of food systems to attend the population's supply (High Level Panel of Experts on Food Security and Nutrition, 2021). Traditional commercial spaces, such as municipal fairs and markets were closed (Schneider et al., 2020), due to mobility restrictions, significantly compromising access to the market and making it difficult the flow of production, affecting the income of the most popular farmers (Valadares et al., 2020). Producers integrated into agro-industrial chains suffered lower losses income (Food and Agriculture Organization of the United Nations, 2020b). The closure of informal food markets also affected low-income consumers, whose the main way of accessing food was through these markets, worsening food and nutritional insecurity (FNI) in these families (Rede PENSSAN, 2022a). Therefore, this study aimed to analyze the flour production conditions and its relationship with food security in family farmers in the cassava chain, in Recôncavo Baiano Region, during the pandemic of COVID-19.

Theoretical Foundation

The COVID-19 pandemic generated one of the biggest economic crises in the world, leading to the deterioration of the economic conditions of households and difficulties in accessing food (Organización de las Naciones Unidas para la Alimentación y la Agricultura, 2020). At a global level, the increase in inflation in the prices of basic products stands out, mainly, energy and food (High Level Panel of Experts on Food Security and Nutrition, 2021).

The crisis had a strong impact on the economies of Latin America and the Caribbean, amid to persistent disruptions that have affected global supply chains and the rate of consumer prices (CPI), in which food expenses were increased, now representing 24% of family spending (Comisión Económica para América Latina y el Caribe, 2022). During the pandemic, the most popular class in family farming was the most affected, due to difficulties in production and commercial dynamics, recording that 70% of Latin American farmers reported a decrease in income (Instituto Interamericano de Cooperación para la Agricultura, 2020).

In Brazil, the pandemic further worsened the economic crisis of recent years, exposed and expanded the FNI of individuals, families and communities (Alpino et al., 2020; Jaime, 2020). In the national survey by Del Grossi (2020), regarding working conditions and income in the face of the pandemic, for half of family farmers, there was a reduction in income, with an average drop of just over a third in usual income. To alleviate this impact, the Brazilian State created an Emergency Aid Program for the population in situations of economic vulnerability, as a social assistance measure (Brasil, 2020b).

According to the II National Survey on Food Insecurity in the Context of COVID-19 pandemic, in Brazil, inequality in access to food was more incident in rural households, where 18.6% of families lived in Food Insecurity (FI) severe, located in the North (25.7%) and Northeast (21.0%), unlike the regions South and Southeast, whose impacts of the crisis were less intense among family farmers. It was found that almost 65% of families in a situation of Hydric Insecurity (HI) also lived with moderate or severe FI, with the coexistence of HI and FI severe cases more prevalent in the North (48.3%), Southeast (43.0%), Central-West (41.8%) regions and Northeast (41.2%). Among states in the Northeast, Bahia recorded the smallest population in severe FI situation, with a rate lower than the national average (Rede PENSSAN, 2022b).

It is noteworthy that the institution of the Organic Law on Food and Nutritional Security (*Lei Orgânica de Segurança Alimentar e Nutricional - LOSAN*) aimed to ensure the Human Right to Adequate Food (HRAF) (Brasil, 2006). Conceptually, Food and Nutritional Security (FNS) can be understood as the

[...] realization of everyone's right to regular and permanent access to quality food, in sufficient quantity, without compromising access to other essential needs, based on health-promoting eating practices that respect cultural diversity and are environmentally, culturally, economically and socially sustainable (Conselho Nacional de Segurança Alimentar e Nutricional, 2004, p. 4).

It is known that family farming depends on short supply chains, proximity and local markets, to sell their production, and that these spaces were affected, especially at the beginning of the pandemic, when municipal fairs were suspended (Schneider et al., 2020; Singulano et al., 2023). In this sense, it is a fact that the open-air markets provide the opportunity to sell farmers' production at affordable prices, better than in supermarkets, which reinforces the role of this informal market for food supply and for the FNS. In Bahia, fairs play an important role in the economy of the municipalities, generating a means of subsistence and income for the population (Vorley, 2013; Pereira, 2021).

In a study by Preiss et al. (2021), most fairs remained in activity during the pandemic. These authors reported distinct characteristics, in municipal fairs in Southern Brazil, registering both an increase and a reduction in the flow of people, in relation to the period before the pandemic. The increase was associated with the closure of restaurants and the greater demand for food in home production, and the reduction, for fear of visitors of becoming infected with the disease.

In order to overcome the difficulties, new marketing channels, mediated by information technologies, were identified by farmers. It should be noted that the type of online commerce (for example, via WhatsApp and telephone, with home delivery), require logistical conditions to

transport products, devices such as smartphones and internet access with good connectivity for operationalization in the digital market (Schneider et al., 2020; Gazolla & Aquino, 2021).

