



MULTIDIMENSIONAL PORTRAIT OF FOOD AND NUTRITIONAL INSECURITY OF THE URBAN POPULATION OF THE STATE OF TOCANTINS, BRAZIL

RETRATO MULTIDIMENSIONAL DA INSEGURANÇA ALIMENTAR E NUTRICIONAL DA POPULAÇÃO URBANA DO ESTADO DO TOCANTINS, BRASIL

Received: 02/10/2021

Accepted: 02/11/2023

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Abstract

This article aims to present a multidimensional portrait of food and nutritional (in)security of the urban population of the state of Tocantins. A cross-sectional, population-based study conducted in the urban area of 22 cities of Tocantins. A total of 596 households were evaluated, divided from a systematic draw proportional to the size of the population. Conducted the survey of information referring to the cities. At home we applied a semi-structured questionnaire to head of the family, to obtain socioeconomic and demographic information, and the Brazilian Food Insecurity Scale to assess food insecurity. Also we conducted the assessment of the nutritional status of the residents. The prevalence of food insecurity in the state occurred in 63.4% of the households assessed. Micro-regions with higher prevalence of food insecurity also present worrying conditions regarding social indicators and nutritional status. The factors assessed must be considered in order to understand the determinants and implications of food and nutritional (in)security, identify vulnerable families

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and to assist in the implementation of local public policies to reduce social inequalities and improvement of food and health conditions of the population.

Keywords: Food and nutrition security. Social indicators. Nutritional status.

Resumo

Este artigo tem como objetivo apresentar um retrato multidimensional da (in)segurança alimentar e nutricional da população urbana do estado do Tocantins. Estudo transversal de base populacional realizado na área urbana de 22 municípios do Tocantins. Foram avaliados 596 domicílios, divididos em um sorteio sistemático proporcional ao tamanho da população. Realizamos o levantamento de informações referentes aos municípios. No domicílio, aplicamos um questionário semi-estruturado ao chefe da família, para obter informações socioeconômicas e demográficas, e a Escala Brasileira de Insegurança Alimentar para avaliar a insegurança alimentar. Também realizamos a avaliação do estado nutricional dos moradores. A prevalência de insegurança alimentar no estado ocorreu em 63,4% dos domicílios avaliados. As microrregiões com maior prevalência de insegurança alimentar também apresentam condições preocupantes quanto a indicadores sociais e estado nutricional. Os fatores avaliados devem ser considerados para entender os determinantes e implicações da (in)segurança alimentar e nutricional, identificar as famílias vulneráveis e auxiliar na implementação de políticas públicas locais para reduzir as desigualdades sociais e melhorar as condições alimentares e de saúde da população.

Palavras-chave: Segurança alimentar e nutricional. Indicadores sociais. Estado nutricional.

INTRODUCTION

Food and Nutrition Security (FNS) is based on the principle of the right of every human being to have adequate food, in order to guarantee his health and well-being (ROCHA, LIMA, ALMEIDA, 2014). It has a broad and interdisciplinary character, involving aspects such as access and production of quality food, healthy and sustainable food practices, citizenship and human rights (KEPPLE, SEGALL-CORRÊA, 2011). Therefore, FNS is a complex phenomenon that is related to factors such as structural and cultural characteristics of the society and family life habits (SOUZA, et al.; 2016).

According to the Food and Agriculture Organization of the United Nations (FAO), in 2017, around 821 million people were malnourished worldwide (FAO, 2018), indicating that food insecurity is a relevant public health problem in Brazil and in the world, with significant inter- and intra-regional variations in their prevalence, and it is important to point and assess them for the adequate implementation of public policies (FACCHINI, et al.; 2014).

