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Food (in)security and home availability of food for the Northern region of the State of Tocantins residents

(In)segurança alimentar e disponibilidade domiciliar de alimentos de moradores da região norte do Estado do Tocantins

Abstract

Introduction: Studies that review the factors associated with food and nutritional (in)security are essential for the planning of public health promotion actions and policies. ***Objective***: To assess household food availability according to the NOVA classification and its association with the situation of families food (in)security ***Methods***: Cross-sectional study conducted with 199 families living in the Bico do Papagaio micro-region, in the State of Tocantins. Families socioeconomic and demographic data were reviewed. The situation of food insecurity was assessed using the Brazilian Food Insecurity Scale. To calculate the daily energy availability at home, the methodology suggested by FAO was followed, grouping according to the degree of food processing. The chi-square test and the linear trend test were used to verify association among the variables. ***Results***: In total, 69.9% of the population had some degree of food insecurity, and 43.2% did not have sufficient food calories availability. It was observed that, as the degree of food insecurity increased, the caloric value available in the household got reduced, with the greatest caloric contribution coming from fresh and/or minimally processed foods, followed by culinary ingredients, ultra-processed foods and processed foods, regardless of the level of food insecurity ($p<0.05$). ***Conclusion***: The importance of evaluating different determinants of food (in)security in this region is emphasized, in addition to the importance of adopting public policies that improve the families' living conditions and help implementing strategies that encourage production and consumption of regional foods.

Keywords: Food. Food Availability. Food and Nutrition Security.

Resumo

Introdução: Estudos que analisam fatores associados à (in)segurança alimentar e nutricional são imprescindíveis para o planejamento de ações e políticas públicas de promoção da saúde. ***Objetivo***: Avaliar a disponibilidade domiciliar de alimentos de acordo com a classificação NOVA e sua associação com a situação de (in)segurança alimentar das famílias. ***Métodos***: Estudo transversal realizado com 199 famílias residentes na microrregião do Bico do Papagaio, no estado do Tocantins. Foram analisados dados socioeconômicos e demográficos das famílias. A situação de insegurança alimentar foi avaliada a partir da Escala Brasileira de Insegurança Alimentar. Para o cálculo da disponibilidade energética diária no domicílio, seguiu-se a metodologia sugerida pela FAO, agrupada conforme o grau de processamento dos alimentos. Utilizou-se o teste qui-quadrado e teste de tendência linear para verificar a

associação entre as variáveis. ***Resultados***: No total, 69,9% da população apresentou algum grau de insegurança alimentar, e 43,2% não possuía disponibilidade calórica de alimentos suficiente. Observou-se que, conforme aumentava o grau de insegurança alimentar, reduzia-se o valor calórico disponível no domicílio, sendo que a maior contribuição calórica foi advinda dos alimentos *in natura* e/ou minimamente processados, seguida de ingredientes culinários, alimentos ultraprocessados e de alimentos processados, independentemente do grau de insegurança alimentar ($p<0,05$). ***Conclusão***: Ressalta-se a importância de avaliar diferentes determinantes relacionados à (in)segurança alimentar nessa região, além de adotar políticas públicas que melhorem as condições de vida das famílias e implementem estratégias que incentivem a produção e consumo de alimentos regionais.

Palavras-chave: Alimentação. Disponibilidade de Alimentos. Segurança Alimentar e Nutricional.

INTRODUCTION

Access to food is everyone's right, and to ensure adequate and healthy food, basic living conditions are necessary, such as work, housing, employment, education, health and leisure, among others.[1,2]

In Brazil, this right is covered through the Organic Law on Food and Nutritional Security - LOSAN (Law No. 11,346, dated September 15, 2006), which defines Food and Nutritional Security (SAN) as everyone's right to have regular and permanent access to quality food, in sufficient quantity, without compromising access to other essential needs, based on health-promoting food practices that respect cultural diversity and that are environmentally, culturally, economically and socially sustainable.[3]

To assess the condition of family food (in)security in Brazil, the Brazilian Food Insecurity Scale (EBIA) has been used; this is an instrument that assesses the perception of individuals regarding the access to food and food availability at home.[4] United Nations Food and Agriculture Organization (FAO) traditionally uses the indicator of the average daily caloric availability *per capita* measurement to assess and monitor the degree of vulnerability from food shortages in different countries.[5]