According to a study on digital accessibility in rural territories in Latin America and Caribbean regions, there was low significant connectivity (SC), that is, quality of internet that makes access to services and information impossible. It was estimated that 71% of urban population has SC, while only 36.8% of the rural population has it. It should be noted that SC also presents inter-regional inequalities, in which 72% of family farmers do not have access to adequate connections, and in Brazil, those “without connectivity”, 50% are in the North/Northeast (Instituto Interamericano de Cooperación para a Agricultura, 2021). Low accessibility is a limitation, in general, common among farmers, which in itself also represents difficulties for remote studies with rural populations (Dias & Bezerra, 2021; Duarte & Cardoso, 2022).

During the pandemic, in a study that focused on Southern-American food systems, the population had more supply problems than demand, highlighting the lack of access to formal and informal markets (Bolivia and Paraguay), due to restrictions and technological isolation. On the other hand, in Brazil, problems of demand were most mentioned and were related to access to food, in school and community feeding programs, due to the suspension of classes, situation subsequently corrected, through government measures (Organización de las Naciones Unidas para la Alimentación y la Agricultura, 2020).

According to an analysis by Grisa et al. (2018), of the thirteen Brazilian public policies that affect family farming, four of them presented capillarity above 80% of the municipalities and seven of them did not reach 10% of these. Added to this lack of reach, policies for the category had cuts in budget of central action programs for FNS, such as the Food Acquisition Program (Programa de Aquisição de Alimentos - PAA), and changes to institutional framework, due to switches in government (Alpino et al., 2020).

The discussion about sustainable food systems highlights the importance of dynamization of local economies and short production/commercialization circuits of food and the valorization of family farming (Gazolla & Schneider, 2017). The Regionalized Food Systems (RFS) also dialogue with the maintenance of food culture and local biodiversity. Furthermore, it presents food as a lever for change, offering opportunities to address health issues, and access to food of nutritional quality and culturally appropriate (Blay-Palmer et al., 2021). In emerging economies, through informal markets, the means of subsistence and food security for traditional food producers are promoted and their connection with low-income consumers (Vorley, 2013).

Methodology

This work is part of the research and extension project “The paths to Geographical Indication (GI) of Copioba cassava flour” and was approved by the Committee of Ethics in Research with Human Beings of the School of Nutrition, by the Opinions number 3,681,387, of November 4, 2019, and 4,730,430, of 2021, by amendment, in the period of pandemic.

A cross-sectional, exploratory study was carried out, using a semi-structured questionnaire, applied to 86 cassava flour producers from 11 municipalities in the Recôncavo Baiano Region. Data collection took place between August 2021 and September 2022.

Due to the pandemic, filling out the questionnaire began in the online format (Google Forms), with dissemination in instant messaging app groups, composed of flour producers and representatives, a means of communication already used by the larger project. However, taking into account the difficulty of producers in responding (less use of cell phones and low

internet access), and the course of the pandemic, the questionnaire was applied in two other ways: by telephone calls ($n=22$), still in the pandemic, and in person ($n=12$), after release from isolation. In these cases, the interview was conducted by the researcher oneself.

In the composition of the sample, as this study is a development of a research and extension project, some of the producers were already known by the research team, while the others were mobilized through contacts with municipal managers, leaders of rural communities and union, which describes the formation of a non-probabilistic sample. The participating municipalities were initially part of the delimitation agreement of the GI, which included: Nazaré, Maragogipe, São Felipe, Muniz Ferreira, Conceição do Almeida, Cruz das Almas, São Felix, Cachoeira and Dom Macedo Costa. However, the coverage was spontaneously expanded to Cabaceiras do Paraguaçu and Castro Alves, for disseminating the questionnaire link among producers.

To participate in this study, producers must be over 18 years old, have expressed consent, through a Free and Informed Consent Form (FICF), be active in the production and commercialize their flour production.

To facilitate for farmers to understand the questionnaire, it should be noted that this instrument was prepared with short questions and common words, being pre-tested, with flour producers in Pará, and further adjusted. The questionnaire consisted of 68 questions, organized into seven blocks: (1) personal data of producers; (2) worker health; (3) access to water in communities; (4) COVID-19 prevention measures; (5) flour production and repercussions of the pandemic; (6) access to information and technical assistance; (7) Food and Nutritional Security (FNS) and social assistance to flour producers. In this article, the dimensions of blocks 1, 3, 5 and 7 are discussed. There is also, a field diary to record additional information, coming from the producers. Furthermore, information from municipal representatives was included.

