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Food insecurity and social inequalities: situation of families settled in the rural Potiguar region of Northeast Brazil

Insegurança alimentar e iniquidades sociais: situação de famílias assentadas do interior potiguar

Abstract

Introduction: In the context of food and nutrition security (FNS) in Brazil, rural settlements have played an ambivalent role. They contribute positively to improving the food and nutritional situation of many families but are also associated with a greater frequency of food insecurity (FI). *Objective*: The focus of this study was to investigate FNS and nutritional status in families residing in a rural settlement in the interior of the state of Rio Grande do Norte. *Methods*: A cross-sectional study with a quantitative component was conducted. Data were collected through home interviews with the aid of a questionnaire (open- and closed-ended questions) and analyzed using SPSS version 27.0. The prevalence of household FI was estimated using the Brazilian Food Insecurity Scale (BFIS). Socioeconomic and demographic variables were collected and the nutritional status of children two to ten years of age was investigated. *Results*: The prevalence of FI reached as high as 88.9%. The rate of moderate insecurity was 46.3%. A total of 40.6% of the children assessed were overweight and 90.6% experienced some degree of FI. This scenario reflects the low income and educational level of the residents of the settlement. *Conclusion*: Income transfer programs, such as the Family Grant Program, can help improve food security for families living in extreme poverty. However, it is essential to strengthen and implement other public policies in conjunction with agrarian reform to address FI effectively, especially in rural areas. The situation of FI found among the settled families underscores the urgency of actions to promote FNS more comprehensively in this context.

Keywords: Food Insecurity. Rural Settlements. Food and Nutrition Security

Introdução: No contexto da Segurança Alimentar e Nutricional (SAN) no Brasil, os assentamentos rurais têm desempenhado papel ambivalente. Por um lado, contribuem positivamente para a melhoria da situação alimentar e nutricional de muitas famílias, enquanto por outro, estão associados a uma maior prevalência de Insegurança Alimentar (IA). *Objetivo*: O foco do estudo foi avaliar a situação de SAN e Nutricional em famílias residentes em um assentamento rural no interior do Rio Grande do Norte. *Métodos*: Trata-se de estudo transversal e quantitativo, no qualos dados foram coletados por meio de entrevistas domiciliares utilizando questionário semiestruturado; e

analisados com programa SPSS versão 27.0. A prevalência de IA domiciliar foi estimada pela Escala Brasileira de Insegurança Alimentar (EBIA), juntamente com a avaliação de variáveis socioeconômicas e demográficas, além do estado nutricional de crianças de 2 a 10 anos. *Resultados*: Os achados revelaram uma prevalência de IA atingindo 88,9%, com 46,3% de insegurança moderada. Além disso, 40,6% das crianças avaliadas apresentavam excesso de peso e 90,6% sofriam com algum grau de IA.Este cenário reflete a baixa renda e escolaridade dos moradores do assentamento.*Conclusão*: Programas de Transferência de Renda, como o Bolsa Família, podem ser benéficos para melhorar a segurança alimentar das famílias em situação de extrema pobreza. No entanto, é essencial considerar o fortalecimento e a implementação de outras políticas públicas em conjunto com a reforma agrária para abordar eficazmente a IA, em especial nas áreas rurais. A situação de IA observada entre as famílias assentadas destaca a urgência de ações para promover a SAN de forma mais abrangente neste contexto.

Palavras-chave: Insegurança Alimentar. Assentamentos Rurais. Segurança Alimentar e Nutricional.