Epidemiological studies (SILVA, et al.; 2012; GUERRA, et al.; 2013; INTERLENGUI, SALLES-COSTA, 2014; SABOIA, SANTOS, 2015) and government documents such as the National Survey of Demography and Health of Women and Children-NSDH (BRASIL, 2009) and the National Household Sample Survey-NHSS (IBGE, 2014) assess household food insecurity, with a primary focus on their proportion, associated factors and implications of food insecurity in the family environment, as well as in the assessment of social programs (SEGALL-CORRÊA, MARIN-LEON, 2009; MARQUES, et al.; 2014). NHSS of 2013 reported that 22.6% of Brazilian households were exposed to food insecurity, with the most unfavorable conditions in the North and Northeast regions, with 36.1% and 38.1%, respectively (IBGE, 2014).

The state of Tocantins, located in the north region of the country, according to the last census of 2010, has 1,383,445 inhabitants, distributed in 139 cities, where 78.8% live in the urban area (IBGE, 2010) and, according to NHSS 2013, a total of 37.6% of households in this state were food insecure, prevalence above the national average and the north region (IBGE, 2014).

Studies regarding the condition of food and nutritional (in)security in the state of Tocantins are still scarce, thus, in order to contribute to the understanding of this situation, this article aims to present a multidimensional portrait of food and nutritional (in)security of the urban population of the state of Tocantins.

METHODOLOGY

A cross-sectional, population-based study inserted in the "Project to Strengthen the Food and Nutrition Security System in the States of Amapá, Pará and Tocantins", financed by the Ministry of Social Development - MSD and conducted in the urban area of 22 of the 139 cities of Tocantins, accounting for 15% of the total number of cities in the state. Tocantins is divided into eight micro-regions: Araguaína, Bico do Papagaio, Dianópolis, Gurupi, Jalapão, Miracema do Tocantins, Porto Nacional and Rio Formoso¹⁴. In this study, we randomly draw 22 cities in order to contemplate proportionally all the micro-regions, from a complex sampling plan by clusters, divided into three stages. We performed the sample calculation using the OpenEpi[®] program, through the proportions equation. We considered a tolerable error of 5%; effect of the study design of 1.5 and 95% confidence level, besides adding 10% to control confounding factors, making a total of 595 households, divided from a systematic draw proportional to the size of the population of each one

of 22 cities. We conducted a pilot study in a city not randomized, prior to the research, with the objective of testing the equipment and instruments of data collection.

In order to collect data, we initially conducted the survey of information referring to the cities in the database of the Brazilian Institute of Geography and Statistics (IBGE): Gross Domestic Product per capita (GDP per capita), Municipal Human Development Index (MHDI) an indicator composed of three dimensions: longevity, education and income, and the Gini Index that is used as a measure of inequality. We have visited municipal managers to obtain information on the coverage of basic sanitation (sewage network, water treatment and garbage collection), existence of municipal social assistance policies and Municipal Councils for Food Security (MCFS). We also obtained the average price of food from the basic food basket standardized by the Inter-Union Department of Statistics and Socioeconomic Studies (DIEESE, 2016) for the state of Tocantins, from the average of 03 commercial establishments visited in each city.

Later, home visits were made to assess food and nutritional (in)security and its determinants. At home, the interviewee was the head of the family, that is, the reference person responsible for the household or so considered by other residents (IBGE, 2014). We applied a semi-structured questionnaire to obtain socioeconomic and demographic information, which included: sex, race/color, age, marital status, education and remunerated activity of the head of family; total household residents, per capita family income, receipt of income transfer program benefits, basic household sanitation, drinking water at household and food production in the backyard for self consumption.

We used the Brazilian Food Insecurity Scale (BFIS) to assess, as well as its classification divided into four levels of food (in)security: For households with individuals under 18 years old, the scale considers food security (0 points); light food insecurity (1 to 5 points); moderate food insecurity (6 to 10 points) and severe food insecurity (11 to 14 points). For households where only adults reside, the scale classifies as food security (0 points); light food insecurity (1 to 3 points); moderate food insecurity (4 to 6 points) and severe food insecurity (7 to 8 points) (IBGE, 2014). We grouped the categories of moderate and severe food insecurity to describe the prevalence of food insecurity in this study.