The responses obtained formed a database, in Excel® software, which was organized and reviewed, initially being treated by descriptive statistics. Subsequently, the data were analyzed in Software R, version 4.1.2, with association tests between variables of interest, using the Pearson Chi-square test, at a probability level of 0.05.

Results and Discussion

Considering the organization of the questionnaire, the results are presented in topics as described below.

Family farmers and making flour in Recôncavo

In Bahia, cassava farming establishments are mostly occupied by men (74%), with the predominant age group between 45 and 64 years old, for both genders (Instituto Brasileiro de Geografia e Estatística, 2017), similar characteristics among the farmers in the present study. Regarding the age of participants, it is worth noting that the type of collection instrument (online questionnaire) favored the participation of younger producers, a trend that was partly circumvented by applying the questionnaire by telephone and in person ($n=34$), in which 50% of the respondents were between 41 and 59 years old and 23.5% were 60 years old or older. In the Table 1, the sociodemographic profile of the participating family farmers is presented.

Table 1. Sociodemographic profile of cassava flour producers in the municipalities from Recôncavo Baiano Region, Brazil, 2022.

Variables	Distribution
Gender	% (n)
Female	45.3 (39)
Male	54.6 (47)
Age Range	% (n)
≤40 years old	45.3 (39)
41-59 years old	43.0 (37)
≥60 years old	11.6 (10)
Age	Years
Average (median)	44.6 (42)
Education	% (n)
Illiterate	4.6 (4)
Incomplete elementary school	34.9 (30)
Complete elementary school	8.1 (7)
Incomplete high school	11.6 (10)
Complete high school	31.4 (27)
Incomplete higher education	4.6 (4)
Complete higher education	4.6 (4)
Experience in flour production	Years
Average (median)	29.2 (29)
Until 15 years - (%) n	22.1 (19)
≥16 years - (%) n	78.0 (67)

Regarding the level of education of family farmers, obtained in the rural census in Bahia, 15.85% corresponded to incomplete elementary education and 13.4% to complete high school education (Instituto Brasileiro de Geografia e Estatística, 2017). Of the total sample, 25.6% (n=22) of men did not completed elementary education and, of those completing high school education, the majority were women, 18.6% (n=16). These findings agree with a study carried out in Nazaré - Bahia, about life in the countryside, where the educational level of the male producers proved to be superior to that of the female producers (Branco et al., 2015).

The producers interviewed were considered experienced in the craft, in their majority, with labor time in flour production equal to or greater than 16 years, which for many included stages of childhood and adolescence. In this context, it should be noted that the children's initiation into production, in the possible stages for each age, is interpreted in the logic of domestic life and family activities, and not under the logic of child labor (Pena & Cardoso, 2022). According to producers, between 8 and 10 years of age, they carried out productive activities in a "conscious" and more responsible way.

In the field, producers also reported aspects of the division of labor. The steps of cassava peeling and re-pinching - removal of residual peel from the mechanic process, are predominantly female (Silva, 2015). Those steps used to bring together many producers, also constituting a caring environment for children. The roasting of flour, considered a crucial for its quality, was rarely performed by women. Commercialization, an activity considered "productive", as it generated income, was mostly male (Pereira, 2021) – even so, female producers were also interviewed, who handled all stages alone: from production to trade of their flour.

Flour production, marketing channels and food systems in the pandemic

In Figure 1, the usual buyers of produced cassava flour were listed, noting a decrease in the purchase of flour by market customers, direct buyers (legal entities) and middlemen,

considered the main buyers in the region. This variation was verified when customer profiles were compared at two moments, before the pandemic and after the resumption.

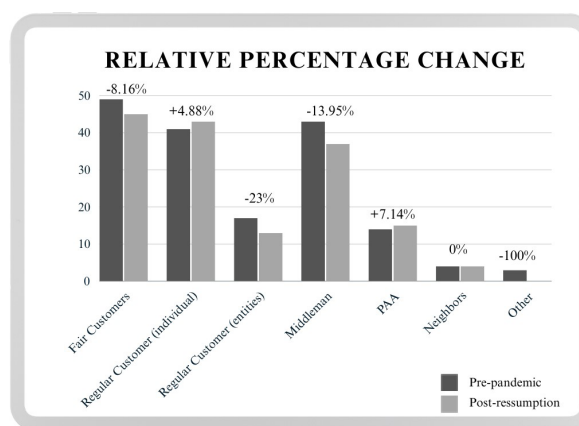


Figure 1. Percentage of variation in the main buyers of cassava flour and distribution (n) of pre-pandemic and post-resumption phases. Recôncavo Baiano Region, Brazil, 2022.