INTRODUÇÃO

Food and nutrition security (FNS) is

> [...] the right of everyone to regular, 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 sustainable from an environmental, cultural, economic, and social standpoint, without any type of dietary restriction.[1]

Despite advances in the field of food security between 2003 and 2013, which culminated in Brazil's exit from the Hunger Map, a setback has occurred in this field beginning in 2014 caused by the economic crisis that impacted the country. The situation of food insecurity (FI) was aggravated as a result of the austerity measures implemented by the government between 2016 and 2018 and deepened during the administration between 2019 and 2022.[2]

The recent FNS scenario in Brazil is marked by major social setbacks resulting from the previous government policy, which prioritized economic development over social development. The aggravation of hunger in Brazil is directly associated with the orchestrated dismantling of FNS public policies in the country, the National Food and Nutrition Security System, and the National Food Security Council.[3]

The National Food Security Council was an advisory board directly linked to the presidency and an instrument of communication between the government and civil society with regards to the proposal of guidelines directed at actions in the field of food and nutrition.[4] The extinction of this council was one of the first acts of the former president and constituted an authoritarian blow to the process of establishing policies for FNS.[5]

Moreover, the COVID-19 pandemic led to a dramatic increase in hunger throughout the world.[6] Social isolation implemented as an attempt to curtail the spread of the disease changed the lifestyle in society, causing the restriction of some economic activities and directly affecting the income of thousands of individuals.[7] The pandemic led to a major economic crisis that culminated in the inflation of prices, an increase in the unemployment rate, and the expansion of social inequalities.[8]

According to the Second National Survey on Food Insecurity in the Context of the Covid-19 Pandemic in Brazil conducted in 2022 by the Research Network on Food and Nutritional Sovereignty and Security,[9] less than half of Brazilian homes (41.3%) were in a situation of food security, whereas 58.7% were in a situation of food insecurity and 15.5% of these homes in a situation of FI experienced severe FI.[9]

Family farming in Brazil is highly relevant to the economy and generates a significant number of jobs in the countryside.[10] Rural settlements contribute positively to ensuring FNS, as a large part of the settled families in Brazil managed to improve their food and nutritional situation after the acquisition of land.[11]

Despite the potential in terms of promoting FNS, rural settlements face several challenges, such as low productivity, low income, a lack of technical assistance, the abandonment of lots, the exodus of youths, and environmental degradation.[12] Moreover, family farming faces numerous obstacles related to the dismantling and reduction of government policies orchestrated by the Bolsonaro government. According to Calcanhoto,[13] there has been a government tendency since 2016 to defend the interests of the landowning elite over the interests of landless rural workers.

It is also important to highlight spatial differences in Brazil in terms of FNS. According to Rocha, Lima, & Almeida,[14] residing in a rural area increases the likelihood FI twofold. The 2017-2018 Household Budget Survey reported a 7.1% rate of severe FI in homes located in rural areas of Brazil, in contrast to the 4.1% rate in urban areas.[15] Corroborating this finding, the Second National Survey on Food Insecurity in the Context of the COVID-19 Pandemic in Brazil also found that 63.8% of homes in rural areas were in a situation of FI and 18.6% of these homes were in situations of severe FI.[9] Furthermore,

despite general knowledge of the FNS situation on the national scale, little is known with regards to the conditions in which specific groups find themselves, such as residents in rural settlements.

Thus, there is a clear need for an in-depth understanding of the FNS situation in families residing in a rural settlement in the municipality of Lagoa Nova, state of Rio Grande do Norte, Brazil, with the aim of raising awareness of issues related to this problem and contributing to the identification of effective measures for combatting food insecurity.

METHODS

A cross-sectional with a quantitative component was conducted from April to June 2022 in a settlement in the rural area of the municipality of Lagoa Nova in the state of Rio Grande do Norte, located 156 km from the state capital Natal. The José Milanez Settlement Project, located 209 km from Natal, was created in 1999 and has 132 settled families, 95 of whom have managed to acquire their title of ownership, which is the assurance that the land definitively belongs to the family.

The sample was composed of women and children residing in the settlement. For the inclusion criteria, the women needed to be residents of the settlement, be at least 18 years of age, and have knowledge of the family dynamics. Women who did not occupy the home permanently and those not present when the home was visited were excluded. For the children, those who resided in the settlement and were between two and ten years of age were included.

The sample size was calculated using the Statcalc program of EPI INFO version 7.2.5.0, considering the universe of 132 households in the settlement and a 75.3% rate of food insecurity. This rate of FI was the result found in the Second National Survey on Food Insecurity in the Context of the COVID-19 Pandemic in Brazil for the rural population of Northeast Brazil.[9] A 95% confidence interval and design effect of 1.0 were also considered, resulting in the need for 90 homes to be investigated in this study.