We conducted the assessment of the nutritional status of the residents by measuring weight (kg), height or length (cm) and waist circumference (cm) according to the norms recommended by

the Ministry of Health (BRASIL, 2011). To classify the nutritional status, we followed the specific recommendations for adults of the World Health Organization (WORLD HEALTH ORGANIZATION, 1998), for the elderly the cutoffs proposed by the Pan American Health Organization (ORGANIZAÇÃO PAN-AMERICANA DE SAÚDE, 2001). For children and adolescents, we adopted the parameters of the World Health Organization (BRASIL, 2011), based on height/age (H/A) and BMI/age indices, and for pregnant women we used the classification BMI/gestational age proposed by Atalah and collaborators (ATALAH, et al.; 1997). We calculated the waist-to-height ratio for adolescents, adults and the elderly, with a cutoff point ≥ 0.50 indicating metabolic risk (HSIEH; YOSHINAGA, MUTO, 2003). We used the height-for-age index (H/A) to verify height deficits in adults and elderly, pondering 19 years, which is the maximum age assessed in the growth charts, and cutoff point for short height of < -2 score-Z (BRASIL, 2011), which corresponds to up to 161.9cm for men and 150.1cm for women.

We generated thematic maps using ArcGis software version 10.3 to verify the spatial distribution of food insecurity. Initially, the maps of the micro-regions of the state of Tocantins were extracted from the cartographic database available from the Brazilian Institute of Geography and Statistics (IBGE) - Regions and States of Brazil of 2010. Subsequently, we included data on food insecurity for the elaboration of thematic maps with the prevalence of light and moderate/severe food insecurity in each micro-region. All maps were generated in the Flat Coordinate System, Universal Transverse Mercator System (UTM), 23S spindle, SIRGAS 2000 datum.

We double typed the data in the Microsoft Excel 2010 program. We performed the consistency check and the statistical treatment of the data in the statistical package Stata version 14.0, where the variables were described in absolute and relative frequencies with a 95% confidence interval. The study was approved by the Human Research Ethics Committee of the Federal University of Viçosa (opinion nº 1.561.102) and only families whose residents signed and the Informed Consent Term were included in the study, and when those under 18 years old the Term of Assent.

RESULTS

The final sample consisted of 596 households, belonging to 22 cities, divided proportionally in the 8 micro-regions of the state of Tocantins.

Considering the total sample, of the heads of families interviewed, there was a predominance of heads aged from 18 to 49 years (54.7%), self-declared browns (56.5%), married/stable union (57.2%), without remunerated activity (51.5%) and women (77.2%). We can highlight that 44.4% of heads of families had between 0 and less than 8 years of education, that is, they were illiterate or had incomplete elementary education. In relation to the households studied, there was predominance of families with up to 3 residents (57.6%). In total, 38.8% of households were on the poverty line, with a monthly per capita income below ½ minimum wage, 19.30% were beneficiaries of the Federal Government's *Bolsa Família* Program, 82.9% did not have a sewage network and 85.1% of households produced food for self-consumption.

We also observed that, of the 22 cities visited, only 13.6% had public social assistance policies at municipal level and the other only execute the policies coming from the federal government. In addition, 27.3% of cities did not have MCFS in operation.