In some of the studied municipalities, there were changes regarding opening hours' operation and location of fairs, - for a wider space generating modification, such as increasing the distance between tents. However, even with the recognition that open-air fairs would be safer, as they are airy environments, changes were recorded in the behavior of buyers, who suspended their purchases in these places, characteristic also seen in the study by Schneider et al. (2020), a more expressive pattern at the beginning of the pandemic, in general, as preventive measures to avoid the closure of fairs.

In addition to the reduction in the diversity of buyers, there was an impact on the dynamics of production, in flour houses, identifying reductions in the average values of following indicators: monthly flour production (26%), number of workers (18%) and worked hours (9%). The variation measured was evaluated based on the comparison pre-pandemic and post-resumption¹, that is, when farmers return to work in flour houses. Also referring to changes in production dynamics, in the variation measured, there was a reduction in the number of bags produced per worker from 5.44 to 4.92, corresponding to an approximate drop of 10%. Regarding the variation in the number of bags per worked hours, from 4.75 to 3.85, a reduction of approximately 19%.

These findings agree with Salazar et al. (2020), which point out as the main effects of the pandemic: difficulties in maintaining productive and commercial dynamics; the impacts on production volumes; the effect on prices received and drop in income of family farmers. These farmers depend on short supply chains, adjacent markets and proper space to flow their production (Schneider et al., 2020; Singulano et al., 2023).

As Pereira (2021) reinforces, fairs are spaces that generate livelihood – income for the producer and feeds the population, a social space for profound exchanges, in addition to acquisition of goods. It is in this informal trade where trust business relationships are developed between producer and customer (Vorley, 2013), a context that may justify the increase in the number of long-standing contumacious individual buyers in this study.

¹ For the post-resumption period, a specific date was not considered - a gradual movement of return of workers to activities, on a more regular basis, considering local conditions and health recommendations for each municipality.

In general, municipal administrations in Brazil have established a set of guidelines and practices, aiming at the safety of people at fairs and to alleviate the impact in both population's supply and food and nutritional security (Schneider et al., 2020; Kushitor et al., 2022). However, it was unable to prevent the reduction in family income, given the fragile situation that the pandemic exposed the majority of the population, affecting their consumption, including food.

Figure 2 records the general panorama of the pandemic's repercussions on production dynamics – in flour production and the income arising from this activity, before the pandemic and during the study.

Of the total number of interviewees, 64% (n=55) agreed on the answer position regarding the impact on the quantity of bags of flour and income arising from this production, being that: 46.5% (n=40) indicated a reduction in both; 2.3% (n=2) that both increased; and 15.1% (n=13) that there was no change in production or income. The findings coincide with records of a Minas Gerais study, whose reduction in income from productive activity varied from 40 to 80% (Singulano et al., 2023).

For the remaining 36% (n=31) there was no agreement between the answers changes in the quantity produced and those related to income from flour. To what it seems, it denotes an understanding of the general repercussion of the pandemic on production, a common perception of a drop in income, given the general increase in prices of essential items (Singulano et al., 2023). It is noted that this data can also be attributed to variations in product price and production cost, but this information was not evaluated in the study.

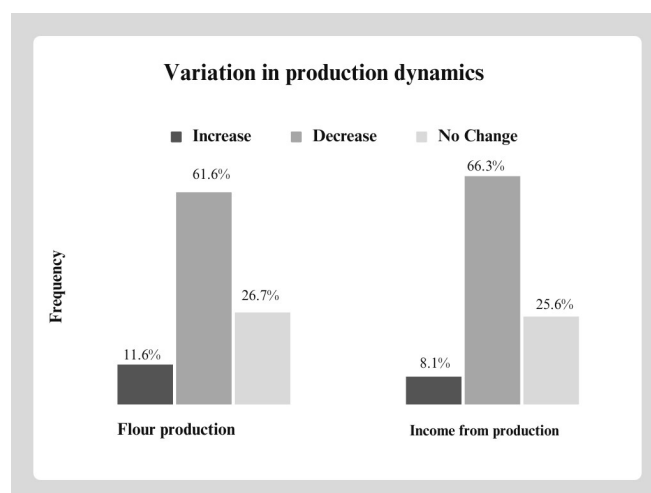


Figure 2. Distribution of participants regarding variation in cassava flour production and variation in income arising from this production. Recôncavo Baiano Region, Brazil, 2022.

In the statistical analysis, the change in flour production showed no significant association with gender ($p=0.452$) or age groups of producers ($p=0.088$). Likewise, there was no significant difference considering the change in income arising of flour production in relation to gender ($p=0.752$) and education ($p=0.561$). On the other hand, the length (years) of experience of producers was associated with income from flour production ($p=0.047$), which assumes that the more consolidated this production, and probably the link with consumers, less likely to have the income affected.

