



## MULTIFUNCTIONAL CHARACTERIZATION OF FAMILY FARMING IN RURAL SETTLEMENTS IN CAMPO MAIOR, PIAUÍ

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### ABSTRACT

**Purpose:** Characterize the multifunctionality of family farming in the rural settlements Fazenda Boa Vista and Brejinho, in Campo Maior, Piauí.

**Theoretical Framework:** Family farming in rural settlements is multifunctional as it involves four dimensions: socioeconomic, social and cultural cohesion, food security and preservation of natural resources. The characterization of these dimensions allows us to understand the territory, promoting debates that can contribute to the construction of public development policies.

**Methods:** Field research was carried out, with data collection and analysis through technical visits, guided tours and application of semi-structured forms with 56 families in 56 lots.

**Results and conclusions:** Multifunctional family farming in the Fazenda Boa Vista and Brejinho settlements, although it enables sustainable cultural and technical practices, does not guarantee food security or the main income of the settlers, requiring more efficient support from public policies, especially technical assistance. Environmental impacts were also found in the territories, such as deforestation and burning of garbage.

**Research implications:** The multifunctional characterization of family farming adopted proved to be fruitful, enabling the systemic assessment of rural settlements, which can assist in public policies for managing these settlements.

**Originality/value:** The characterization method based on the multifunctionality of family farming allows a detailed social, economic and environmental analysis of rural settlements and can also be adopted in similar research.

**Keywords:** Family Farming, Multifunctional Characterization, Rural Settlements, Public Policies.

## CARACTERIZAÇÃO MULTIFUNCIONAL DA AGRICULTURA FAMILIAR EM ASSENTAMENTOS RURAIS DE CAMPO MAIOR, PIAUÍ

### RESUMO

**Objetivo:** Caracterizar a multifuncionalidade da agricultura familiar nos assentamentos rurais Fazenda Boa Vista e Brejinho, em Campo Maior, Piauí.

**Referencial Teórico:** A agricultura familiar nos assentamentos rurais é multifuncional por ensejar quatro dimensões: socioeconômica, tecido social e cultural, segurança alimentar e preservação dos recursos naturais. A caracterização dessas dimensões permite compreender o território, promovendo debates que podem contribuir na construção de políticas públicas de desenvolvimento.

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**Método:** Foram realizadas pesquisas de campo, com coleta e análise de dados mediante visitas técnicas, turnês-guiadas e aplicação de formulários semiestruturados com 56 famílias, em 56 lotes.

**Resultados e conclusões:** A agricultura familiar multifuncional nos assentamentos Fazenda Boa Vista e Brejinho, embora possibilite práticas culturais e técnicas sustentáveis, não garante a segurança alimentar e nem a renda principal dos assentados, carecendo de apoio mais eficiente das políticas públicas, em especial de assistência técnica. Também foram constatados impactos ambientais nos territórios, como desmatamento e queima do lixo.

**Implicações da Pesquisa:** A caracterização multifuncional da agricultura familiar adotada se mostrou profícua, possibilitando a avaliação sistêmica dos assentamentos rurais, o qual pode auxiliar nas políticas públicas de gestão desses assentamentos.

**Originalidade/valor:** O método de caracterização baseado na multifuncionalidade da agricultura familiar permite uma análise social, econômica e ambiental detalhada dos assentamentos rurais, podendo ainda ser adotado em pesquisas similares.

**Palavras-chave:** Agricultura Familiar, Caracterização Multifuncional, Assentamentos Rurais, Políticas Públicas.

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## 1 INTRODUCTION

Brazilian family farming is one of the main activities that guarantees the food security of thousands of families, even though it does not have high investments and not always applying modern farming technologies. In addition to this food security and family income source, this practice relates to cultural values and the environment through sustainability.

The reflections inherent to family farming have been gaining legitimacy in Brazil's social, political and scientific circles. It is increasingly common to use these reflections in rural social movements, government public policies and academic research, especially in the Social and Environmental Sciences, which analyze agriculture and the rural world (Schneider, 2006).

In Brazil, family-type agriculture is officially defined as being that carried out by a farmer or rural family entrepreneur, while meeting the following requirements: it does not, in any way, hold an area larger than four fiscal modules (in hectares, ha); the labor used is predominantly from the family itself; it has minimum percentage of the family income arising from economic activities of the establishment or enterprise and the management of that establishment is family owned (Brazil, 2006).

