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Research Paper

Situation of Poverty and Vulnerability of the Population in the Context of the Tocantins-Araguaia Hydrographic Basin, Central-West Region of Brazil: a Technical and Spatialized Reading [1]

[1] Maria das Dôres Saraiva de Loreto
(Titular Professor at the Federal University of Viçosa, Campus Viçosa, Minas Gerais, Brazil)

[2]Aline Oliveira Silva
(Post Doctoral Student in The Department of Home Economics, Federal University of Viçosa, Campus Viçosa, Minas Gerais, Brazil)

[3] Luan Peroni Venêncio
(Post Doctoral Student in Agricultural Enginnering Department, Federal University of Viçosa, Campus Viçosa, Minas Gerais, Brazil)

[4] Rosária Cal Bastos
(Doctoral Student and Master in Home Economics at the Department of Home Economics, Federal University of Viçosa, Campus Viçosa, Minas Gerais, Brazil)

[5] Thayne Nárgyle Botelho Vital
(Student of Agricultural and Environmental Enginnering, Federal University of Viçosa, Campus Viçosa, Minas Gerais, Brazil)

Corresponding Author: Maria das Dores Saraiva de Loreto

ABSTRACT: *The aim of this article was to develop a spatialized technical reading of the situation of poverty and social vulnerability of individuals/families residing in the Central-West Region of the Tocantins Araguaia Basin. Therefore, based on bibliographic and documentary research, economic vulnerability indicators were selected, taking into account the proportion of people registered in CADÚNICO. For the collection of this indicator, the 178 municipalities that make up the territory of the Tocantins-Araguaia Basin, in the context of the Central-West Region, were adopted as the territorial reference unit. The results suggest a situation of social vulnerability in the municipalities, demonstrating the need for more investments, generating jobs and income, aiming to reduce the poverty rate and promote social inclusion.*
KEYWORDS: *Poverty, Social Vulnerability, CADÚNICO, Tocantins-Araguaia Basin.*

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I. INTRODUCTION

It is recognized that the term poverty not only implies a state of material deprivation, but also a way of life. In this sense, those with an income below the value established as the poverty line are considered poor, and are therefore incapable of meeting the set of needs considered minimal in a given society. On the other hand, the indigent represent a subset of the poor whose income cannot even meet nutritional needs. Ultimately, being poor means having insufficient income and not having the means to adequately operate the social group in which one lives [1].

The multidimensional character of poverty reinforces the need to consider that its causes and explanations are linked to historical, social and cultural issues. According to Carneiro [2], the main advantage for reading poverty, based on the income focus, consists in the possibility of identifying the target universe of the intervention and generating indicators for the construction of actions to fight poverty and social vulnerability.

In this sense, the government created the Cadastro Único (CADÚNICO) for Social Programs of the Federal Government, which is an instrument for the identification and socioeconomic characterization of low-income Brazilian families, used for various policies and social programs aimed at this audience. Through its database, it is possible to know who they are, where they are and what are the main characteristics, needs and potential of the poorest and most vulnerable part of the population. That is why, the Cadastro Único is an important tool for the articulation of the social promotion and protection network and also a fundamental mechanism for the integration of initiatives from different areas and in all spheres of the federation, which aim to promote social inclusion [3].

According to the Ministry of Social Development [3], this tool has been constantly improved and updated. This qualification work is the result of the improvement of shared management between the Union, states, municipalities and the Federal District, as well as the great effort of managers and technicians responsible for the Cadastro Único, in different administrative spheres. It is up to these actors the task of managing and executing the activities necessary for the proper functioning of the Cadastro Único, in its area of competence, coordinating the teams and activities to be developed and defining action strategies, in accordance with the guidelines of the Federal Government. Its performance is, therefore, essential for the consolidation of an effective social network and social promotion.

