

## Food Insecurity among indigenous families of Dourados, Mato Grosso do Sul, Brazil

Insegurança Alimentar entre famílias indígenas de Dourados, Mato Grosso do Sul, Brasil

Inseguridad alimentaria entre las familias indígenas de Dourados, Mato Grosso do Sul, Brasil

### RESUMO

Objetivo: Estudo transversal realizado no período de junho a outubro de 2013 com 435 famílias indígenas residentes nas Aldeias Jaguapiru e Bororó, pertencentes ao município de Dourados (MS). O objetivo do estudo foi estimar a prevalência de insegurança alimentar e identificar os possíveis fatores associados. Para mensuração da Insegurança Alimentar utilizou-se a Escala Curta de Segurança Alimentar e também foi aplicado um questionário padronizado sobre a situação sócio-econômica e demográfica. Para análise estatística foram utilizados os testes de Qui-quadrado, exato de Fischer e de tendência linear. A prevalência de insegurança alimentar foi de 64,1% (IC 95% = 59,8% - 68,7%), sendo que 27,1% foram classificados em insegurança alimentar sem fome e 37% em insegurança alimentar com fome. Dentre as variáveis independentes sócio-demográficas, a escolaridade, o nível socioeconômico, o número de moradores, a presença de trabalho remunerado o ano todo foram estatisticamente significativos. A aldeia Bororó apresentou piores condições socioeconômicas e maior prevalência de insegurança alimentar. A elevada prevalência de insegurança alimentar encontrada demonstra uma situação preocupante que as famílias vivenciam na reserva de Dourados.

**PALAVRAS-CHAVE:** Insegurança alimentar, indígenas, Jaguapiru, Bororó.

### ABSTRACT

Objective: Cross study performed during June to October of 2013 with 435 indigenous families residents in villages Jaguapiru and Bororó, belonging to the city of Dourados (MS). The aim of the study was to estimate the prevalence of food insecurity and to identify the possible associated factors. To measure of Food Insecurity we used the Short Scale Food Security and a standardized questionnaire on socio-economic and demographic situation. For Statistical analysis used for tests were Chi-square, right of Fischer and linear trend. The prevalence of food insecurity was 64.1% (IC 95% = 59.8% - 68.7%), and 27.1% were classified as no hunger food insecurity and 37% on food insecurity hungry. Among the socio-demographic independent variables, education, socioeconomic status, number of residents, the presence of paid work all year were statistically significant. The Bororo village had low socioeconomic status and higher prevalence of food insecurity. The high prevalence of food insecurity found show an alarming situation that families experience in booking of Dourados.

**KEYWORDS:** Food insecurity, Indian, Jaguapiru, Bororó.

### RESUMEN

Objetivo: Estudio transversal realizado entre junio y octubre de 2013 con 435 familias indígenas residentes en las Aldeas de Jaguapiru y Bororó, en el municipio de Dourados (MS). El objetivo del estudio fue estimar la prevalencia de inseguridad alimentaria e identificar posibles factores asociados. Se utilizó la Escala Breve de Seguridad Alimentaria para medir la inseguridad alimentaria y también se aplicó un cuestionario estandarizado sobre la situación socioeconómica y demográfica. Para el análisis estadístico se utilizaron las pruebas de Chi-cuadrado, exacta de Fischer y de tendencia lineal. La prevalencia de la inseguridad alimentaria fue del 64,1% (IC 95% = 59,8% - 68,7%), con un 27,1% clasificado como inseguridad alimentaria sin hambre y un 37% como inseguridad alimentaria con hambre. Entre las variables sociodemográficas independientes, la escolaridad, el nivel socioeconómico, el número de residentes y la presencia de trabajo remunerado a lo largo del año fueron estadísticamente significativas. La aldea de Bororó presentaba las peores condiciones socioeconómicas y la mayor prevalencia de inseguridad alimentaria. La alta prevalencia de inseguridad alimentaria encontrada demuestra la preocupante situación vivida por las familias de la reserva de Dourados.