Data were collected through home interviews with the aid of a questionnaire containing open- and closed-ended questions addressing sociodemographic and nutritional aspects. Anthropometric assessments of children two to ten years of age were also performed.

Food security was investigated using the Brazilian Food Insecurity Scale, which directly assesses the food security situation in a population through the perception and experience of food insecurity and hunger on the household level.[16] The scale is composed of 14 questions with positive and negative answers regarding situations of food restriction due to economic limitations in the previous three months. A score of 0 (zero) is attributed to each negative answer and 1 (one) is attributed to each positive answer.

The final score is the result of the sum of the positive answers and enables the classification of the home on one of four levels: Food security (FS) in cases with no positive answers (0 points); mild food insecurity (1-5 points in homes with children under 18 or 1-3 points in homes without children); moderate food insecurity (6-9 or 4-5 points for families with and without children under 18, respectively); and severe food insecurity (10-14 for homes with children under 18 or 6-8 points for homes without children under 18).[16]The scores for homes with children are different from those used to classify homes where only adults reside, for which only eight questions are used.

According to Monteiro et al.,[17] the assessment of the nutritional status of children is an indirect measure the quality of life and health of the child population and is used as a complement to the assessment of the situation of food security.

Weight and height were determined for the nutritional assessment of the children. Anthropometric measurements were taken at the time of the interview in the presence of the child's guardian. Height was measured using a stadiometer, with the meter as the unit of measure. For such, the children were barefoot, without head accessories, positioned upright with feet together and face straight, gazing at a fixed point at eye level. Weight was measured using a portable digital scale,

with kilogram as the unit of measure. For such, the children were barefoot, wearing light clothing and without accessories or personal objects, such as glasses, watches, necklaces, belts, etc.

Both measurements were taken in duplicate to minimize errors. If the two measurements differed by more than 0.5 cm or 0.5 kg, a third measurement was taken and the average of the two measurements with the closest values was calculated. The body mass index (BMI) was calculated by dividing weight by height squared (kg/m^2).

Nutritional status was assessed using tables from the World Health Organization (WHO), considering the sex and age of the child. Specific indexes defined by the WHO were used for the nutritional assessment. Weight for age (W/A), weight for height (W/H), BMI for age (BMI/A), and height for age (H/A) were considered for children 0-5 years of age, whereas W/A, BMI/A, and H/A were considered for children 5-10 years of age.[18]

Anthropometric data were analyzed for the classification of nutritional status using the WHO Anthro 2006 software for children 2-5 years of age and WHO Anthro Plus 2007 for children 5-10 years of age. The percentile and z-score were calculated for each child. The Statistical Package for the Social Sciences, version 27.0 (SPSS® Inc, Chicago, IL) was used for data analysis. The data were expressed as absolute and relative frequencies.

This study received approval from the Human Research Ethics Committee of the Trairi School of Health Sciences of the Federal University of Rio Grande do Norte (certificate number: 55486722.3.0000.5568) in compliance with Resolution 466/2012 of the National Board of Health.

RESULTS

Fifty-four families participated in the study, corresponding to approximately 60% of the target sample size. The estimated sample size was not reached due to difficulties in collecting data in rural areas, such as the researchers' travel and the absence of a resident in the home, along with the limitations imposed by the pandemic during the development of the study.

The demographic and socioeconomic characteristics and food security levels of the families are displayed in Table 1. Most of the women interviewed were adults (61.1%) and had low schooling; more than 60% were illiterate or had only completed a primary school education.

Table 1. Demographic and socioeconomic characterization of women and homes in rural settlement of Lagoa Nova, RN, 2022.

Characteristics	N (54)	%
Age of interviewee (years)		
18-24	7	13
25-59	33	61.1
≧60	14	25.9
Schooling of interviewee		
Illiterate	15	27.8
Up to complete primary school	18	33.3
> Complete primary school	21	38.9

Table 1. Demographic and socioeconomic characterization of women and homes in rural settlement of Lagoa Nova, RN, 2022.