It is noteworthy that, for the Cadastro Único, low-income families, according to the MDS are those with: a) monthly family income of up to half the minimum wage per person (being considered in a situation of extreme poverty, families with monthly income per person up to R$ 89.00 and in a state of poverty, those with monthly income per person from R$ 89.01 to R$ 178.00); or b) monthly family income of up to three minimum wages in total. [3].

In addition, Decree No. 6135, of June 26, 2007, which regulates the Cadastro Único, also allows the registration of families with higher incomes, provided that their inclusion in the Cadastro Único is linked to participation in social programs implemented by the Union, by the states, municipalities and the Federal District. This possibility is especially important for social programs that seek to serve families whose vulnerable situation is not necessarily linked to income [3].

The Ministry of Social Development highlights that, since its creation, the Cadastro Único has been strengthened as an important management tool in the three spheres of government for the implementation of social programs, actions and services aimed at the low-income population, as contains information on: a) characteristics of the family and the household in which they reside, in terms of: family composition, address and characteristics of the household, access to public water, sanitation and electricity services, monthly expenses, in addition to belonging to groups traditional and specific populations, among others; b) characteristics of each of the family members, considering: education, labor market situation, disability, civil documentation and income, among others [3].

The MDS highlights that the national database of the Cadastro Único had, in 2017, information on approximately 40% of the Brazilian population. Therefore, it is considered a representative map of the poorest and most vulnerable families in our country. In addition, the information contained in the Cadastro Único is used by the Federal Government to identify and select beneficiaries of various social programs, including: the Bolsa Família Program (PBF); the Social Electricity Tariff (TSEE); the Continuous Cash Benefit (BPC); the Minha Casa Minha Vida Program; Exemption from entry fees in public tenders; Retirement for low-income people (Low Income Faculty); the Bolsa Verde Program; the Promotion and Technical Assistance Program for Rural Productive Activities; the Cisterns Program; and the National Agrarian Reform Program, among others. In other words, the use of the Cadastro Único is mandatory for all federal social programs aimed at the low-income population, with the exception of Social Security programs [3].

It is worth noting that, in Brazil, in May 2020, there were 28,782,308 families registered in the Cadúnico, which corresponds to 75,689,258 people registered. The distribution of registered families according to the declared monthly per capita income indicated that: 13,679,513 families had a per capita income of up to

R$ 89.00; while 2,788,197 had per capita family income between R$89.01 and R$178.00; and 6,000,613 with per capita family income between R$ 178.01 and half the minimum wage [4].

Considering the study area in question, specifically the Tocantins-Araguaia Basin, in the Center-West Region of Brazil, involving the states of Goiás, Mato Grosso and Distrito Federal, data from the Cadúnico, in May 2020, showed that: a) Goiás presented 835,521 families (239,038, with per capita family income of up to R$ 89.00; 128,102, with per capita family income between R$ 89.01 and R$ 178.00; and 226,670, with per capita family income of R$ 178 .01 and a half minimum wage), which corresponds to a total of 2,124,658 people registered; b) Mato Grosso had 512,674 families (128,380, with per capita family income of up to R$ 89.00; 69,295, with per capita family income between R$ 89.01 and R$ 178.00; and 138,850, with per capita income family capital between R$ 178.01 and half the minimum wage), corresponding to 1,255,281 individuals enrolled in the Cadúnico; c) In turn, the Federal District had a total of 167,752 registered families (78,006, with per capita family income of up to R$ 89.00; 20,889, with per capita family income between R$ 89.01 and R$ 178 .00; and 35,426, with per capita family income between R$ 178.01 and half the minimum wage), with a total of 449,759 individuals registered in May 2020 [5;6;7].

It is understood that the technical reading of this database of the population in poverty, combined with its spatialization, is, above all, a mechanism that gives visibility to the most vulnerable population in each municipality in the territory, making it possible to map their needs and, at the same time, promoting the integration of actions from different areas, aiming at the social inclusion of the basin's population.