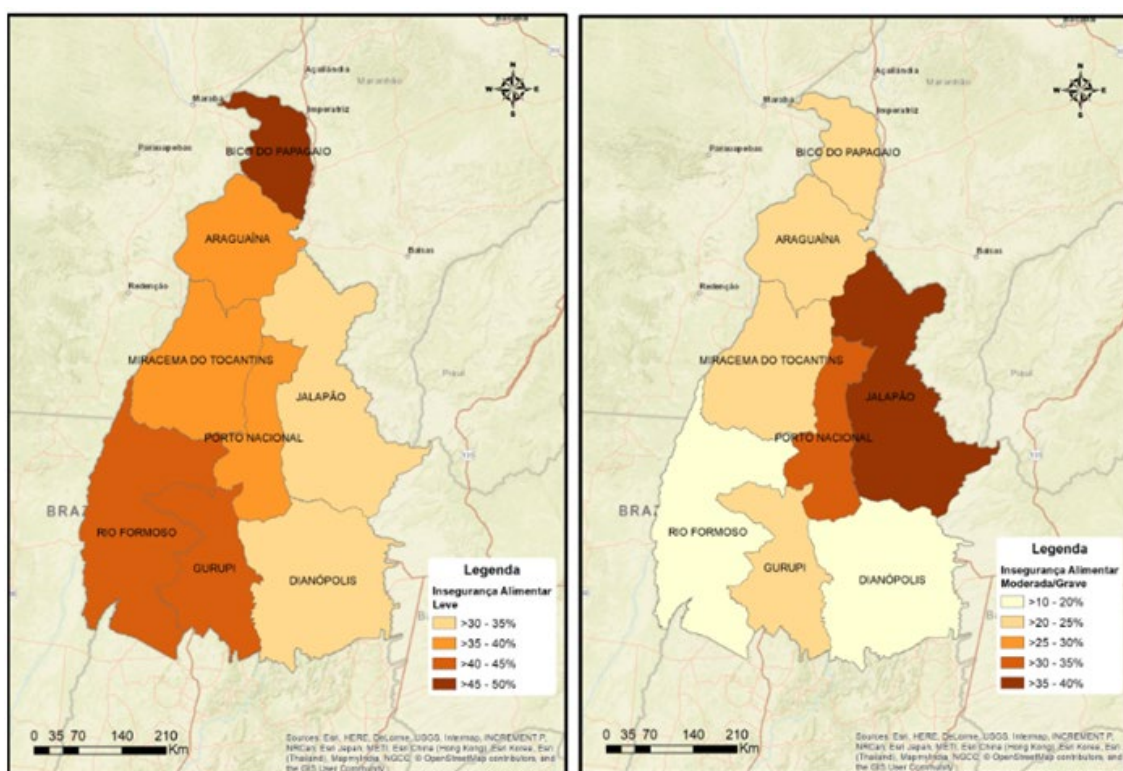
Table 1 shows the prevalence of food insecurity in the state, occurring in 63.4% of the households assessed, 40.9% in light food insecurity and 22.5% in moderate or severe food insecurity. The best food security condition was found in the Dianópolis micro-region (48.6%).

Table 1: Prevalence of food (in)security in the 08 micro-regions of the state of Tocantins, Brazil, 2016/2017 (n = 596)

Micro-region	Total	FoodInsecurity	Light	Moderate/severeFoodInsecurity
			FoodInsecurity	
	n(%)	% (95%CI)	% (95%CI)	% (95%CI)
Porto Nacional	28 (100,0)	71,4 (50,0-85,7)	39,3 (22,4-59,2)	32,1 (16,9-52,4)
Jalapão	24 (100,0)	70,8 (48,4-86,2)	33,3 (16,7-55,5)	37,5 (19,7-59,4)
Bico do Papagaio	200 (100,0)	70,0 (63,2-76,0)	47,5 (40,6-54,5)	22,5 (17,2-28,9)
Gurupi	40 (100,0)	67,5 (51,0-80,6)	45,0 (29,9-61,1)	22,5 (11,8-38,7)
Miracema do Tocantins	95 (100,0)	60,0 (49,7-69,5)	36,8 (27,6-47,1)	23,2 (15,6-32,9)
Rio Formoso	41 (100,0)	58,5 (42,5-73,0)	43,9 (29,1-59,8)	14,6 (6,5-29,7)
Araguaína	133 (100,0)	56,4 (47,7-64,7)	36,1 (28,3-44,7)	20,3 (14,2-28,1)
Dianópolis	35 (100,0)	51,4 (34,5-68,0)	31,4 (17,8-49,3)	20,0 (9,5-37,4)
Total	596 (100,0)	63,4 (59,5-67,2)	40,9 (37,0-44,9)	22,5 (19,3-26,0)

Figure 1 represents the spatial distribution of the situation of light and moderate/severe food insecurity, where the micro-regions with the highest proportion of food insecurity were Bico do Papagaio, Gurupi and Rio Formoso (> 40%), and moderate/severe food insecurity were the micro-regions of Jalapão and Porto Nacional (>30%).