The evolution of food availability in Brazilian households, based on the latest Family Budget Surveys (FBS), indicates that fresh or minimally processed foods and culinary ingredients are losing space to processed and ultra-processed foods.[6] This transition in the population's eating pattern has been associated with an intense growth in obesity, diabetes mellitus and different other food-associated chronic diseases, in addition to contributing to the increase in nutritional deficiency rates.[7]

According to Monteiro et al.,[8] in developed countries, ultra-processed foods are already prevalent in the diet. Thus, research aimed at obtaining food consumption indicators such as the FBS stands out for being an important information source.[9]

Therefore, the need to carry out a survey of those determinants that reflect all the way from food access till the conditions of such access is emphasized, providing useful and reliable indicators for assessing and monitoring food insecurity conditions, since the development of studies that review the factors associated with food and nutritional (in) security is essential for planning public health promotion actions and policies.[10,11]

In addition, the NOVA classification, based on the degree of food processing, has been widely used in epidemiological studies of food consumption, quality of food, individuals' health conditions and development of food guides, such as the Food Guide for the Brazilian Population.[12,13]

In this sense, the present study aimed to assess the availability of food and the food (in)security of families dwelling in the Bico do Papagaio micro-region, in the North Tocantins State.

METHODS

This is a cross-sectional population-based study, inserted in a larger study entitled: "Prevalence and factors associated with food and nutritional (in)security in the State of Tocantins", which was conducted in the urban area of 22 municipalities in Tocantins. In this work, preliminary data from four municipalities belonging to the Bico do Papagaio micro-region - Araguatins, Augustinópolis, Praia Norte and Santa Terezinha do Tocantins - were used, totaling 199 households.

A complex conglomerate sampling plan was used, divided into three stages: first, samples of municipalities were drawn based on a proportional division of the Tocantins micro-regions according to the population size; then, the census sectors in each municipality were classified and randomly drawn; then, a city block, and in the block a

corner, which was the starting point for the households. The number of families until reaching the quantity established in the sample calculation was interviewed.

Previous training of the interviewers and a pilot study were carried out; subsequently, data collection from September 2016 to July 2017 was performed. For data collection, home visits were made and the following procedures were used: application of a semi-structured questionnaire with the head of the family, containing questions on education, race/skin color, age, gender of the respondent, total number of people living in the household, classification by age of those residents, *per capita* family income and participation in the Federal Government's Bolsa Família program.

The situation of the household (in) food security was assessed using the Brazilian Food Insecurity Scale (EBIA), a psychometric scale that directly measures the perception of family (in) food security during the last three months.[14] EBIA was validated based on the US scale and was made available as an easy-to-use and low-cost instrument for diagnosing food (in) security in Brazil.[15]

The availability of food in the household was verified using a food availability questionnaire used by the researcher with the head of the family, who reported on the acquisition of food and beverages for home consumption in the last 30 days. The record included the description of food/drink, quantity purchased and unit of measurement.

Foods were grouped according to the NOVA classification, based on the extent and purpose of an industrial processing (fresh and minimally processed food, processed ingredients for cooking, processed and ultra-processed foods) proposed by Monteiro et al.,[8] in order to assess the contribution of each food group in the food availability and its relationship with home food security.

To calculate the daily energy availability at home, the methodology suggested by the Food and Agriculture Organization of the United Nations (FAO) was followed as presented by Smith, according to which families with food availability below 2,500kcal/*per capita*/day were considered to be in a situation of food insecurity.[16]

The data were tabulated in duplicate, in order to identify typing errors, in the Microsoft Excel 2010® program. Statistical analysis was performed with the aid of the Stata version 14.0 program. After performing the data normality test, the variables were described as frequency and median, and interquartile range. The chi-square test was used to verify the relationship between food insecurity observed by the FAO method and by EBIA. The linear trend test was applied to ascertain the association between the availability of total calories and *per capita* food group, and the situation of household (in) food security.

The investigation project was submitted to the Research Ethics Committee of the Federal University of Viçosa (CAAE: 55435716.6.0000.5153), and the participants signed the Free and Informed Consent Term, giving permission for their participation in the investigation.