The legal concept of Family Agriculture is based on three criteria: family labor, area of rural property and factors that make up the economic income of the property. However, it is well known that rural family farming is more complex than the defining criteria above, as it encompasses cultural and environmental aspects. Analyzing this agriculture from a systemic point of view, it is characterized as multifunctional.

In this context, multifunctional family agriculture has essentially four dimensions: food security for rural families and society; socio-economic reproduction, through economic development; the maintenance of the social and cultural fabric of the territory and the preservation of natural resources and the rural landscape, with a view to sustainable development (Carneiro; Maluf, 2003; Cazella; Bonnal; Maluf, 2009).

Many family farmers practice their activities in rural settlements, which are expressions of historical achievements of the socio-territorial movements in the countryside, in the centuries-old struggle for democratization of access and use of land, the heart of agrarian



reform. The settlements thus represent continuity of the struggle for the territory, in the arduous task of rebuilding family agriculture (Bergamasco; Norder, 2003; Gonçalves, 2017).

A rural settlement is a set of agricultural units installed in an unproductive rural property. In the federal sphere, this installation is the responsibility of the National Institute of Colonization and Agrarian Reform (INCRA). The property is divided into units (parcels, plots or plots), being delivered by INCRA to a family without economic conditions, which must reside and operate these units, developing diverse productive activities. Families should also be able to count on credits, technical assistance and infrastructure (INCRA, 2021).

Despite its importance, family farming still faces obstacles that limit and delay its development. In this sense, research involving the socioeconomic and environmental area is useful to highlight the reality of rural settlements and their inhabitants, generating debates that favor the elaboration of more effective public development policies (Sangalli, 2013).

The problem of this study questions how the multifunctional dimensions of family agriculture are expressed in rural settlements Fazenda Boa Vista and Brejinho, located in Campo Maior - PI, allowing to infer the contribution of this agriculture in the family management of these settlements. The objective of the article was to characterize the socioeconomic dimensions, social and cultural fabric, food security and preservation of natural resources in these two settlements.

## 2 THEORETICAL FRAME

The concept of multifunctionality of agriculture is of European origin, being a broader way of analyzing agricultural practice in relation to the traditional, basically economic perspective. When considered in its multifunctionality, other practices should be taken into account, such as ecological, territorial and social. Thus, the multifunction of agriculture can be understood as a process of interdependence of social, territorial and environmental functions (Silveira, 2021).

The characterization of the multifunctionality of family farming adopted in this study is that of Carneiro and Maluf (2003) and Cazella, Bonnal and Maluf (2009), which considers it with four dimensions: promotion of food security of families and society; socioeconomic reproduction of families through economic development; maintenance of the social-cultural fabric of the territory and conservation of natural resources and the rural landscape, aiming at Sustainable Development.

The Food Security dimension considers that families have a quality diet and that it represents ecological and cultural diversity. Family farming plays a part in promoting this security, since it makes it possible, in the territory where it is practiced, to have access to and availability of food, the production of which is generally organic. In the dimension of Economic Development, family agriculture is a source of work and income, allowing the socio-economic reproduction of families with social justice, thus ensuring the permanence of these families in the rural environment, in dignified conditions.

The dimension of the Social and Cultural Fabric considers the enhancement of relations with nature, sociability in relations and the reproduction of local cultures. Agriculture is thus regarded as a "way of life" (Konzgen; Salamoni, 2019). In the Preservation of Natural Resources, family farming works by developing simple, flexible, innovative, dynamic and environmentally sustainable productive practices (Ploeg, 2014), being an alternative for sustainability in small family farms.

Land reform settlements are one of the main rural territories of family farming in the country, and are a term originating from public land intervention policies. These policies aim to expropriate rural properties to target the populations that, deprived of this good, occupied areas as a way of pressuring the State (Medeiros; Leite, 2004). This new condition allows the



settlers to resume trajectories and interrupted family ties, establishing new spaces for social, political and economic integration (France, 2004).

It can be inferred, then, at this juncture, that various scientific studies have given priority to rural settlements, given their inherent economic, political, social and environmental diversity. The settlements, according to Medeiros and Leite (1997), thus constitute themselves into veritable "laboratories of experience" of Brazilian family farmers. Leite *et al.* (2004) point out that research directed at rural settlements in Brazil has grown in recent years, but point out that there is little systematic information about the advances and difficulties of these settlements at the regional level.