Figure 1: Spatial distribution of light and moderate/severe food insecurity in the micro-regions of Tocantins state, Brazil, 2016/2017.



Source: The authors (2018)

Table 2 shows the micro-region characterization of the state of Tocantins according to socioeconomic, demographic and nutritional status data. We verified that the average of the Municipal Human Development Index (MHDI), Gini Index and GDP *per capita* had the worst results in the micro-regions of Bico do Papagaio, Jalapão and Porto Nacional, with the highest prevalence of food insecurity. Cities of 5 micro-regions (Dianópolis, Gurupi, Jalapão, Porto Nacional and Rio Formoso) did not have a public sewage network, while all micro-regions had a percentage of water treatment and garbage collection over 80%. The price of the basic food basket was higher in the micro-regions of Miracema do Tocantins, Porto Nacional and Rio Formoso.

Among nutritional deviations, three microregions presented a prevalence of low weight over 5% (Araguaína, Bico do Papagaio and Miracema do Tocantins), and five of them had a prevalence of short height above 20.0% (Araguaína, Bico do Papagaio, Jalapão, Miracema do Tocantins and Porto Nacional). Overweight was the most prevalent nutritional deviation in all micro-regions.

Table 2: Characterization of the micro-regions of the state of Tocantins according to socioeconomic, demographic and nutritional status data, Brazil, 2016/2017 (n = 8)

Indicator	Micro-regions							
	01*	02*	03*	04*	05*	06*	07*	08*
MHDI**	0,654	0,630	0,655	0,675	0,574	0,659	0,612	0,651
Gini Index **	0,537	0,545	0,537	0,498	0,628	0,534	0,584	0,541
GDPper capita**	13.992,05	8.894,88	16.954,35	35.173,22	8.346,22	21.225,10	9.108,84	26.394,83
Sewage network**	30	15	0	0	0	40	0	0
Garbagecollection**	83,3	96,2	93,3	94,5	90	93,3	97,5	90
Watertreatment**	81,3	84,7	96,6	99,5	90	93,3	100	100
Basic foodbasketprice***	331,14	337,36	357,95	343,98	321,08	390,67	395,39	390,74
Lowweight**	7,9	8,6	4,1	2,1	4,8	9,2	4,1	2,9
Overweight**	53,9	32,3	34,7	30,8	52,2	47,8	49,3	40,4
Short height****	22,5	23,0	18,0	9,6	22,6	21,2	21,9	13,5

We performed a nutritional assessment of 1393 individuals belonging to the families surveyed, making up 69.6% of the total population of the households. Of these, 226 (16.2%) children, 216 (15.5%) adolescents, 679 (48.7%) adults, 255 (18.3%) elderly and 17 (1.2%) pregnant women.

The percentage of overweight was high in all life cycles, but adults had the highest prevalence (59.4%), while the elderly had the highest prevalence of low weight (21.2%) and short height (48.6%). Regarding the cardiometabolic risk, 86.3% of the elderly and 69.8% of the adults presented an increased risk (Table 3).

Table 3: Nutritional status according to body mass index, height-for-age index and waist-to-height ratio in children, adolescents, adults, elderly and pregnant women surveyed. Tocantins, Brazil, 2016/2017. (n=1393).