According to the participants in this study, during the pandemic, the month of June 2020 was recorded as the lowest performing in flour production, with an average of 12 bags, in which the most frequent justifications for this reduction were summarized in Table 2.

Table 2. Frequency of the main causes pointed out by farmers for the reduction in cassava flour production (%) during the pandemic. Recôncavo Baiano Region, Brazil, 2022.

Causes pointed out by farmers for the reduction in production	% (n)
Closing or changes in the operation of fairs made sales difficult	59.3 (51)
Producers started selling cassava, as it is more profitable than flour	26.7 (23)
Elderly customers stopped buying at fairs	23.2 (20)
Cessation of flour production and sale of flour houses	18.6 (16)
Reduction in the number of workers (off work due to COVID-19)	18.6 (16)
Reduction in the number of workers (receiving emergency aid)	17.4 (15)
Customers buy flour at a lower price in supermarkets	16.2 (14)
Increase in the price of the raw material (cassava)	15.1 (13)
Customers from neighboring municipalities sought out closer suppliers	12.7 (11)
Reduction in the purchase of flour due to the reduction in emergency aid	11.6 (10)
Regular customers died	7.0 (6)
Reduced cassava harvest has impacted production (regardless of the pandemic)	7.0 (6)
Lack of manpower related to the rural exodus and migration of professional activity	4.6 (4)

In view of the above, two of the most common causes are related to the opportunity to sell, through fairs and to elderly customers, who used to be long-standing customers. As for the causes related to the cost of production and labor, it should be noted that, although the flour-producing communities of the Recôncavo follow the working logic of the peasantry, as a network of solidarity - in the logic of labor exchange and the joint effort system (Pereira, 2021), in some flour houses, workers are also paid per diem.

In the field, producers pointed out difficulties with labor in the flour houses, especially when the amount received for a sack of flour could not cover production costs such as worker pay. This finding demonstrates, to a certain extent, a situation that can condition the reduction of production, due to the return income to the producer does not “compensate for the work”.

In the same direction, in a study with farmers from Minas Gerais, production was reduced, due to lack of workers and evasion due to job search in other regions. In particular, more careful or costly cultivation products were removed from the list of products or even abandoned, with reduction or elimination of the time dedicated to this production (Singulano et al., 2023). Likewise, Recôncavo producers reported concerns about the general activity reduction of “making flour”, in the context of a lack of promotion in the chain production and the migration of young people from communities to other cities or other professional activities.

In the findings of Salazar et al. (2020), in family farming in food chains labor-intensive supply, a significant portion of farmers (40%) faced difficulties in hiring workers, 56% of them reported an increase in costs of inputs. The study also pointed out that in the long term, without the support of governments and credit for production, the possibility of these farmers selling their assets would increase.

In view of the conditions imposed by the pandemic, which impacted the production of flour, family farmers adapted their production and marketing processes, with strategies that are still little or not used. In this sense, flour producers were asked about sales strategies in the digital environment, through apps and social networks. For the majority of producers (70.9%, n=61), it was not possible to sell online, while 10.5% (n=9) made this type of sale and 18.6% (n=16) delivered at home.

One case that stands out was that of producers from Cruz das Almas, who had the support from the Public Centers for Solidarity Economy of Bahia (Centros Públicos de Economia Solidária

da Bahia - CESOL), and were organized through messaging app groups to trade their cassava-based products.

Thus, although online commerce and delivery are highlighted as entrepreneurship to maintain production and commerce, during social distancing (Gazolla & Aquino, 2021), this trend did not correspond to the reality of farmers in the Recôncavo. In turn, similarity is observed with a study by Singulano et al. (2023), whose farmers tried to sell online, but faced difficulties associated with logistics and low demand, as they did not have a customer base (on the internet), such as farmers who already had this sales channel, before the pandemic.

A notable case happened to farmers in the Amazon Hinterland, selling traditional and agroecological products – Uarini flour and tapioca, coffee, fruit pulp, sweets and jams – which had the support of social networks and digital platforms, in collective actions coordinated remotely by Rede Maniva de Agroecologia (Rema) (Souza & Araújo, 2020). In the study by Preiss et al. (2021), farmers used information and communication technologies (ICTS) as well to guide consumers on adaptations to the operation of fairs, during the pandemic. In this sense, it is understood that the incorporation of digital technologies into agriculture would contribute to overcoming challenges in rural territories, given the repercussions of the pandemic on production and marketing (Instituto Interamericano de Cooperação para a Agricultura, 2021).

In view of the above, the study by Blay-Palmer et al. (2021) reinforces the approach RFS as a more efficient, sustainable and safe strategy for supplying food with reduced time and travel, costs and waste. These systems, in addition to maintain the local economy, with the right destination of production and fairer income generation for producing families and prove to be more effective in the food supply of the population, in adverse contexts, such as pandemics, wars and natural disasters. According to Singulano et al. (2023), furthermore, the pandemic produced changes, whose developments will be felt in the medium and long term, making it urgent to consider on the methods of production, processing and distribution of food.