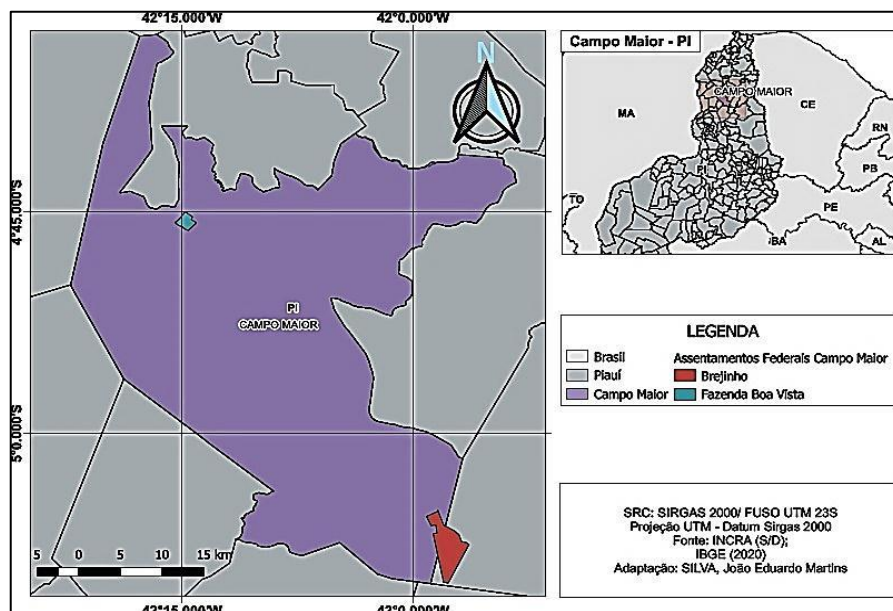
In this sense, there are still several gaps to be decoded by the analysis, and the study of small rural municipalities needs to return to the research agenda (Niederle; Fialho; Conterato, 2014). Considering the representativeness for Brazil's rural development, studies and research on the diversity of family farming is a necessary and urgent demand (Schneider; Cassol, 2013).

### 3 METHODOLOGY

#### 3.1 Definition and characterization of the field of study

The study was developed with family farmers in rural settlements in Campo Maior, Piauí, located 84 kilometers from Teresina, the state capital. Campo Maior has 45,793 inhabitants, distributed in an area 1,608,861 km<sup>2</sup>, with 13,309 inhabitants in the countryside. The characteristic biome of the region is the Cerrado, and areas of ecotone are also observed between this biome and the Caatinga (IBGE, 2019; 2022).

In the municipality there are two rural settlements under the responsibility of INCRA: Fazenda Boa Vista e Brejinho (Figure 1), with technical capacity to settle 69 families, in an area that totals almost three thousand hectares (INCRA, 2023).



**Figure 1** - Location of Rural Settlements Fazenda Boa Vista and Brejinho, in Campo Maior - PI  
**Source:** IBGE (2022). Organization: The authors (2023). Geoprocessing QGIS: João Eduardo Martins Silva (2023).

The settlement Fazenda Boa Vista is located northwest of the center of Campo Maior, being distant 11 km from this and approximately 89 km from the Brejinho Settlement. It has an area of 312,8070 ha with total perimeter of 7,493.68 meters. The settlement Brejinho is located



in the rural area, 78 km, southeast direction, from the city center. The total registered area of this settlement is 2,637 ha, with a perimeter of 23,464.80 meters (INCRA, 2023).

### 3.2 Methods and techniques

Previously, meetings were held with leaders and presidents of the Sertaneja Association of Community Development of the Fazenda Boa Vista Community and the Association of Residents Organized in the Fight Brejinho (AMONALUB), occasion in which the objectives and instruments of research research were presented, having good reception and authorization by the settlers.

Then, considering the approach of human beings both directly and indirectly, the research was formalized with the Research Ethics Committee of the Federal University of Piauí (CEP - UFPI), via Plataforma Brasil, under the protocol Certificate of Presentation of Ethical Appreciation (CAAE) 58209522.4.0000.5214, being the project approved.

Thus, data collection and analysis were carried out, using field research, seeking the typification of the variety of representations of people in their living world (Bauer; Gaskell, 2017). In the field, direct observations, guided tours, notes in diaries, photographic records and application of semi-structured forms were made to the head of the family, over 18 years old, resident in each lot of the two settlements, through the agreement and signing of the Term of Free and Informed Consent (TCLE).

The field research techniques adopted had the objective of collecting quantitative qualitative data from the two selected settlements. The processing of this data followed the concept and structure of multifunctionality of family farming of Carneiro and Maluf (2003) and Cazella, Bonnal and Maluf (2009), references in the area. In each of the four dimensions a series of criteria were specified, thus allowing for a systemic characterization of this multifunctionality (Table 1).