Characteristics	N (54)	%
Family income		
Up to monthly minimum wage *	40	74.1
≧ Monthly minimum wage	14	25.9
Ex-Beneficiary of Family Grant Program		
Yes	46	85.2
No	8	14.8
Beneficiary of Brazil Income Program		
Yes	25	46.3
No	29	53.7
Main profession/occupation of interviewee		
Formal or informal employment	5	9.3
Farmer and homemaker	36	66.6
Retired	13	24.1
N° of residents in home		
1-3	20	37
≧4	34	63
N° of children in home		
0	27	50
≧1	27	50
Type of home		
Unfinished masonry	11	20.4
Finished masonry	43	79.6
Trash destination		
Trash collection truck	49	90.7
Buried/burned/thrown in yard	5	9.3

*Monthly minimum wage: R$1212.
Source: Data from study (2022).

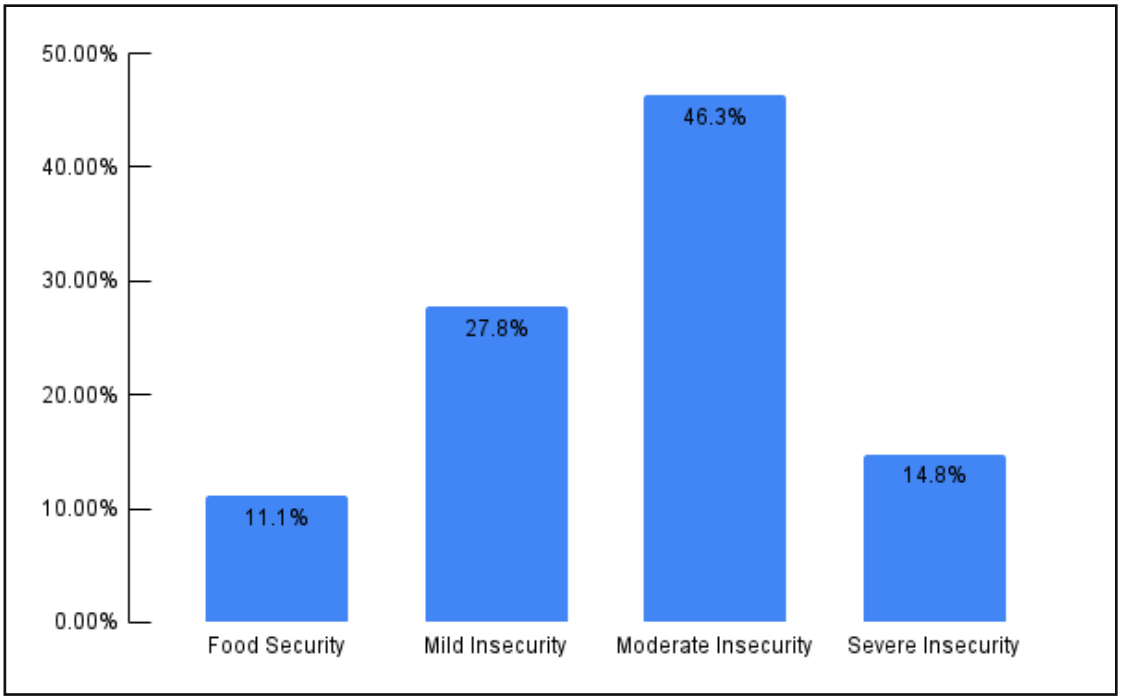
Concerning economic aspects, 74.1% of the homes lived on an income equal to or less than the monthly minimum wage, a little more than 46% received the government benefit "Renda Brasil", and 85.2% reported having been beneficiaries

of the Family Grant Program. In terms of occupational activities, 66.6% of the women combined agricultural work with domestic activities.