**PALABRAS CLAVE:** Inseguridad alimentaria, indígena, Jaguapiru, Bororó.

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**INTRODUCTION**

In Brazil, the indigenous population is estimated at approximately 1.7 million individuals and more than half of them live in the Amazon. 1 Among them, there are those who live in a situation of relative sociolinguistic and territorial “isolation”, and those who have close contact with the non-indigenous population. Some cluster on impossibly small lands; others live on the outskirts and slums of small cities or large metropolises; Still others have adequate and sufficient spaces for their physical and cultural reproduction, but live with the most diverse internal and external threats and pressures. Some groups can be considered more privileged in terms of assistance (governmental or non-governmental) and others, on the other hand, present themselves in a situation of abandonment, vulnerability and almost social “invisibility”.<sup>2</sup>

Mato Grosso do Sul (MS) is the state with the third largest indigenous contingent in the country, estimated at approximately 116 thousand people. In the city of Dourados, MS, there are around 15 thousand indigenous people living in the villages Bororó, Jaguapirú, Panambizinho and Porto Cambira. The villages with the largest population are Bororó and Jaguapirú with approximately 13 thousand indigenous people, represented by the Kaiowá, Nandeva and Terena ethnic groups.<sup>1</sup>

The Terenas and the Nandeva basically occupy the Jaguapirú village, which has better socioeconomic development. The Kaiowá predominantly inhabit the Bororó

village, which presents conditions of extreme poverty and scarcity. In addition to the ethnic differences that permeate these tribes in Dourados, there is a dispute over land and leadership, these ethnic groups present different behavior and compete with each other.<sup>3</sup>

Regarding the food of indigenous peoples, in the past they depended, to a greater or lesser extent, on agriculture, hunting, fishing and gathering for their subsistence. Due to several factors, the lifestyle of these people has undergone profound changes, altering subsistence systems, which has resulted in food shortages and poor nutrition, compromising food security.<sup>4</sup>

Food security is described as regular and permanent access to quality food, in sufficient quantity, without compromising access to other essential needs, based on health-promoting dietary practices that respect cultural diversity and are socially, economically and environmentally sustainable.<sup>5</sup>

The right to adequate food is provided for in the Universal Declaration of Human Rights 6, in the Federal Constitution, defined by the Organic Law on Food and Nutritional Security (LOSAN) 7, as well as in article 11 of the United Nations International Covenant on Economic, Social and Cultural Rights. 8 Public authorities must adopt necessary policies and actions to promote and guarantee food and nutritional security for the population.<sup>7,8</sup>

Among the guidelines of the National Food and Nutritional Security Plan 2016-2019 (PLANSAN), one of them addresses the promotion, universalization and coordination of food and nutritional security

actions aimed at indigenous communities.<sup>9</sup>

As a consequence, food insecurity (FI) can generate quantitative and/or qualitative deficiencies in food consumption, constituting a problem in the health and nutritional conditions of indigenous people. Data show a worrying scenario regarding the food and nutrition conditions of these people<sup>10,11,12,13,14,15</sup>, with prevalence of malnutrition and anemia in children and overweight and obesity in adults.

Scales that assess AI have been proposed with the aim of monitoring and evaluating the impact of programs or strategies that aim to reduce the situation of hunger or poverty in different populations. It was adapted from the US Department of Agriculture scale 16 a national instrument, the Brazilian Food Insecurity Scale (EBIA - Escala Brasileira de Insegurança Alimentar).<sup>17</sup> From this, reduced and adapted versions were created, such as Blumberg's<sup>18</sup> who developed a short scale containing six questions, called the Short Food Security Scale.

There are few studies on FI in indigenous populations in Brazil, and the lack of this knowledge hinders the development of actions to improve quality of life and nutrition. From this perspective, the objective of the present study was to compare the prevalence of AI and its possible associated factors among indigenous families from the Jaguapirú and Bororó villages in the city of Dourados, MS.

**METHODS**

A cross-sectional population study was carried out in the villages Bororó and Ja-

**Table 1 – Food Safety Short Scale Question**

QUESTIONS	Answers that score
1 - Have you ever run out of food and didn't have the money to buy more?	YES
2 - Can you offer a varied diet, with beans, rice, meat, salads and fruits for your family?	NO
3 - Have you or anyone else in your home had to reduce the amount of food or not eat a meal due to lack of money to buy more?	YES
4 - IF YES: In how many months did this happen?	> 2 months
5 - Did you eat less than you wanted because you didn't have money to buy more?	YES
6 - Did you feel hungry, but didn't eat because you didn't have money to buy more food?	YES

Source: Bickel et al.<sup>16</sup>

guapirú, located in the indigenous reserve of Dourados, MS. The sample population was selected among indigenous women responsible for the selected households.