This type of methodological approach, of description and spatialization, through socioeconomic indicators, is defended by different authors, such as Cansi [8], Novaes et al [9], Fonseca and Aguiar [10], Souza and Ribeiro [11], Silva et al [12], Carvalho et al [13], Coelho et al [14], Silva and Fracolli [15], Azevedo et al [16], who highlight the concern related to the conceptual and methodological improvement of more specific instruments of quantification and qualification of living conditions and other dimensions of social reality, with the purpose of subsidizing the socioeconomic and environmental diagnosis and, at the same time, supporting the process of formulation, implementation, monitoring and evaluation of regional development policies. In other words, reading socioeconomic indicators can allow a picture of the living conditions of certain areas/social groups to be obtained, as well as allowing managers to formulate new strategies, set goals and develop action plans, showing themselves as a adequate way to influence decision-making and the formulation of public policies.

In this context, the objective of this article was to develop a specialized technical reading of the situation of poverty and social vulnerability of individuals/families residing in the Midwest Region of the Tocantins Araguaia Basin.

II. METHODOLOGICAL PROCEDURES

The present study is configured as a quantitative research, of a macro nature and of an exploratory and descriptive character. The execution involved a logical sequence of activities, for the characterization of the scenario, in the specific case, the territory of the Tocantins-Araguaia Basin, in the context of the Central-West Region of Brazil.

According to Bezerra [17], the Midwest Region is the second largest region in the country in terms of territorial extension, with an area of 1,606,399,509 km², which corresponds to 18.86% of the national territory. It houses three states and the Federal District whose capitals are: Mato Grosso (MT) – Cuiabá, Mato Grosso do Sul (MS) - Campo Grande, Goiás (GO) – Goiânia and the Federal District (DF) - Brasília. Its central position allows connection with all other Brazilian regions, in addition to bordering two South American countries, Bolivia and Paraguay.

In the context of the Central-West Region, the Tocantins-Araguaia Hydrographic Basin stands out, considered the largest hydrographic basin entirely in Brazil, selected as an empirical unit of analysis for the study, due to its socioeconomic and spatial conditions, as well as a planning strategy for government investments, aiming to minimize regional imbalances. According to ANA [18], the basin occupies an area of approximately 967,059 km², draining approximately 9.5% of the national territory, and its limits are as follows: a) South, Paraná-Paraguay basins; b) West, Xingu Basin; c) East, São Francisco Basin; d) Northeast, Parnaíba Basin. It involves the states of Goiás (21.4%), Mato Grosso (14.7%), Tocantins (30.2%), Maranhão (3.3%), Pará (30.3%) and the Federal District (0 .1%), totaling 409 municipalities, 94% of which are located in the hydrographic region (Table 01).

Table 01-Distribution of Areas in the Tocantins-Araguaia Hydrographic Basin

Federation Unit (UF)	UF Area in the Basin		Basin Area in UF (%)	Counties			
	(km^2)	(%)		Total		Headquartered in the Basin	
				(nº)	(%)	(nº)	(%)
Pará	278.073	30,3	22,3	79	19,3	73	92,4
Tocantins	277.621	30,2	100,0	139	34,0	139	100,0
Goiás	196.297	21,4	57,7	131	32,0	122	93,1
Mato Grosso	135.302	14,7	15,0	37	9,0	33	89,2
Maranhão	30.757	3,3	9,3	22	5,5	18	81,8
Distrito Federal	772	0,1	13,3	1	0,2	0	0,0
TOTAL	**918.822**	**100,0**	**----**	**409**	**100,0**	**385**	**94,1**

Source: ANA (2009)