Nutritional Status	Child	Adolescent	Adult	Elderly	Pregnant Women
	(n=226)	(n=216)	(n=679)	(n=255)	(n=17)
	n(%)	n(%)	n(%)	n(%)	n(%)
Short height	11 (4,9)	13 (6,0)	137 (21,0)	124(48,6)	2 (11,8)
Low weight	07 (3,1)	15 (6,9)	19 (2,8)	54 (21,2)	3 (17,7)
Eutrophy	164 (72,6)	156 (72,2)	257 (37,8)	103 (40,4)	5 (29,4)
Overweight	39 (17,3)	33 (15,3)	247 (36,4)	35 (13,7)	6 (35,2)
Obesity	16 (7,0)	12 (5,6)	156 (23,0)	63 (24,7)	3 (17,7)
Cardiometabolic Risk	--*	29 (13,4)	474 (69,8)	220 (86,3)	--*

DISCUSSION

The identification of determinants associated to FNS is based on information such as nutritional status, sociodemographic conditions, basic sanitation, Human Development -Index and public policies (KEPPLE, SEGALL-CORRÊA, 2011; ALIAGA, CHAVES, 2014; AZEVEDO, RIBAS, 2016). We understand, therefore, that FNS depends on individual and household factors, which are affected by local and regional determinants (KEPPLE, SEGALL-CORRÊA, 2011).

We have verified in this study the increased prevalence of food insecurity in the cities assessed (63.4%), which was higher than that of the NHSS in 2013, which indicated that 36.1% of households in the north region were food insecure, being Tocantins, the third state with the highest rates, behind only Amazonas and Pará (IBGE, 2014). These findings confirm NHSS' (2013) information that despite the reduction in the prevalence of food insecurity in the country, the North and Northeast regions and the urban area of the North continue to be more prevalent in moderate and severe food insecurity (IBGE, 2014). Thus, the National Food and Nutrition Security Policy seeks to consolidate public policies in these regions (ROCHA, LIMA, ALMEIDA, 2014).

Brazil is a country with high social inequality, and regions with greater disparities in income distribution contribute to the poorer health conditions of the population. Because they live in the same socioeconomic, cultural and environmental context, individuals from the same region are more similar in relation to health problems than those from another location (ALVES, LEITE, MACHADO, 2010). These conditions could be noted in this research, since the micro-regions that presented the highest prevalence of food insecurity, coincide with those with worse socioeconomic conditions, verified from the MHD, Gini Index, GDP per capita and basic sanitation situation.

The price of food is also a determinant factor of food and nutritional (in)security. The Inter-Union Department of Statistics and Socioeconomic Studies (IUDSSS) calculates the monthly price of the Basic Food Basket, elaborated according to Decree Law no. 399, of April 30, 1938. This same decree defined that the basic food basket is composed of 13 foods stipulated according with regional dietary habits and in quantities that provide for one month the need for an adult worker (DIEESE, 2016). When IUDSSS compared the cost of the national basic food basket with the liquid minimum wage, it was found that the Brazilian wage earner compromised on average 48.89% of his income in December 2016 and 42.52% in December 2017, with feeding (DIEESE, 2017).

One of the reasons for the country's hunger is the difficulty of access to basic foods due to inequalities in Brazil's socioeconomic structure, thus causing food insecurity (NEDER, FILHO, SOUZA, 2015). We observed in this study that an expressive part of the sample has low income for the acquisition of foods that meet the needs of the families, since 38.8% of them have *per capita* income of up to ½ minimum wage, in addition, we can emphasize that the micro-region that has the lowest *per capita* GDP value, besides other unsatisfactory social indicators, is the one that presented the

highest average price of the basic basket. All these aspects highlight the impact of price and access to basic foods in the food security situation of families.

The 2006 National Survey of Demographics and Health of Children and Women (NSDH) and NHHS of 2013 presented socio-demographic characteristics of the head of family that determine higher degree of vulnerability to food insecurity, such as female heads of family and/or browns, blacks, low education, and households with higher numbers of residents (BRASIL, 2009; IBGE, 2014). These characteristics are also observed in part of the households assessed in this study and may help to explain the high percentage of food insecurity found in the sample. Studies have used women in the situation of head of family as an indicator of the feminization of poverty (BITTENCOURT, et al.; 2013), and among the conditions attributed to the association between female heads of family and food insecurity, we emphasize that the average income *per capita* in households headed by women is lower when compared to male-headed households and the possibility of food insecurity is higher when lower maternal education (FACCHINI, et al.; 2014).