Dimensions	Criteria	Parameters			
Socio-economic	Income	Up to 1 S.M*	1 to 3 S.M	3 to 5 S.M	Above 5 S.M
	Schooling	Illiterate	Primary Education	Higher Education	Post-graduate
	ATER**	Missing	Low	Medium	High
	Public promotional credits	Missing	Low	Medium	High
Social and Cultural Fabric	Access road	Bad	Regular	Good	Excellent
	Access to health services	Missing	Bad	Regular	Good
	Exercise	Never	Rarely	Regular	Continuous
	Traditional celebrations	Missing	-	-	Present
	Integration with other settlers	Missing	Regular	Medium	High
	Handicrafts	Missing	Low	Medium	High
	Internet access	Missing	Rarely	Regular	Continuous
	TV Signal	Missing	Rarely	Regular	Continuous
	Violence in the surroundings	Missing	Rarely	Regular	Continuous
Preservation of Natural Resources	Use of pesticides	Missing	Rarely	Regular	Continuous
	Trash Destination	Burns	Open Sky	Collection by municipality	Selective Collection
	Destination of the sewer bathroom	Open skies ( <i>in natura</i> on the ground)	River, dam, stream or stream	Rudimentary pit	Septic fossa
	Deforestation	Missing	Low	Medium	High
	Burned	Missing	Low	Medium	High
	Illegal hunting	Missing	Low	Medium	High
	Predatory fishing	Missing	Low	Medium	High
	Sustainable techniques in agriculture	Missing	-	-	Present
Food safety	Production for own consumption	Missing	Low	Medium	High
	Productive Backyard***	Missing	Low	Medium	High
	Aid from social programs	Missing	Low	Medium	High

\*Minimum salary in force in the year 2023 (R\$ 1,302.00).

\*\*Rural Technical Assistance.

\*\*\* Consider here the diversification of the cultivation, breeding and use of plants and animals.



**Table 1** - Dimensions, criteria and parameters used in the evaluation of the multifunctionality of family farming in the settlements Fazenda Boa Vista and Brejinho, in Campo Maior, Piauí

**Source:** The authors (2023), based on Carneiro and Maluf (2003); Cazella; Bonnal; Maluf (2009) and Cotrim *et al.* (2018).

Field surveys took place from July to October 2022 at Fazenda Boa Vista, while in Brejinho they were from October 2022 to February 2023. At Fazenda Boa Vista, 13 families were researched in 13 lots, while in Brejinho there were 43 families, in 43 lots. Each family occupies a lot, surrounded with barbed wire and divided by the settlers themselves.

After data collection, information was tabulated and processed using Microsoft Excel® 2010 software. The analysis of this data obtained was carried out by descriptive methods that, according to Appolinário (2011), comprise techniques that describe, summarize, total and graphically present the research data

## 4 RESULTS AND DISCUSSION

### 4.1 Socio-economic Dimension

At the time of the research, the settlement Fazenda Boa Vista had a total of 41 settlements, 23 male and 18 female, distributed in 13 lots, each with a house (average of three persons/house). The current division of the area of this settlement into lots was not carried out by INCRA, but by the settlers themselves. The area of the lot, the house and the area intended for family farming are expressed in Table 1.

	Minimum	Maximum	Medium	Standard deviation
Batch area (m <sup>2</sup> )	700	50.000	17.976,92	13 503,95
Area of house (m <sup>2</sup> )	48	216	108.92	51.60
Area for Family Farming (m <sup>2</sup> )	250	20.000	9.557,69	27.059,85

**Table 1** - Minimum, maximum, average and standard deviation values of the lot area, of the house and of family agriculture in the settlement Fazenda Boa Vista, in Campo Maior, Piauí

**Source:** The authors (2023)

Family farming in Fazenda Boa Vista takes place in Productive Quintals or in larger plantations, in the very lot of the seated farmer. No areas of cultivation or animal husbandry were observed outside the lot itself and/or shared, that is, divided between two or more settlers from different families.

Agriculture in seven lots (53.85%) is intended for domestic consumption and marketing. As regards livestock farming, in 10 batches (76.92%) it is intended for both domestic consumption and marketing. In agricultural cultivation, maize, beans, cassava and pumpkin predominate, totaling an average annual production of 5,695 kg. In animal husbandry, pigs, goats, cattle and gallinaceous animals were observed, with an average production of 61,883 kg per year.