In terms of housing, most lived in finished masonry houses (79.6%) with four or more residents (63%). All homes had running water and did not have access to sewage treatment, using rudimentary septic tanks (data not shown in table). Regarding trash disposal, 90.7% of the interviewees reported sending the waste produced to the trash collection service.

Only 11.1% of the families were in a situation of food security, whereas 88.9% experienced varying degrees food insecurity, such as mild food insecurity (27.8%), moderate food insecurity (46.3%), and severe food insecurity (14.8%) (Figure 1).

Figure 1. Distribution of homes of settlement according to levels of food (in)security, Lagoa Nova-RN, 2022 (n = 54).



Source: Data from study (2022).

Table 2 displays the sociodemographic and anthropometric characteristics of the children residing in the homes analyzed as well as the levels of food insecurity of the families. Thirty-two children participated in the study, 53.1% of whom were girls and 46.9% were boys, with most in the five-to-ten-year-old age range (65.6%).

With regards to the assessment of the nutritional status of children, 12.6% had inadequate weight for age, with 6.3% being underweight for their age and 6.3% being overweight for their age. The weight for height index revealed that 63.6% of the children less than five years of age (n = 11) were at risk of being overweight. The BMI for age index revealed a high frequency of excess weight (40.6%), with nine children classified as overweight (28.1%) and four exhibiting obesity (12.5%) (Table 2). All children were within the normal range in terms of height for age (data not shown in table).

Table 2. Sociodemographic, anthropometric, and food insecurity characterization of children residing in settlement, Lagoa Nova/RN, 2022.

Characteristics	N (32)	%
Age (years)		
2-4	11	34.4
5-10	21	65.6
Sex		
Female	17	53.1
Male	15	46.9
Weight for age		
Low	2	6.3
Adequate	28	87.5
High	2	6.3
Weight for height *		
Accentuated thinness	1	9.1
Ideal range	3	27.3
Risk of excess weight	7	63.6
BMI for age		
Underweigth	2	6.2
Ideal range	17	53.1
Excess weight	13	40.7
Level of food (in)security		
Food security	3	9.4
Mild insecurity	8	24.9
Moderate insecurity	14	43.8
Severe insecurity	7	21.9

*Children less than five years of age.
Source: Data from study (2022).

A total of 90.6% of the children resided with families that experienced some degree of FI, such as mild food insecurity (24.9%), moderate food insecurity (43.8%), and severe food insecurity (21.9%).

DISCUSSION

In this study, the number of homes in situations of food insecurity (FI) was significantly higher than the number of homes in a situation of food security (FS). The most prevalent form of FI in settlement analyzed was moderate. This high prevalence of FI is similar to findings described in previous studies that also investigated the situation in rural settlements, where rates of 88.8%, 70.5%, and 78.6% were recorded.[19-21]

In cases of mild FI, the most affected aspect is the quality of food, at the same time there is concern that there may be a shortage of food in the near future. In cases of moderate FI, adults of the family experience a quantitative restriction in food. In cases of severe FI, adults and children suffer from a quantitative deficiency of food, even reaching the point of hunger.[22]

Food and nutritional insecurity (FNI) is a common occurrence in rural settlements, where low income and a lack of food variety are contributing factors.[19] According to Hoffmann, a low family income is the main determinant of FNI, along with the schooling level of the residents, as the prevalence of FNI is lower in homes with a higher the level of schooling.[23]

A survey conducted by the National Institute of Colonization and Agrarian Reform in 2010 revealed that more than half of the residents of rural settlements are illiterate or have only completed the 5th grade of primary school.[24] As observed in the present investigation, recent studies confirm this characteristic of low schooling among rural settlers.[25,26] According to Santos et al.,[27] a low schooling level limits the capacity of settlers to employ technological resources to increase the productivity of their crops and search for alternatives for marketing their production.