RESULTS

It can be seen, from table 1, that the profile of the public assessed includes a predominance of heads of family aged between 17 and 49 years (59.3%); brown (56.8%), female (75.4%); 49.3% had less than eight years education. In 37.7% of the families, *per capita* income was up to half a minimum wage, 47 families (23.6%) received social assistance benefits from the government and 50.3% of the households had more than three residents.

Regarding the situation of (in) food security, it can be seen, from the EBIA results, that 69.8% of the households presented some degree of food insecurity. On the other hand, by the method of food availability proposed by FAO, 43.2% of families were in this condition due to the low caloric availability of the household (table 1). In addition, it was

found that the greater the degree of food insecurity as determined by EBIA, the greater the percentage of families with food insecurity detected by the FAO method (p=0.04) (data not shown in the table).

As for the foods most frequently available in the households, rice, beans, beef, chicken meat and onions stand out among fresh or minimally processed foods. Among the culinary ingredients, sugar, salt and oil were the ingredients most found. The most reported processed foods were: bread rolls, cheese, canned corn and canned sardines; and finally, ultra-processed foods included: margarine, ready-made tomato sauce, salty crackers, soda and instant noodles (data not shown in the table).

Table 1. Characterization of the families assessed according to socioeconomic and demographic data. Bico do Papagaio Microregion, Tocantins, Brazil, 2016/2017 (n=199).

Variables	N	%
Householder	199	100.0
Gender		
Female	150	75.4
Male	49	24.6
Age		
17-49	118	59.3
50-99	81	40.7
Skin color/Race		
White	39	19.6
Back	44	22.1
Brown	113	56.8
Indigenous	03	1.5
Education		
< 4 years	53	26.7
4-8 years	45	22.6
> 8 years	101	50.7
Householder		
Family income per capita (in minimum wages)		
Up to ½	75	37.7
½ - 1	62	31.2
> 1-2	27	13.6
> 2	07	3.5
Not informed	28	14.0
Beneficiaries of the Bolsa Família Program		
Yes	47	23.6
No	152	76.4
Number of residents		
From 1 to 3	99	49.7
From 4 to 6	84	42.2
≥ 7	16	8.1
Food (in)security (EBIA)		
Food security	60	30.3
Mild food insecurity	94	47.3
Moderate/severe food insecurity	45	22.6
Food (in)security (FAO)		
Food security	113	56.8
Food insecurity	86	43.2

Table 2 shows that the greater the degree of insecurity, the lower the household caloric availability. Fresh foods are those that have the greatest caloric contribution in all (in) food security levels, followed by processed ingredients, ultra-processed foods and, finally, processed foods. There is a statistically significant relationship between food (in) security and the total *per capita* caloric availability of fresh and minimally processed foods, processed and ultra-processed foods. (p<0,05).

Table 2. Total caloric availability *per capita* and by degree of food processing and the situation of food (in)security. Bico do Papagaio, Tocantins, Brazil, 2016/2017 (n=199).

Food (in)security	Kcal total *per capita*[a]	Kcal Fresh food and minimally processed[a]	Kcal Culinary ingredients[a]	Kcal Processed food[a]	Kcal Ultraprocessed food[a]
	p=0.024	p=0.047	p= 0.065	p=0.00	p=0.00
Food security	2889.56 (2307.77-3938.23)	1861.90 (1333.89- 2338.98)	569.49 (405.76 -757.06)	107.52 (56.86-198.89)	354.41 (221.16 – 495.16)
Mild food insecurity	2582.13 (1862.17– 3422.62)	1624.68 (1155.71-2317.01)	488.68 (323.11 -742.73)	64.51 (20.91-122.63)	239.65 (125.68 -407.02)
Moderate/severe food insecurity	1437.06 (2433.66- 3922.03)	1366.02 (982.81–2525.64)	435.11 (297.82-765.04)	28.03 (7.97-98.10)	148.35 (91.72 -338.58)

Note [a] Kcal values presented in median and interquartile range.

DISCUSSION

Our results indicate that 69.9% (n = 139) of the population assessed through EBIA presented some degree of food insecurity. Different prevalence of food insecurity (FI) in the various regions of Brazil are evidence of regional inequalities, since the North and Northeast present the most unfavorable food insecurity situations, representing an important public health problem.