In addition, low levels of education make it difficult to enter the labor market, impacting family income, thus impairing the improvement of food insecurity (ALMEIDA, et al.; 2017), making clear the social, ethnic and socioeconomic determination (MORAIS, et al.; 2014; BEZERRA, OLINDA, PEDRAZA, 2017) of this condition. This reinforces the importance of collecting socioeconomic information, family composition and cultural aspects besides the application of BFIS, in order to better characterize the determinants of household food insecurity (IBGE, 2014).

In relation to the frequency of households in this sample that were at the poverty line, the data are similar to those of the continuous NHSS of 2016, which pointed out that 25.4% of Brazilians and 32.7% of Tocantins residents were in poverty, with higher prevalences in households in the interior of the states compared to capitals. Therefore, knowing the differences of regional inequalities is important to indicate the places with greater economic difficulties due to lack of access to financial resources (IBGE, 2017).

According to the Food Security Information Report of the Ministry of Social Development - MSD, in the state of Tocantins, 122.774 families are beneficiaries of the *Bolsa Família* Program, of which 85,786 (69.9%) have monthly income *per capita* of up to R\$ 85,00 (BRASIL, 2018). In the sample surveyed, we observed that 19.3% of families received this benefit, of which 27.8% had up to $\frac{1}{4}$ of the *per capita* minimum wage, and 41.7% were in the Bico do Papagaio region, which

presented a high percentage of food insecurity. Such information demonstrates the social vulnerability of a significant portion of Tocantins population.

We observed in this study a high percentage of households and cities that did not have a sewage network. According to NHSS continuous data, in 2016, 84.9% of the Brazilian population had water supply, 89.5% of garbage collection and 63.7% had access to sanitary sewage by collecting or rainwater network, that is, the sewage was removed from the home, however, not meaning that it was adequately treated (IBGE, 2017). The precariousness or lack of basic sanitation is one of the factors that contributes to the inadequate biological utilization of nutrients contained in food, thus compromising the food and nutritional security of individuals (PANELLI-MARTINS, SANTOS, ASSOS, 2008).

People living in poor housing conditions, lacking access to basic sanitation, as well as the number and age of people living in the same household are related to access to food. Thus, the difficulties of access to food added to social inequalities compromise the health and food security of families in different regions of Brazil, including in Tocantins (BRASIL, 2009).

Most of the families surveyed produced food in the backyard. Problems of food insecurity commonly occur in social segments with greater difficulty in accessing food, either due to the financial condition or the inability to produce food for self consumption (GUERRA, et al.; 2013). It should be emphasized, therefore, that the production of food for own consumption can be a mechanism to protect against food insecurity, by allowing a greater supply and access to food (ROCHA, LIMA, ALMEIDA, 2014).

An analysis of the nutritional status of the Brazilian population by the Family Budget Survey (FBS 2008-2009) showed a prevalence of 6.8% of height deficit and 4.1% of weight deficit among children aged 5 to 9 years and 3.4% of weight deficit in adolescents. On the other hand, overweight has reached about a third of the children, with a prevalence of 25% in the North region and about one-fifth of adolescents with a prevalence of 16% in the North region (IBGE, 2010). This analysis, when compared to the present study, indicates that the sample assessed has lower proportions of weight and height deficits, with a similar prevalence of overweight in children, and higher percentages of deficits and excess weight in adolescents, alerting to the importance of local health promotion actions since childhood and adolescence.

Regarding adults, the FBS presented a prevalence of weight deficit of 2.7%, and about 50% of excess weight, which is similar to that found in this study. In recent decades, there has been a reduction in the prevalence of weight deficit in parallel with the increase of overweight in children, adolescents and adults in all Brazilian regions (IBGE, 2010).