In the context of the Recôncavo flour production chain, there is also the challenge in guaranteeing supply, considering a segment that already has weaknesses, due to lack of investments and policies to strengthen, protect and innovate family agriculture, especially small ones (Grisa et al., 2018; Souza & Jesus, 2021). Furthermore, at a global level, it is noted that the pandemic scenario had repercussions on the FNS, mainly, with: loss of income and means of subsistence; in expanding the social differences; interruptions of social protection programs; and rising prices of food, which compromised a larger portion of family income (High Level Panel of Experts on Food Security and Nutrition, 2021).

In the rural context studied, SC inequality adds to the difficulties of access markets and productive resources, such as land, water, financing, which keep away farmers from access to knowledge and innovations, feeding back insecurity, immigration and poverty in the countryside (Salazar et al., 2020; Instituto Interamericano de Cooperação para a Agricultura, 2021). Brazil registered successive losses in social policies in recent years, especially for family farmers. As a paradox, in the context of agribusiness - whose growth appears independent of governments, data shows that the pandemic has had little effect, mainly referring to exports of food and raw materials, that is, while food empires benefit, family farmers become impoverished (Schneider, et al., 2020; Singulano et al., 2023).

Public policies, Food and Nutritional Security and Social Assistance

Information was sought about public authorities' support for producing communities, to improve the marketing of products, such as flour transportation, to mitigate the risk of contagion

of COVID-19, between producers and consumers, and to avoid greater impacts on production flow. However, only 8.1% of participants (n=7) indicated support from city halls in logistics, 86% (n=74) did not receive support and 5.8% (n=5) were unable to answer. Most families have either adapted to the adverse conditions, in some way, or had the support of the community network, neighbors and family members who owned their own cars.

Regarding access to resources to support the continuity of production, 84.9% (n=73) were not covered by any emergency credit line, 12.8% (n=11) did not know whether there would be any legal credit and only 2.3% (n=2) reported receipt of the so-called emergency PAA (municipality of Nazaré) supplying flour, *beiju*, tapioca, cassava, yams, potatoes and bananas for the institutional market. It is important to emphasize that producers who were already beneficiaries of the PAA would be ineligible to receive the emergency PAA. These findings agree with a study by Singulano et al. (2023) as to reports of lack of support from public authorities.

Despite the disclosure of emergency public actions, at the federal level, announcing support for transport, expanding access to public purchases, such as the PAA and provision of an emergency line of credit, to minimize the impacts of pandemic in family farming (Valadares et al., 2020; Brasil, 2021), such measures did not have satisfactory reach among the study producers.

As highlighted by Preiss et al. (2021), actions to strengthen family agriculture, in addition to being strategic in combating food insecurity, they are part of the international agenda of the Sustainable Development Goals (SDGs) "Zero Hunger" (High Level Panel of Experts on Food Security and Nutrition, 2021), given the importance of this social category in the production and supply of food, in social and sustainable development, at a global level.

To survey the perception and risk of AI and hunger, at the household level of flour producers, two questions from the Brazilian Food Insecurity Scale (Escala Brasileira de Insegurança Alimentar - EBIA) that evaluate FNS dimensions, were applied. Considering the period of the last three months, of the questionnaire application, 50% (n=43) of those interviewed reported being concerned that food would run out before they were able to purchase or receive them. Of the producers, 33.7% (n=29) reported that the food ran out before they had money to buy more.

In reports, producers alleged difficulties in purchasing meat and dairy products, while others, since they raised some animals, reported having suffered less impact of rising prices for these items. It is worth noting the rise in the prices of foods that compose the Brazilian food basket, such as rice, beans, meat, which, added to the drop in income, compromised access of the population to food, which is inconsonant with what LOSAN recommends (Jaime, 2020; Brasil, 2006). Besides, in the context of chronic inflation, in December 2021, in Brazil and other Latin American countries, it was recorded an inflation rate of two digits (Comisión Económica para América Latina y el Caribe, 2022).

Furthermore, it is important to characterize access to water in the homes of producers in the study, whose forms of supply were mainly wells or cisterns 78% (n=67); rivers, reservoirs, lakes and streams 16.3% (n=14); general distribution network 12.8% (n=11); rainwater stored in a cistern or other way 10.5% (n=9); spring/source/sink 11.6% (n=10); and others 3.5% (n=3). Among the producers, 32.6% (n=28) had two forms of water supply. In the findings of Nogueira et al. (2021), wells and cisterns were also prevalent among rural workers. In a previous study, together with flour producers in the Copioba Valley, in the municipalities of Maragogipe, Nazaré and São Felipe, no participant reported having public network water supply in their homes (Silva, 2014).