To carry out probabilistic sampling proportional to the number of households in the villages, the EPI-INFO version 7.0 program was used. The parameters for calculating the sample were: number of households in the villages, prevalence of food insecurity estimated at 75.5% for indigenous people in Brazil 10 as a reference, 5% accuracy and 95% confidence.

The required sample size was 257 households, with the inclusion of 20% losses

the sample was expanded to 309 households. As this work is part of a larger study, 500 households were estimated.

A list containing the registration of households taken from a map of the villages was used for the draw.<sup>19</sup> O sorteio foi realizado através de amostra aleatória simples pelo programa SPSS versão 21. The selected households were located during data collection using a Garmin eTrex® GPS.

Of the 500 eligible households drawn, 435 (87%) were found for the present study.

Data collection was carried out by students from the Master's Degree in Health

Sciences, the Multiprofessional Residency in Health and students from the undergraduate course in Nutrition at the Federal University of Grande Dourados (UFGD), who were divided into three teams, each with an indigenous translator with knowledge of local indigenous languages to assist in communicating with families.

The teams and translators were properly trained in the standardization and application of the questionnaire. When it was necessary to translate the questionnaire, this was carried out after the interviewers had read each question, and the same was repeated by the translator in the local lan-

Table 2 – Score for FI classification.

Score	Classification
0 - 1	Food safety
2 - 4	Food insecurity without hunger
5 - 6	Food insecurity with hunger

Source: Bickel et al.<sup>16</sup>

guage, faithfully to the original. In case of absence of the person responsible for the household, the team returned up to three times to the same household before considering sample loss.

A pilot study was carried out to verify the suitability of the questionnaire for the study objectives. The test sample was represented by 10 households from an indigenous camp (not included in the sample), where questionnaires were administered to evaluate their performance/functionality. After the pilot study, modifications were made to the questionnaire deemed necessary to implement the research itself.

A standardized and pre-coded questionnaire drawn from material used in the 1st National Indigenous Health Survey<sup>20</sup> was applied individually to women responsible for households.

Regarding the study variables, for the age of the interviewees, the date of birth was collected, which was transformed into years and was subsequently classified into three age groups (10-19 years; 20-59 years and 60 years or more). For education, data were collected on the series of studies, which were then converted into years of study, as follows: none, literacy for young people and adults in primary education. to the 4th. Year (0 to 4 years); 5th grade elementary school. to the 9th. year (5 to 8 years); secondary and higher education (more than 8 years).

The household questionnaire contained information on nineteen durable goods to classify the economic level according to the 1st National Indigenous Health Survey.<sup>21</sup> The economic level classification was carried out based on the quantity of durable goods in households through factor

analysis, using the principal components analysis technique. The result of the principal components analysis generated a value for each durable good that was multiplied by the number of items in each household, subsequently, this score was classified according to the tertile separator measure, with the first tertile representing the lowest socioeconomic level and the third tertile the highest socioeconomic level.

The women were asked about the number of residents in the homes, this data was divided into two categories: one to four people and five or more. They were also asked about the presence of paid work year-round by any resident (yes/no).

To measure FI, the Short Food Safety Scale was used<sup>18</sup>, which has six questions relating to the 12 months prior to the interview. Each question can generate one point and its sum varies from 0 to 6. Questions number 1, 3, 5 and 6 score based on the positive answer, number 2 for the negative answer and question 4 depends on the time of exposure to lack of food, as shown in Table 1. According to the score, families are classified into food security, food insecurity without hunger and food insecurity with hunger ( Table 2).