As regards the income obtained from marketing that production, it does not exceed a minimum wage per lot. The average total income of the 13 lots ranges from one to two minimum wages, with only one exceeding three minimum wages. Family farming is not the main source of income for any of the 13 plots in the Boa Vista Farm, with the main income for eight of them being retirement (61.54%), followed by pluriactivity, which is work outside and not linked to settlement (five plots, 38.46%).

As for schooling, the Boa Vista Farm was illiterate, with predominance of those with incomplete or complete basic education (92.68%), mainly among adults. Two settlers have higher education and two attend vocational technical high school. It should be noted that it was



a constant complaint in the lots about the lack of public school transport (61.54%), hindering the learning of the students.

Incomplete basic education has a direct relationship with the aging of the settlers, who have not studied at the right age and are not stimulated to enter the Education of Young and Adults (EJA), besides the pluriactivity exercised by the young. The lack of school transport also contributes to this situation. Complementing this picture of delay are the complications arising from the COVID Pandemic - 19, in which the school calendar was severely altered in the schools that serve the pupils of the Boa Vista Farm

The lack of Rural Technical Assistance (ATER) is a chronic problem for family farmers in Boa Vista Farm, because 11 lots (84.6%) said they did not receive this type of assistance. This problem requires the effectiveness of public policies not only in this settlement, but in the semi-arid northeast, since only 8% of the family establishments have this resource in the region. Piauí stands out negatively in this index, where only 2.95% of family farmers' establishments received ATER (SIDRA, 2019). This deficiency harms settlers who need assistance when there is bad weather, such as agricultural pests, animal diseases and soil erosion.

In relation to public credits fostering family farming, all the lots of Fazenda Boa Vista have already contracted credit, five (38.46%) have already paid the amount and the rest (eight lots, 61.54%), the financing was still ongoing. Thus, access to these credits is not a limitation in this rural settlement. This is due to the active presence of the Residents' Association, which assists farmers, mainly in the documentary part in the bank branches. The average amount of credit was R\$ 5,000.00, via Banco do Nordeste do Brasil (BNB), Campo Maior agency. Family farmers reported in the interviews that this credit was generally intended for the purchase of animals, in particular pigs and goats.

In the settlement Brejinho, of the 43 plots interviewed, there were 136 inhabitants, of which 76 were men and 60 were women (55.88 and 44.12%, respectively). The average age of men is 33 years, and the average age of women is 37 years. The significant presence of elderly people was also found (26.26%).

Family farming in Brejinho is practiced only in the lot itself, in Productive Quintals (29 lots, 70.73%), and in the lot itself and areas external to the lot, in a shared way (11 lots, 26.38%). In a lot, Family Farming occurs only in the shared area (outside the lot). No family farming activities were observed in two lots. The reason for this agriculture outside of the lot itself is the inadequate division of the same, resulting in smaller areas with less fertile soil for some settled farmers. The area of the lot, the house and the area intended for family farming are expressed in Table 2.

	Minimum	Maximum	Medium	Standard deviation
Batch area (m <sup>2</sup> )	80	450.000	66,445	112,518,8204
Area of house (m <sup>2</sup> )	24	200	68,14285	29,5507595
Area for Family Farming (m <sup>2</sup> )	0	100.000	15.880	2 3861,70 206

**Table 2** - Minimum, maximum, average and standard deviation values of the lot area, the house and family agriculture in the settlement Brejinho, in Campo Maior, Piauí

**Source:** The authors (2023)

As regards agriculture, five plots do not (12.20%), of the remaining 36, of which six are intended for consumption and sale (16.67%). In all of these six lots, the sale takes place both directly and indirectly, with the income coming from not exceeding a monthly minimum wage. Family farming consists of rice, corn, beans and cassava, with an average annual production of 33,095 kg.

In the settlement Brejinho, there is the breeding of animals for slaughter and feeding in 40 batches. In 12 lots (30%), it is intended for both the family and for marketing, four of which sell their creations directly; four sell only indirectly and four in both forms. The income



obtained from this marketing of the animals does not exceed a minimum wage per month, with the exception of three lots, which reported earnings of up to two monthly minimum wages. Predominantly, pigs, poultry, cattle and goats are reared, with an average annual production of 40,357 kg.

In Brejinho, family farming does not represent the main income of any of the 41 plots, being destined for domestic consumption and extra and sporadic income in 18 plots (43.90%). In relation to the main income of the 43 lots, the high dependence of Brazil Aid was found in 22 of them (51.16%). The two other main sources of income cited are retirement (41.86%) and pluriactivity (6.98%).