Most homes in the present study had a family income equal to or less than the monthly minimum wage (MMW). A study conducted in the state of Maranhão indicated that the risk of FI was nearly twice as high for families that survived on one and a half times the MMW *per capita* compared to those that had a higher income *per capita*.[20] According to data from the Second National Survey on Food Insecurity in the Context of the COVID-19 Pandemic in Brazil, more than 90% of homes with an income of less than 1/4 the MMW per capita experiences some degree of FI.[9]

Thus, federal government's income transfer programs are relevant in this context, such as the Family Grant Program, which is a conditional income transfer program under which beneficiary families must meet conditions related to access to public healthcare and education service networks. The main objective of the Family Grant Program is to assist families in situations of poverty and extreme poverty. As Calcanhoto states, being a Family Grant beneficiary directly implies the acquisition of food and, consequently, an improvement in the situation of food and nutrition security in the home.[21]

According to a study that investigated the impact of the Family Grant Program on FS using data from the 2006 National Demographic and Health Survey, inclusion in this program increases the likelihood of a home being in a situation of FS by 7.4 percentage points. Moreover, the program significantly affects homes in a situation of mild insecurity, increasing the likelihood of this group shifting to a situation of FS condition by 11 percental points.[28]

Despite the positive impact of the Family Grant Program on FNS, the program underwent a series of changes during the COVID-19 pandemic and was replaced by the Brazil Assist Program in 2021. According to Costa, this change was an electoral strategy on the part of the government in power at the time. The program is not superior to the Family Grant Program in any way, having been harshly criticized by experts and social organizations.[29,30]

The replacement of the Family Grant Program with the Brazil Assist Program also generated uncertainty and concerns regarding the continuity and effectiveness of income transfer policies in the country. Combined with the weakening of policies and programs to promote the production of family farming, such as the end of the Ministry of Agrarian Development (2016) and the low investment in the Food Acquisition Program and National School Meal Program, this scenario resulted in an increase in food insecurity, especially in the rural setting.[30,31]

Most of the women interviewed exercised agricultural and domestic activities as their profession, as expected. According to the Landless Workers' Movement, women play a prominent role in rural settlements, share leadership of the property, and collaborate with work in the field and the organization of the production.[32]

A study conducted in a rural settlement in the state of São Paulo reported the leading role of women in the generation of FS through the practice of family farming. Women farmers promoted FNS in the community, meeting the principles of access to food in adequate quantity and quality.[33] Despite this, studies show that homes headed by women are more vulnerable to FI.[9,31,34] Authors point out that when a woman is responsible for the household, it is often a single-parent household in which no partner is present, thus implying a lower family income.[35,36]

Braga sought to determine what characteristics of households headed by women are responsible for increasing the likelihood of FI, reporting that women's work outside and inside the home as well as the structure of households headed by women explain a considerable part of the occurrence of FI.[36] According to the Research Network on Food and Nutritional Sovereignty and Security, FI in households headed by women is influenced by several factors, such as the low valuation of their work, unequal wages compared to men, the greater degree of informality in the occupation, and instability in terms of access to income.[34]

The fact that most homes had four or more residents may exert an impact on the FI situation. In a study conducted in a settlement in the state of Minas Gerais, Veiga et al.[37] found that 94.7% of homes with up to five family members were in a situation of FS or mild food insecurity and 5.3% were in a situation of moderate or severe FI. In contrast, half of homes with more than five residents experienced moderate or severe FI.

In terms of housing conditions, although the community had access to treated water and public trash collection services, the lack of basic sanitation is worrisome issue that can directly impact the FNS situation of the families. As Baccarin points out,[38] an important association is found between the FNS situation and the availability of trash collection, water, and sewage services.

A study conducted in the state of Paraíba found that the lack of basic sanitation was associated with a two-fold greater likelihood of FI.[39] According to Panigassi et al.,[40] the absence of a sewage system can increase the likelihood of moderate food insecurity and severe food insecurity by 5.3 times and mild food insecurity nearly twofold. A lack of basic sanitation can also compromise the quality of food, contributing to the transmission of diseases. Therefore, it is essential to address FI in an integrated manner with other issues related to human development, such as access to drinking water and basic sanitation.