According to Santos et al.<sup>21</sup> the use of the short scale compared to the EBIA (Brazilian food security scale) can be positive, facilitating the development of studies whose purpose is to verify and/or monitor the food situation of Brazilian families. Studies show that the Short Food Security Scale is a simple, quick, low-cost and useful tool for monitoring food insecurity.<sup>18,21,22,23,24</sup>

The questionnaires were coded, reviewed and tabulated. The database was double entered into the Epi Data version

3.1 program.

The descriptive analysis was carried out using the STATA statistical package version 13. Initially, the frequencies of all socioeconomic and demographic characteristics were calculated according to the indigenous village. Next, the associations between AI and socioeconomic and demographic variables were investigated using the Pearson Chi-square test ( $\chi^2$ ), linear trend and Fisher's exact test (when expected < 5), with a significance level of 5% being statistically considered.

The research was approved by the Ethics and Research Committee of the Federal University of Grande Dourados (CEP/UFGD) - protocol no. 009/2011, National Research Ethics Commission (CONEP) - opinion no. 653/2011 with the consent of indigenous leaders. The women responsible for the household who agreed to participate in the study signed an Informed Consent Form (TCLE).

## RESULTS

The study was carried out from June to October 2013. Of the 435 families identified, 222 (51.1%) belonged to the Bororó village and 213 (48.9%) to the Jaguapirú village. The prevalence of AI was 64.1% (95% CI = 59.8% - 68.7%), with 27.1% classified as AI without hunger and 37% as AI with hunger. In relation to AI by village, the Bororó village had a higher prevalence (77.9%) compared to the Jaguapirú village (49.8%) ( $p < 0.001$ ). Regarding the magnitude of AI, the Bororó village revealed a higher prevalence of hungry AI (48.2% versus 25.4%) ( $p < 0.001$ ), while the Jaguapirú village presented similar values in relation

to the types of AI (Table 1).

Table 1 shows the characteristics of the families in relation to socioeconomic and demographic variables. Approximately 90% of women were aged between 20 and 59 years old. In relation to education, the majority (57.2%) had four years or less of study, and this percentage was higher in the Bororó village (65.8% against 49.0%), the Jaguapirú village stands out for having a higher percentage of women with longer years of study (more than eight years) when compared to the Bororó village (25.5% versus 9.8%) ( $p < 0.001$ ).

The socioeconomic classification was different in relation to the villages, with no family in Bororó found belonging to the third tertile (highest socioeconomic level) and in Jaguapirú there was none in the first tertile (lowest socioeconomic level). Regarding the number of residents in households, the distribution was similar between the villages, the majority of families (56.8%) had five or fewer residents. There is a predominance of absence of paid work all year round (58.4%) by a family member, in both villages. The

majority of families in the Bororó village (77.9%) and the Jaguapirú village (71.8%) receive some type of social benefit.

The main means of acquiring food were planting and raising animals, purchasing and receiving food parcels (Table 2). The majority of families in the two villages (89.4%) do not use hunting, fishing or gathering as a source of food, being higher in the Jaguapirú village (92.5%) ( $p = 0.044$ ).

The prevalence of FI, grouping the classification with and without hunger, were different according to socioeconomic and demographic characteristics (Table 3).

When the villages were studied together, there was a higher prevalence of AI among the elderly (84.2%) and lower among adolescents (41.2%) ( $p = 0.004$  and  $p = 0.001$ ), with the Bororó village showing no significant differences ( $p = 0.239$ ) unlike Jaguapirú ( $p = 0.004$  and  $p = 0.001$ ).

A decreasing trend in AI was noted, inversely proportional to the increase

in education, with these associations being statistically significant both in the villages independently and together ( $p < 0.001$ ). The prevalence of AI was higher among families with lower socioeconomic status (tertiles 1 and 2), but the differences were not significant in the separate villages (Bororó  $p = 0.091$  and Jaguapirú  $p = 0.143$ ).

Regarding the number of residents in the household, those with more than five residents are more food insecure (72.9% compared to 57.5%), the data are similar and significant both in the villages individually and together. The same was observed in the absence of paid work all year round as a source of income (76% versus 47.5%) ( $p < 0.001$ ). Families that received some type of social benefit were more food insecure in the villages combined (67.2% versus 55.0%) ( $p = 0.028$ ).