As to schooling, of the 121 settlers who declare some degree in this criterion, those who possess basic education predominate (68.60%), followed by only 5.79% who possess higher education. The high number of illiterate people in Brejinho calls attention, reaching 25.61%, notoriously amongst the elderly. The aggravating factors of the latter are intensified by the lack of schools close to this settlement, in particular the EJA, besides the terrible roads that make the pupils' transportation difficult.

Considering the educational context, it is important to highlight the high rate of family farmers in the semi-arid Northeast who cannot read, with an index of 49.83% (SIDRA, 2019). According to Ney (2006), the educational process is the main factor that explains the largest share of income inequality in rural areas. Ferraro (2012), for his part, states that the latifundium is the main structural determinant of illiteracy in the field.

ATER is a severely loss-making criterion in Brejinho, as the 43 lots stated that they have never received or rarely received any kind of technical assistance. Castro and Pereira (2017), analyzing the history of ATER in Brazil, say that the effective construction of this public system is still incipient, pointing out how challenges to establish partnerships with non-state entities, incorporating new concepts to this process of assistance and rural extension. The authors also raise doubts about the capacity of the State to conduct this enterprise efficiently.

As for access to development credits for Family Agriculture in the Brejinho settlement, a little more than half of the lots (23 lots, 53.49%) have already contracted this type of credit, 16 of them (69.57%) have already paid the amount and the seven remaining lots (30.43%), the financing was ongoing. The average value was R \$ 9.952,17 per lot, where stood out the Rural Development INCRA and the National Program of Strengthening of Family Agriculture (Pronaf). That credit was basically intended for the purchase of animals, in particular pigs and goats.

## 4.2 Social and Cultural Fabric Dimension

In this dimension, it was found that the satisfactory criteria in the settlement Fazenda Boa Vista were access to the internet, regular television signal, integration with other settlers and occurrence of traditional celebrations. Internet access is common in all 13 lots, via radio, through the antenna installed in the central part of the settlement; the TV, by the presence of satellite dishes in 12 lots (92.31%), added to the periurban location of the Fazenda Boa Vista, which allows the tuning of some channels with the common antenna.

The integration between the settlers results from the good relationship of friendship between them, there also counting the kinship and the proximity of the houses to each other, in a concentric model. All 13 plots stated that they have the custom of ceding or exchanging family farm products with neighboring plots on a continuous basis.

At Fazenda Boa Vista, family farming makes it possible to carry out two annual flours, in the so-called Casa de Farinha, duly equipped. Also, it makes possible the Feasts of San Francisco, which takes place around the Chapel of the same name, starting with a mass, with the presence of farmers and several guests. Once the religious ceremony is over, there is an



auction of products coming from family farming, with the emphasis on cakes, roast piglets, capons and roasted hens or mixed with rice. The proceeds go to the families and the Residents' Association.

Access to medical and dental consultations (health services) are not sensitive criteria for family farmers of Fazenda Boa Vista, since 10 lots (76.92%) said they had access to these services. However, it was found that the performance of specific examinations requires a wait of weeks, sometimes months. Such a problem, in Brazil, is macro, inherent to the management model of the Brazilian health system, as attested by Basto *et al.* (2020) and Dantas *et al.* (2021).

At Fazenda Boa Vista, no handicraft practices were observed carried out by family farmers. This is because there is no specific tradition inherited from the ancestors, nor training courses carried out in the settlement, which could initiate and encourage this practice, through the abundance, for example, of the straw of the carnauba in the territory.

Other sensitive criteria pointed out by family farmers and observed during the field research at Fazenda Boa Vista, were difficulty in traffic on access roads (61.54% considered it to be very bad), violence around the settlement (cited by 46.2% of the lots) and poor practice of physical exercises (69.23% do not practice).

The roads of the rural settlement Fazenda Boa Vista have difficult access during the rainy period, because it is a car road, subject to flooding, although there is no total interruption of access during this period.

The violence around the Boa Vista Farm can be explained, although it demands complex causes, by its periurban location, which facilitates the movement of offenders. Family farmers reported motorcycle and cell phone thefts mostly at night on access roads, as well as animal theft. According to Vieira and Doula (2019), "living in peace in the countryside is a thing of the past", because criminality, besides urban contexts, is already observed in the rural environment, which starts to be resignified by insecurity and fear.