One study showed that the FBS also reports that the elderly presented a high prevalence of overweight, as in this research, while low weight showed a relationship directly proportional to the advancement of age, with more expressive proportions of the nutritional deficit in the long-lived elderly (PEREIRA, SPYRIDES, ANDRADE, 2016). Environmental, cultural and socioeconomic characteristics can affect the quality of life of the elderly, and access and/or availability of food, affecting their food choices throughout life and impacting their nutritional status (FARES, et al.; 2012).

The Food and Nutrition Surveillance System (FNSS) presented in its reports for the year 2017 a prevalence of 17.4% of pregnant women with low weight in Brazil, 19.66% in the north region and 20.2% in the state of Tocantins, as well as 44.7% of overweight in pregnant women from all over the country, 39.1% in the north region and 38.0% in Tocantins (BRASIL, 2018). These percentages approximate those of this sample with regard to low weight, whereas the proportion of overweight in pregnant women found in this study was higher than the prevalences reported for Brazil, north region and Tocantins.

There is a high percentage of adults and elderly with cardiometabolic risk observed from the waist/height ratio indicator. We know that food insecurity is not only related to weight deficit or nutritional deficiencies, but also to cardiometabolic risk factors developed from childhood and adolescence (ROCHA, et al.; 2016).

We should highlight that overweight was frequent in all micro-regions of the state, and we found high prevalences of overweight, low weight and short height even in the micro-regions where food insecurity is more prevalent and social indicators show the worst results, thus suggesting that both access to food and the quantity and quality of food impact on the food and nutritional security of individuals, even in the most vulnerable regions and families. In addition, malnutrition, micronutrient deficiency and overweight can coexist not only in the same region, but also in the same household, characterizing the nutritional transition (SALES-PERES, et al.; 2010). Ensuring adequate nutritional status is one of the objectives of food and nutritional security, so it is important

to identify indicators that assess both the right of access to food and the conditions of this access and its consequences on the health and nutrition status of individuals (OLIVEIRA, et al.; 2009).

The data presented point to the need to implement social policies at the local level, as well as strengthening MCFS in the cities assessed. However, the empowerment of councilors is paramount in order to enable them to exercise social control of FNS policies effectively (SIQUEIRA, et al.; 2011), and we emphasize that the broad reach of FNS requires intersectoral policies and programs that promote access to adequate food through decentralization, territorialization and social participation (VASCONCELLOS, MOURA, 2018) in accordance with the principles and guidelines of Food and Nutrition Security System.

CONCLUSION

This study provided a comprehensive diagnosis of food insecurity, socioeconomic, demographic and nutritional conditions of families living in the urban area of Tocantins. Food insecurity can be considered a public health problem for the state, since it reaches a significant portion of the population. Characteristics of head of family, *per capita* family income, receipt of socio-welfare benefits, basic sanitation conditions and nutritional status may be related to the situation of vulnerability and food insecurity of households.

We can also highlight that micro-regions with higher prevalence of food insecurity also present worrying conditions regarding social indicators, basic sanitation and nutritional status. Therefore, these factors must be considered in order to understand the determinants and implications of food and nutritional (in)security, to contemplate this phenomenon more comprehensively, to identify vulnerable families and to assist in the planning and implementation of local public policies to reduce social inequalities and improvement of food and health conditions of the population.

In this context, the production of knowledge is essential both for the advances and the confrontation of the problems related to food and nutritional (in)security in the cities and state. In addition, we reinforce the need for the commitment of municipal managers to the FNS policy agenda, for an intersectoral work and participation and social control, since these are essential requirements for the promotion of FNS. Finally, it is necessary to create FNS Municipal Plans as an

instrument for planning and guiding the implementation of the Public Policies for Food and Nutrition Security in the cities.

Acknowledgements: To the Coordination of Improvement of Higher Level Personnel - CAPES (DINTER UFV / UFT) for support to research. This work was supported by the Ministry of Social Development - MDS (grant number: TED nº 08/2014).

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