In relation to the source of food consumed, in the Jaguapirú village and in the villages together, hunting, fishing or gathering and receiving a basic food basket were related to the presence of food in-

<sup>1</sup> In this variable there were 13.5% losses

\*Pearson's Chi-square Test \*\*Test for Linear Trend \*\*\*Fisher's Exact Test

**Table 1 – Socioeconomic and demographic characteristics of the sample of indigenous families by village. Dourados, Mato Grosso do Sul, MS, 2013.**

Variables	Bororó (n=222) n (%)	Jaguapirú (n=213) n (%)	p value	Total (n=435) n (%)
<b>Woman's age (years)</b>			0,238*	
			0,648**	
10 – 19	19 (8,6)	15 (7,0)		34 (7,8)
20 - 59	190 (85,6)	192 (90,1)		382 (87,8)
≥ 60	13 (5,9)	6 (2,8)		19 (4,4)
<b>Women's education (years of study) <sup>1</sup></b>			<0,001*	
			< 0,001*	
0–4	121 (65,8)	94 (49,0)		215 (57,2)
5–8	45 (24,5)	49 (25,5)		94 (25,0)
> 8	18 (9,8)	49 (25,5)		67 (17,8)
<b>Socioeconomic level</b>			< 0,001*	
			<0,001**	
1st Tertile	144 (64,9)	-		144 (33,1)

2nd Tercile	78 (35,1)	68 (31,9)	146 (33,6)
3rd Tercile	-	145 (68,1)	145 (33,3)
<b>Number of residents</b>			0,335***
0-5	121 (54,5)	126 (59,2)	247 (56,8)
> 5	101 (45,5)	87 (40,8)	188 (43,2)
<b>Paid work all year round</b>			0,052***
Yes	82 (36,9)	99 (46,5)	181 (41,6)
Não	140 (63,1)	114 (53,5)	254 (58,4)
<b>Benefícios Sociais</b>			0,151***
Yes	173 (77,9)	153 (71,8)	326 (74,9)
Não	49 (22,1)	60 (28,2)	109 (25,1)
<b>Social Benefits</b>			< 0,001*
Security	49 (22,1)	107 (50,2)	156 (35,9)
Insecurity without hunger	66 (29,7)	52 (24,4)	118 (27,1)
Insecurity with hunger	107 (48,2)	54 (25,4)	161 (37,0)

**Table 2 – Source of food consumed in the sample of indigenous families by village. Dourados, Mato Grosso do Sul, MS, 2013.**

Source	Bororó (n=222)	Jaguapirú (n=213)	p value	Total (n=435)
<b>Plantation or animal husbandry</b>			0,024***	
Yes	147 (66,2)	118 (55,4)		265 (60,9)
No	75 (33,8)	95 (44,6)		170 (39,1)
<b>Hunting, fishing or gathering</b>			0,044***	
Yes	30 (13,5)	16 (7,5)		46 (10,6)
No	192 (86,5)	197 (92,5)		389 (89,4)
<b>Purchasing</b>			1,000***	
Yes	220 (99,1)	211 (99,1)		431 (99,1)
No	2 (0,9)	2 (0,9)		4 (0,9)
<b>Food parcel</b>			0,841***	
Yes	208 (93,7)	201 (94,4)		409 (94,0)
No	14 (6,3)	12 (5,6)		26 (6,0)

\*\*\* Fischer's exact test

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**Table 3 – Prevalence of food insecurity according to the socioeconomic and demographic characteristics of indigenous families by village. Dourados, Mato Grosso do Sul, MS, 2013.**