However, in the Brejinho settlement, several sensitive criteria were obtained in this dimension, namely: poor conditions of access roads (86.05% considered terrible), low practice of physical exercises (62.79% do not practice), no traditional celebrations, minimal integration among the settlers (76.74% of the lots do not give up or exchange agricultural products among themselves) and low practice of crafts (confection of brooms recorded in only one lot)

The access roads to the Brejinho settlement are poorly signposted and are in a poor state of conservation. This precariousness intensifies during the rainy season, even blocking the passage completely. This situation causes several damages to settlers of Brejinho, making it difficult to commercialize the production of family farming, regular attendance at school, and travel to the city for shopping and medical consultations, among others.

It should be noted that the lack of demarcation of the lots, by INCRA, was pointed out as a serious problem by the family farmers of Brejinho (38 lots, 88.37%), being a strong factor of controversy between them. Some settlers also claimed that they were surrounded, with barbed wire, areas of legal reserve (ARL) of the settlement, for illegal logging. There are also reports of the improper occupation of the land of settlers by other settlers, with irregular appropriation of the animals and of agricultural cultivation.

This problem, in particular, reflects in two aspects of the Social and Cultural Fabric in the Brejinho settlement. The first refers to the questioning whether the settled family farmer had the custom of exchanging agricultural and/or animal products with the neighbors (integration between the settlers), and the majority responded negatively (33 lots, 76.74%). The second relates to expectations regarding the future of the settlement, with 19 plots (44.19%) responding "bad".

Another deficient criterion is access to consultations and health examinations, where 27 batches (62.79%) considered poor. The farmers reported that Brejinho has, among the settlers, a community agent of health of the municipality, which marks the consultations at the nearest



health post, which is in a neighboring rural community. However, the settlers complain that there is a constant lack of specialized health professionals, as well as a lack of structure for the performance of examinations. Accordingly, it is common to move to Campo Maior in search of specific attention and examinations.

The criteria for access to the Internet and TV signals were considered satisfactory in the Brejinho settlement. Access to the Internet, as well as at Fazenda Boa Vista, is common to all lots, via radio, due to the antenna installed in the central part of this settlement. The TV signal stems from the presence of satellite dishes in 34 lots (79.07%). Violence, however, can be considered regular, since it was cited by 10 lots (23.26%) in Brejinho.

### 4.3 Natural Resources Preservation Dimension

Various criteria of this dimension, at Fazenda Boa Vista, were satisfactory, such as the low use of agrottoxics in agriculture; the destination of the toilet sewage for septic tanks; low deforestation, burning, hunting and predatory fishing and the use of sustainable techniques in family farming.

The non-use of pesticides in 12 lots (92.31%) is a positive point for family farming in Fazenda Boa Vista, being used, with low frequency, only in one lot. Two sustainable techniques applied in family farming were also found: the use of carnauba bagana in 10 lots (76.92%) and goat manure as natural fertilizer in six lots (46.15%).

Nascimento *et al.* (2022) state that carnauba bagana, applied to the soil surface, contributes to the maintenance of higher humidity and lower temperature of the soil. They also found that the use of bagana on an isolated surface or associated with nitrogen, phosphorus and potassium showed better results in relation to microbial carbon, organic carbon and soil humidity.

As for the burnings, none of the lots reported the use of this pre-planting procedure of the soil, being pointed out by only one lot (7.96%) this criterion as an environmental impact in the territory of the Boa Vista Farm. Illegal hunting and predatory fishing were cited, respectively, by only two (15.38%) and one (7.96%) lots.

However, an environmental problem found at Fazenda Boa Vista concerns the disposal of household waste produced in the lots. What calls attention is the fact that eight of the 13 residences (61.54%) use burning as the destination for this waste produced. This combustion, in the open air, brings about negative environmental impacts, such as respiratory complications coming from the inhalation of smoke and the risks of fires in the settlement.

In the Brejinho settlement, it was found that the burning is a traditional resource for cleaning up the area for planting, adopted (in general) in a controlled manner in 26 lots (63.41%). However, illegal hunting, in spite of not being reported in 26 lots (60.47%), involves the slaughter of the fauna of the cerrado (savanna), often at risk of extinction, like the armadillo (*Tolypeutes tricinctus*). Although it goes back to custom and tradition, this hunt may result, over time, in more incisive environmental impacts. The predatory fishing was disregarded because there were no water bodies in the territory of Brejinho.

The disposal of household waste is an environmental problem in Brejinho, since this waste is burned in the open air in 42 lots (97.67%). This is a common practice in settling, daily, and materials that do not undergo full combustion (such as glass) are discarded directly into the environment or are buried. However, the fate of the bathroom sewage can be considered regular, considering that 30 lots (69.77%) have septic tanks.