PNAD data (2013) reveal that 36.1% of the households in the North Region and 37.6% of Tocantins' families experienced FI.[14] It is also noteworthy that the results of the FBS 2017-2018 indicate that 36.7% of the Brazilian households assessed were experiencing some degree of food insecurity, with the North and Northeast regions still presenting the most unfavorable situation, with 43.0% and 49.7%, respectively, which indicates an increase in food insecurity in the country, that had been declining since 2004.[17] Such prevalence cases, although significant, are actually lower than those found in this study.

The increase in the prevalence of food insecurity can be associated, among others, to the governance profile, austerity economic policies and economic crises.[18] In this connection, the National Policy on Nutritional Food Security has as a challenge the consolidation of public policies in those regions, due to their economic and geopolitical inequalities.[19]

Regarding social conditions, Braga[20] observed that in Brazil there is a relationship between food insecurity and gender, showing greater vulnerability in households headed by women. Likewise, households in which the reference person was black or brown had a higher prevalence of food insecurity in all its dimensions than households that had

a white reference person.[14] The findings of the present study demonstrate the vulnerability of the assessed households, since the majority of the heads of households were women and/or brown people.

Lower income and education, lack of employment and basic sanitation are related to food insecurity.[21] Among these, income stands out, a factor that can influence the choice of food and the food profile. According to Claro,[22] taxes applied to some food groups can affect the food consumption of certain social classes, since this increases the final value of the products to the consumer. The participation of food groups consisting of milk and dairy products, fruits and vegetables, animal fat, alcoholic drinks and ready meals tends to increase consistently according to the family income level.[23]

However, acute degrees of food deficiency can be synonymous of hunger, although food shortages do not always automatically express this phenomenon. In a situation of unfavorable income, individuals change the quality of food and diet, seeking to optimize their financial resources. Subsequently, with little or no financial resources, the amount of food available for family consumption, primarily for adults, begins to decrease. In addition to the fact that poverty is related to food insecurity, there is also a current concern, in more recent studies, with the relationship between FI and obesity.[24]

The basic diet of Brazilians is characterized by the consumption of coffee, bread, rice, beans and beef, in addition to juices and soft drinks and little consumption participation of fruits and vegetables; this is a food basket which is close to that found in the homes assessed in this study.[25] Changes in the eating habits has affected all social classes and all regions of the country, indicating that the diet of Brazilians has been characterized by the introduction of ultra-processed foods with high energy density and sugary drinks.[25]

It is noteworthy that the low consumption of foods such as fruits and vegetables is usually related to the situation of food insecurity.[24] Despite this observation, the FBS 2017/2018 pointed out a high participation of fresh or minimally processed foods and culinary ingredients among lower income families[6] in the North and Northeast regions,

Almeida et al.[26] observed, in their study, that among the food groups which intake is below the recommended minimum, fruits, vegetables, milk and dairy products stand out. These data reflect a high percentage of inadequacy for different nutrients, such as fiber, vitamins and minerals, which hampers the individuals' food and nutritional security. Although some traditional eating habits are still maintained, there is a decline in the consumption of basic foods like rice and bean in the metropolitan areas of the country,[7] contrary to what was found in this study because the households assessed were located in an inland region that still preserves basic and regional eating habits.

It is also noteworthy that the availability of food at home is determined by several factors, such as income, conditions of access to food marketing establishments,[27] production for own consumption and local production of food.[28] Thus, it becomes important to measure the availability of food for a better assessment of food insecurity at home.[29,30]

CONCLUSION

The households surveyed drew the greatest caloric contribution from fresh and/or minimally processed foods, regardless of the degree of food insecurity. It is important to highlight, however, the high percentage of food insecurity found in this population, as well as its relationship with the reduction of the caloric value available in the households.

Thus, there is a need to adopt intersectoral public policies that promote the improvement of the families' living conditions, as well as gender and race/skin color equality.

Finally, the importance of evaluating different determinants related to food (in) security in the region is emphasized, in order to better understand the needs of this population, in addition to the implementation of strategies that encourage the production and consumption of regional foods and food and nutrition education actions that are in accordance with the food culture and the local reality, thus seeking to ensure food and nutritional security.

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Contributors

Cantanhêde LS participated in the analysis and interpretation of data, writing of the article and review of the final version; Alves RL participated in data collection, review and approval of the final version; Schott E participated in the conception and design of the study, data collection, review and approval of the final version.

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