Variables	Bororó (n=222)			Jaguapirú (n=213)			Total (n=435)		
	Total n(%)	FI n (%)	p value	Total n(%)	FI n (%)	p valor	Total n(%)	FI n (%)	p value
<b>Age (years)</b>			0,239*			0,004*			0,004*
			0,117**			0,001**			0,001**
10 – 19	19 (8,6)	12 (63,2)		15 (7,0)	2 (13,3)		34 (7,8)	14 (41,2)	
20 - 59	190 (85,6)	150 (78,9)		192 (90,1)	99 (51,6)		382 (87,8)	249 (65,2)	
≥ 60	13 (5,9)	11 (84,6)		6 (2,8)	5 (83,3)		19 (4,4)	16 (84,2)	
<b>Education (years of study)<sup>1</sup></b>			< 0,001*			< 0,001*			< 0,001*
			< 0,001**			< 0,001**			< 0,001**
0–4	121 (65,8)	109 (90,1)		94 (49,0)	61 (64,9)		215 (57,2)	170 (79,1)	
5–8	45 (24,5)	31 (68,9)		49 (25,5)	21 (42,9)		94 (25,0)	52 (55,3)	
> 8	18 (9,8)	4 (22,2)		49 (25,5)	13 (26,5)		67 (17,8)	17 (25,4)	
<b>Socioeconomic level</b>			0,091**			0,143***			< 0,001*
									< 0,001**
1st Tercile	144 (64,9)	107 (74,3)		-	-		144 (33,1)	107 (74,3)	
2nd Tercile	78 (35,1)	66 (84,6)		68 (31,9)	39 (57,4)		146 (33,6)	105 (71,9)	
3rd Tercile	-	-		145 (68,1)	67 (46,2)		145 (33,3)	67 (46,2)	
<b>Number of residents</b>			0,023***			0,037***			0,001***
0–5	121 (54,5)	87 (71,9)		126 (59,2)	55 (43,7)		247 (56,8)	142 (57,5)	
> 5	101 (45,5)	86 (85,1)		87 (40,8)	51 (58,6)		188 (43,2)	137 (72,9)	
<b>Paid work all year round</b>			<0,001***			0,001***			<0,001***
Yes	82 (36,9)	49 (59,8)		99 (46,5)	37 (37,4)		181 (41,6)	86 (47,5)	
No	140 (63,1)	124 (88,6)		114 (53,5)	69 (60,5)		254 (58,4)	193 (76,0)	
<b>Social Benefits</b>			0,561***			0,004***			0,028***
Yes	173 (77,9)	133 (76,9)		153 (71,8)	86 (56,2)		326 (74,9)	219 (67,2)	
No	49 (22,1)	40 (81,6)		60 (28,2)	20 (33,3)		109 (25,1)	60 (55,0)	



**Table 4 – Prevalence of FI according to the source of food consumed in the sample of indigenous families per village. Dourados, Mato Grosso do Sul, MS, 2013**

Source	Bororó (n=222)			Jaguapirú (n=213)			Total (n=435)		
	Total n (%)	FI n (%)	p value	Total n (%)	FI n (%)	p value	Total n (%)	FI n (%)	p value
<b>Plantation or animal husbandry</b>			1,000			0,169			0,103
Yes	147 (66,2)	114 (77,6)		118 (55,4)	64 (54,2)		265 (60,9)	178 (67,2)	
No	75 (33,8)	59 (78,7)		95 (44,6)	42 (44,2)		170 (39,1)	101 (59,4)	
<b>Hunting, fishing or gathering</b>			0,816			0,040			0,076
Yes	30 (13,5)	23 (76,7)		16 (7,5)	12 (75,0)		46 (10,6)	35 (76,1)	
No	192 (86,5)	150 (78,1)		197 (95,5)	94 (47,7)		389 (89,4)	244 (62,7)	
<b>Purchasing</b>			1,000			02,46			0,302
Yes	220 (99,1)	171 (77,7)		211 (99,1)	104 (49,3)		431 (99,1)	275 (63,8)	
No	2 (0,9)	2 (100,0)		2 (0,9)	2 (100,0)		4 (0,9)	4 (100,0)	
<b>Food Parcel</b>			1,000			0,017			0,141
Yes	208 (93,7)	162 (77,9)		201 (94,4)	104 (51,7)		409 (94,0)	266 (65,0)	
No	14 (6,3)	11 (78,6)		12 (5,6)	2 (16,7)		26 (6,0)	13 (50,0)	

security, but statistically significant only in the Jaguapirú village (p=0.040 and p=0.017).

## DISCUSSION

The present study investigated the prevalence of AI in indigenous families living in the Jaguapirú and Bororó villages of the

indigenous reserve in the municipality of Dourados, using the Short Food Security Scale, which has six questions relating to the 12 months prior to the interview. The method used is proposed by the USDA and in the United States it was purchased with another scale containing 18 questions and proved to be a good tool for tracking Food Insecurity.<sup>17</sup> However, this method makes it

difficult to compare with other studies carried out in Brazil in which EBIA was used.