The use of pesticides in Brejinho agriculture is considerable, reported in 18 lots (43.90%), which use agricultural pesticides based on glyphosate, marketed as Roundup®. It was also found low use of carnauba bagana (24.39%) and manure of animals as fertilizer (39.02%) in the lots of that settlement.



One of the significant environmental impacts on Brejinho is deforestation in an ARL in Cerradão, a fact confirmed in the *on-site* observations and interviews with family farmers (38 lots, 88.37%). According to the farmers, deforestation is carried out by some settlers of Brejinho itself, who illegally extract the wood for marketing.

This deforestation in the ARL, as has already been pointed out, implies strong disagreements between the settled farmers, opposing those who deforest and those who cherish conservation. This unsatisfactory criterion therefore reduces integration between settlers and traditional celebrations. The latter was common in settlements in earlier times, such as floury and festivities, but was diminished until it ceased altogether to the extent that bickering increased.

#### 4.4 Food Security Dimension

In Fazenda Boa Vista, agriculture in five lots (38.46%) is intended only for the consumption of the family itself, while in seven lots (53.85%) it is intended for domestic consumption and marketing. As regards livestock farming, in two batches (15.38%) it is for domestic consumption only, and in 10 batches (76.92%) it is for both domestic and marketing consumption. Like the main income, the production of family farming is not sufficient to guarantee food security, and settlers need to buy other food to complement this production, such as rice.

All the plots of the settlement Fazenda Boa Vista have Productive Backyards. Ferreira (2018) defines them as an integral part of an agro-ecosystem that meets the needs of a family farm, whose benefit is to be easily accessible to farmers. In this space, multiple species are cultivated and/or maintained that contribute to the nutritional functions of the family, plants for plant and ornamental purposes and animals for slaughter and feeding.

Also noteworthy is the aid by government programs, in particular the Brazil Grant (Bolsa Família) which, although present in six of the thirteen lots (46.15%), does not constitute the main source of income in any of them, being complementary income. Thus, although the presence of this aid denotes a situation of socioeconomic vulnerability, in the settlement Fazenda Boa Vista this picture is not the rule, but an exception, since the main income comes from other sources.

In Brejinho, the production of agriculture in 30 lots (83.33%) is only for the consumption of the family itself, and in six (16.67%), the agricultural production is intended both for consumption and for sale. In the case of animals for slaughter and feeding, of the 40 batches in which this activity is recorded, 28 (70%) are intended for consumption by the family only. In the remaining 12 (30%), it is intended both for the family and for marketing.

Like Fazenda Boa Vista, family farming is not enough to guarantee the food security of the settlers of Brejinho, a fact proven by the high dependence of Brazil Aid on 22 lots (51.16%). This high dependence on the Federal Government's basic income program exemplifies the data released by INCRA itself in 2016. At that time, of the 972,289 families settled, 382,899 were beneficiaries of Bolsa Família (39.38%). This shows that these families, despite achieving the territory, did not achieve development through family farming.

## 5 CONCLUSION

In the settlement Fazenda Boa Vista, the socio-economic dimension is characterized by the lack of ATER and family agriculture is not the main income of families, nor is it sufficient to guarantee the dimension of food security. Also, there is no limitation of access to public promotional credits, although they are ineffective due to a deficient ATER.



The dimensions Preservation of Natural Resources and Social and Cultural Fabric at Fazenda Boa Vista were satisfactory, as there is no use of agrottoxics in agriculture and no deforestation, being strong the integration between settlers of different lots. In the Social and Cultural Fabric, family farming allows for traditional celebrations such as floury and festivities, although settlement is impacted by violence and bad roads.

In the Brejinho settlement, agriculture is not responsible for the Food Security of families, but the expressive dependence on Brazil-Aid, which guarantees minimum income so that families are not affected by hunger. However, the Social and Cultural Fabric points to the terrible conditions of the roads, the absence of traditional celebrations and low sociability among the settled farmers.

In the Socio-economic dimension, the ATER criterion was found to be deficient, in addition to the considerable rate of illiterate elderly. The one for the Preservation of Natural Resources, in Brejinho, is impacted by deforestation in an ARL and the burning of the garbage produced in the lots, besides the use of agrochemicals.

Thus, it is necessary to review, by INCRA, the management model adopted in rural settlements of Campo Maior, because multifunctional family agriculture is not effective to the satisfaction in either of the two settlements analyzed, although it has a significant importance. This study identified, according to the methodology adopted, the main causes of this inefficiency.

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