For 11.6% (n=10) of the total interviewees there was a lack of water, according to reports, commonly linked to the well pump stopping, due to interruption in the supply of electricity. Moreover, producers related the scarcity of water in the drought season in communities, a condition that constitutes HI, a topic discussed worldwide (Rede PENSSAN, 2022a), being

associated with a greater risk of food insecurity. Regarding hydric insecurity (lack of water), there was no association with gender ($p=0.514$), nor with education ($p=0.545$). In this sense, it was possible to verify that, even if the population studied had access to water, public supply proved to be deficient, not offering security regarding the quality of water for these producers. According to Alpino et al. (2020), no actions relating to the right to water were identified during the pandemic.

Among Recôncavo producers, the flour produced is intended for self-consumption and commercialization in local and regional markets (Pena & Cardoso, 2022). Besides the flour and cassava derivatives, producers reported production of bananas, oranges, corn, yams, peanuts and raising some animals. According to Pereira (2021), the Recôncavo producers follow the logic of the solidarity network, they come together to harvesting cassava and other crops. After harvesting, the food is separated, part of the production is shared among themselves, donated to friends and family, and another part is sold at open-air markets and for middlemen to supply adjacent markets.

Despite the dynamic of solidarity between farmers, it is understood that the population studied presents a risk of FI. At a national level, the presence of severe FI was verified in 25.6% of rural households of family farmers, where there was a reduction in production, resulting from the difficulty of marketing their products (Rede PENSSAN, 2022a).

In several Brazilian regions, mainly in 2020, campaigns for food and hygiene items donation were carried out both in urban and rural communities. In that scenario, 40.7% ($n=35$) of the interviewed producers reported having received basic food basket. These donations were majority received by women (23.3%: $n=20$), with 25.6% ($n=22$) came from the city hall or the state, 10.4% ($n=9$) from school meals and 9.3% ($n=8$) from others, from the School for Young Adults (SYA), UNICEF and NGOs. As the study by Alpino et al. (2020) highlighted, basic food baskets were distributed to families in a situation of vulnerability, mainly focused on specific groups, such as traditional people, indigenous, riverside population and fishing villages.

From the interviewed producers, 50% of them received incomes from social programs, women were the majority (30.2%: $n=26$). From the total beneficiaries, 36% ($n=31$) received the *Bolsa Família*, 13.9% ($n=12$) were registered with the PAA, 8.1% ($n=7$) were retired and 1.2% ($n=1$) received rural development. Producers registered with the PAA also reported that institutional purchases had reduced demands and that the income arising from this type market share was not a recurring receipt. In this question, there was a significant association between gender and receipt of income from social programs ($p=0.009$), once again, recording the majority of women.

It is worth noting that the pandemic period was marked by poor management of the National School Feeding Program (Programa Nacional de Alimentação Escolar – PNAE) (Rede PENSSAN, 2022a), despite the authorization from municipalities and states, during the suspension of face-to-face classes, the allocate resources and food from the Program to students (Brasil, 2020c). Apparently, the emergency PAA, identified as the main measure in supporting family farmer's members, had little reach in the studied region. The study by Alves et al. (2022), with territories and rural collectives, showed that communities had the suspension or reduction of value of contracts for food access programs, such as PNAE.

To minimize the economic effects of the pandemic, emergency aid was the central treatment adopted, to serve the most vulnerable part of the population, including beneficiaries registered in the Single Registry, for social programs of the Federal Government (CadÚnico) and informal workers, self-employed people and individual micro-entrepreneurs (MEI) through Law n° 13,982 (Brasil, 2020b). This law provided for the characterization of the situation of social

vulnerability, for the purposes of eligibility for the emergency aid benefit, and established social protection measures to be adopted during the period of tackling COVID-19.

In this scenario, producers are part of the informal food sector and were eligible workers to receive emergency aid. From those interviewed, 68.6% (n=59) received emergency aid and 31.4% did not receive it, as recorded in the Table 3.

Table 3. Distribution of producers who received Emergency Aid in the years 2020 and 2021. Recôncavo Baiano Region, Brazil, 2022.