Among the 435 families identified, the majority of them presented some degree of food insecurity (64.1%). The high prevalence of food insecurity found demonstrates a worrying situation that families experience in the Dourados reserve. The indigenous population has sociocultu-



ral particularities that vary according to ethnicity. The results show that although the villages are extremely close, they have different conditions, possibly because the Jaguapirú village is predominantly inhabited by Terenas and Nandeva indigenous people, while Bororó is mainly inhabited by the Kaiowá. In the past, the Terenas adapted better to the new way of life they were subjected to, which resulted in a better economic and social situation.<sup>25</sup>

Data on AI in indigenous populations is scarce; in Brazil, we have the work carried out by Fávoro et al.<sup>10</sup>, who analyzed the prevalence of food insecurity in indigenous families that included children under 60 months of age and identified 75.5% of FI, with these families being exposed to deprivation in both the quality and quantity of food in the diet.

Among international studies with indigenous populations, two studies were found, one carried out in Australia by Markwick<sup>26</sup>, in which 20.3% of indigenous people had IA and another carried out in Canada by Willows et al.<sup>27</sup> in which 33% of indigenous families presented some degree of FI. These studies also compared the prevalence of dietary FI between indigenous and non-indigenous people and found that it was almost four times superior in indigenous people.

Of the studies carried out with populations with the same profile, that of Pimentel et al.<sup>28</sup> carried out with non-indigenous families from a region with extreme poverty rates identified 53.8% of FI.

The prevalence of AI in the present study was slightly lower than that found by Fávoro et al.<sup>10</sup> with indigenous people in Brazil, but

superior to studies with non-indigenous people in Brazil and indigenous people from other countries. However, these prevalences would not be comparable to this study, since the methodology and sample were different.

Regarding socioeconomic and demographic conditions, differences are visible between the villages, Bororó presented worse results in relation to education, to the economic condition and the presence of paid work all year round by a member of the family, in addition to the percentages of eating FI that were higher in this village (77.9%), especially of hungry FI (48.2%).

In relation to the source of food, most families depend on purchasing (99.1%) and receiving a basic food basket (94%) for food. Only 10.6% of families use hunting, fishing and gathering for subsistence. These changes are due to the changes that these people have undergone. In the Dourados reserve, indigenous people live in a situation of territorial confinement, which makes it impossible to produce their own food.

Santos et al.<sup>29</sup> in a study carried out in Rio Grande do Sul, they found higher prevalence of FI when the head of the family had less than 4 years of education and also in families with economic classification E. Markwick et al.<sup>26</sup> found that FI was strongly associated with lower family income and that for each reduction in the income range, FI showed an increase. This finding was also found in the study by Panigassi et al.<sup>30</sup> where the prevalence of AI was higher in families with a greater number of members, lower income and lower education. Therefore, bosses with education below elementary school level were 4.6 times more likely to have mild FI

and 8.4 times more likely to have moderate and severe FI, when compared to those with higher education. In the study by Pimentel et al.<sup>28</sup> the variables of per capita monthly family income, education of the head of the family, socioeconomic level and number of residents showed a significant association with food insecurity.

The results found in the present study reinforce these statements, since families in less favored socioeconomic conditions, with less education and greater family density had a higher prevalence of food insecurity.

Food insecurity affects a large portion of the world's population, especially populations in developing countries such as Brazil, and especially families in vulnerable situations, such as the indigenous population.<sup>31</sup> Ensuring adequate and healthy food in lands that do not have full conditions for physical and cultural survival is still a dilemma. Even people with already regularized lands face difficulties in promoting their food sovereignty.<sup>32</sup>

## CONCLUSION

It is extremely necessary to combat the inequalities that persist in specific population groups, in particular indigenous peoples, it is hoped that the results found can help in the development of actions to improve the quality of life and health aimed at these people. Actions related to Nutritional Surveillance and research on people's health and nutrition must be continuously carried out, as this information is important for directing public policies and health actions, both at the local and national level.

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