Brazilian studies have shown that the presence of children under 18 years of age in the home is associated with an increase in vulnerability to FI.[23,31] Moreover, an association has been described between the presence of FNI and changes in weight early in life and predisposition to future risks of obesity, insulin resistance, diabetes, hypertension, high cholesterol, and metabolic syndrome.[41]

Regarding the assessment of FNS and the nutritional status of the pediatric population, a large proportion of the children analyzed were in a situation of moderate FI as well as being overweight. From this assessment, one can infer that the excess weight found in this population may be related to the situation of FI experienced by these children. In addition to the quantitative restriction in the diet of adults, the nutritional quality of the diet of children in a situation of moderate FI is compromised.

Investigations into the food consumption of settled families have shown a dietary pattern marked by the excessive intake of foods with a high energy content and poor in nutrients.[40,42] This may be related to the cost of purchasing these products, as energy-dense foods are less expensive, constituting a more accessible option for low-income families.[40]

Previous studies corroborate the findings of the present investigation with regards to the nutritional profile, highlighting the growing trend of overweight children.[43-45] Like the rest of the country, Northeast Brazil is in a similar

situation, as demonstrated in a literature review of studies published between 2009 and 2018 on the nutritional status of children and adolescents in the region, which indicated an average rate of 12.5% for overweight and 7.4% for obesity.[46] A study investigating the nutritional status of beneficiaries of the Family Grant Program before and during the pandemic demonstrated that Rio Grande do Norte was the state in Northeast Brazil with the largest number of children at risk of being overweight (18%) in 2019.[47]

According to the WHO, overweight children are more likely to develop chronic non-communicable diseases prematurely and are at greater risk of developing other morbidities.[48] In addition to physical complications, being overweight in childhood can trigger a series of psychological and emotional problems, such as anxiety, low self-esteem, depression, a distorted body image, impaired school performance, and relationship difficulties.[49]

FNI encompasses both the lack of sufficient adequate food, resulting in malnutrition and hunger, and the consumption of inadequate food, which can lead to excess weight and nutritional deficiencies. The consequences of FNI impact several aspects, the most directly affected of which is health.[50] FNS is a fundamental human right and ensuring adequate food is essential to promoting the health and well-being of the population.

The main limitation of the present study is the small sample size, which made it impossible to perform statistical association analyses. Thus, more comprehensive studies should be conducted to understand the situation of access to food in rural settlements.

FINAL CONSIDERATIONS

This study sought to contribute to the portrayal of the FNS situation in a rural settlement in the countryside of the state of Rio Grande do Norte in Northeast Brazil, characterizing the situation experienced by families. The results on the situation of food insecurity in the rural settlement reinforce information reported in other studies conducted in the country and highlight an issue of considerable importance that affects settled families.

In summary, the study showed that FNI is a common finding in rural settlements, the most prevalent form of which is moderate FNI. Income and schooling are important determinants of FNI, the prevalence of which is higher in low-income families and families with lower levels of schooling. In this context, governmental income transfer programs, such as the Family Grant Program, play a crucial role in improving access to food for these families.

Although obtaining rural property is an important step towards valuing a previously neglected community, obstacles to accessing educational resources, basic sanitation services, health care, and technical support remain. These precarious conditions contribute greatly to the condition of FNI in rural settlements, underscoring the need for the implementation of other public policies aligned with the agrarian reform policy.

The dismantling and disarticulation of policies and programs for the promotion of FNS orchestrated during the Temer and Bolsonaro governments, combined with the COVID-19 pandemic, have led to an increase in hunger in Brazil. In light of this scenario, the current government of President Luiz Inácio Lula da Silva has been working to restore this entire system aimed at combating hunger. The main measures taken include the return of the National Food Security Council, Food Acquisition Program and Family Grant Program.

Thus, it is essential for the government to improve and strengthen programs and public policies aimed at the promotion of FNS and invest in education and family farming production to combat food insecurity and ensure the human right to adequate food.

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Contributors

Bento AHC and da Silva CS Participation in the idealization and execution of the study design, data collection, analysis, and interpretation, the writing of the manuscript, final review, and approval of the manuscript for submission;
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