Receiving Emergencial Aid	2020 % (n)	2021 % (n)
More than 7 installments	40.3 (24)	10.2 (6)
5 to 7 installments	28.9 (17)	37.2 (22)
1 to 4 installments	27.2 (16)	25.4 (15)
No installments	1.8 (1)	25.4 (15)
Could not respond	1.8 (1)	1.8 (1)

Most producers received more than five installments of aid, in both years of pandemic, and some of these producers also received other assistance from the State or civil organizations, such as social benefits and basic food baskets. From the 59 producers who received emergency aid, 42.4% (n=25) also received a basic food basket, however, the receiving of emergency aid did not show association with receiving basic food baskets ($p=0.817$). Of those who received aid, 59.3% (n=35) were beneficiaries of social programs. There was an association between education and receipt of emergency aid ($p=0.023$), it seems, constitutes the most vulnerability of producers. There was no significant difference between gender and receipt of emergency aid ($p=0.416$).

Regarding the verification of access to food, there was no association between the receipt of emergency aid and the statement that the food ran out before they had money to buy more ($p=0.766$), as well as in relation to receiving basic food baskets ($p=0.210$). However, there was an association between gender and the concern that food ran out before being able to buy more ($p=0.030$), which may be related with domestic work and food preparation being more prevalent among women.

According to the survey, in the first half of 2020, just over a third of Brazilian family farmers received emergency aid, which in Bahia corresponded to 47% and 54%, in the months of May and June, respectively. Furthermore, the unemployment in the countryside presents a worrying scenario, especially in the states of Bahia, Pará and Minas Gerais, with families with productive capacity and labor underutilized (Del Grossi, 2020). According to national research, the coverage of the *Bolsa Família* Program is larger in households in the North (12.9%) and Northeast (14.2%), as well as in the emergency aid, which registered 32.2% and 34%, respectively (Instituto Brasileiro de Geografia e Estatística, 2021). In Bahia, 58.2% of those who received income transfers from *Bolsa Família* are in a moderate and severe FI situation (Rede PENSSAN, 2022b).

Historically, the North and Northeast regions received more social programs in reason for having higher rates of unemployment and people in the informal sector, compared to other Brazilian regions, and which, in the pandemic, were most affected (Instituto Brasileiro de Geografia e Estatística, 2021). Like this, the need for rapid action by the State is emphasized, fostering family farming in production of basic foods to serve the population and also promote the generation of jobs and income in the countryside.

The pandemic has increased social inequalities, deteriorated the population's income, affecting their rights and access to basic needs, such as water, food, health, jobs and livelihoods,

which have implications for food security and nutritional (High Level Panel of Experts on Food Security and Nutrition, 2021). In practice, it was found that, even with measures such as emergency aid, unemployment insurance, withdrawal from the Employment Time Guarantee Fund Service (FGTS), such actions provided little support for the protection of people in high social vulnerability and in a situation of extreme poverty (Souza & Araújo, 2020).

This context reveals the incapacity isolated of monetary transfer policies in producing some protection, in the current scenario. Reductions in the budget of essential public policies contributed to the worsening of living and work of the population, during the pandemic, who returned to the hunger map and had their human rights violated (Alpino et al., 2020). In addition, according to Silva (2014), the farmers in Recôncavo, historically, have low remuneration for the production of flour, difficulty in accessing rural credit and insufficiencies in public policies.

Therefore, it is necessary to implement mechanisms to promote the FNS of family farmers, as well as protecting them from uncertainty and income losses, improving their access to markets and inputs, with the establishment of specific insurance. There is still the emergence of making food systems more resilient to crises, more equitable and inclusive, with coordinated policies among different governance systems that promote improvements in territorial market infrastructure, at regional and national levels and local (Blay-Palmer et al., 2021; High Level Panel of Experts on Food Security and Nutrition, 2021).

Conclusions

Regarding the repercussions of COVID-19 on flour production, it is necessary that the characteristics of this work be observed, as well as the flow and marketing, so that more effective measures can be defined that allow the territorial and sustainable development of producing families. In this context, the findings point to the need to protect the Recôncavo flour culture and enable the continuity of this important economic activity of artisanal production

Changes in the behavior of customers at fairs, in the functioning of these markets, replacing the production and sale of flour with cassava and difficulties with workforce were important reasons given for the reduction in the commercialization of flour. The average quantity of flour, the worked hours and number of workers, in addition to resulting in a drop in family income, they further compromised Food Security of these producers. In addition, concerns about purchasing food and access to water in households revealed that producers remained at risk of FI, even if they have participated in State income transfer programs.

The predominant mode of sale occurred at fairs, which are of paramount importance for food supply. Despite producers' gradual access to the internet, few sold online or via delivery. To make online sales viable, it is still necessary to improve connectivity in rural areas.

Faced with the risks of contamination by COVID-19, the public authorities acted insignificantly to support the production chain, with restricted access to credits, and also in the transportation of production. Therefore, the pandemic revealed serious losses resulting from the dismantling of social policies, which occurred in Brazil, and the inability of monetary transfer policies to produce any protection in working, health and living conditions, as well as access to food by rural workers.

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