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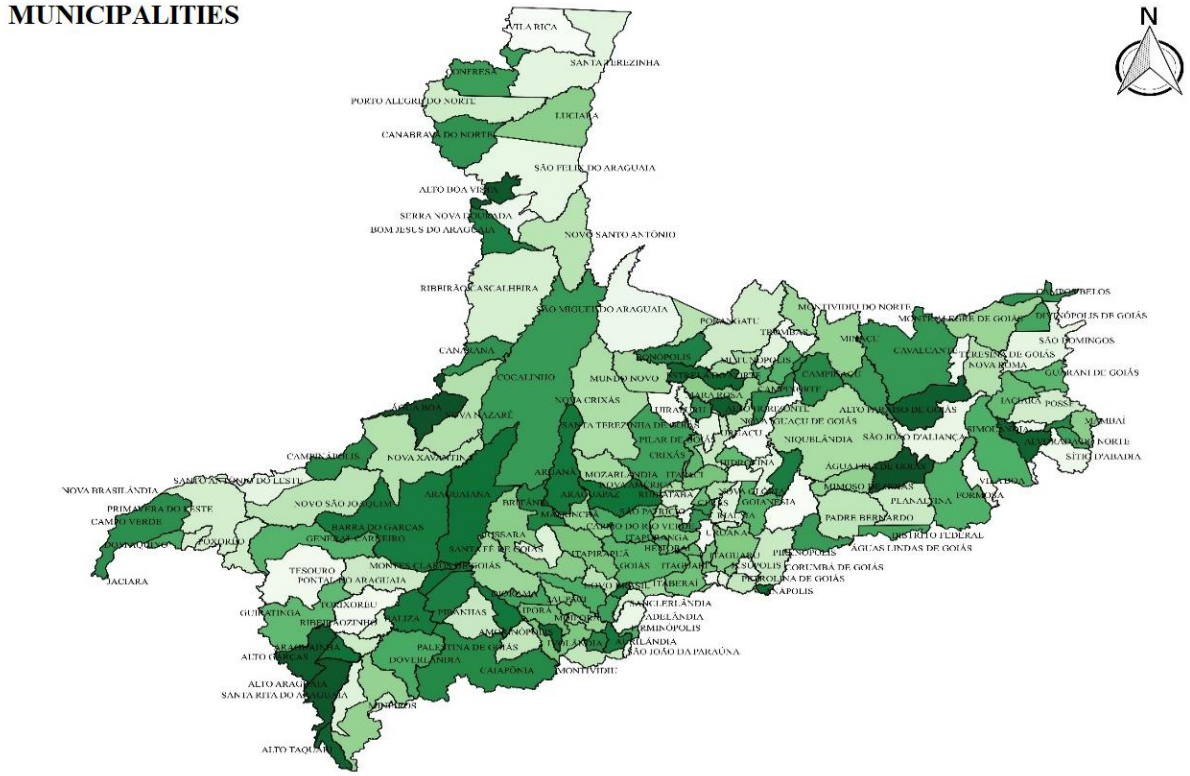
The study in question comprised a total of 178 municipalities (Figure 01), preferably in Goiás (77.5%), followed by Mato Grosso (21.9%) and the Federal District (0.6%).

Figure 01 - Municipalities belonging to the Tocantins Araguaia Basin, in the Midwest Region of Brazil



Source: Survey Data (2020).

For the selection of poverty and vulnerability indicators, a bibliographic and documental research was carried out, taking into account the proportion of people registered in CADÚNICO, which characterizes socioeconomically the Brazilian families in extreme poverty, poor and vulnerable, according to the income criterion

For the collection of these indicators, the 178 municipalities that make up the territory of the Tocantins-Araguaia Basin, in the context of the Central-West Region of Brazil, were adopted as the territorial reference unit. According to Silva and Fracolli [15], the importance of working with territory and, therefore, at the basin

level, is due to the fact that their conception "goes beyond the delimitation of a geographic space, as it is a scenario where procedurally, the life and work relationships of a population occur".

On the other hand, each municipality was considered a unit of analysis; because, as highlighted by Fonseca and Aguiar [10], the option for the scale of analysis by municipality is recommended because this is the level at which public policies (state or federal) have more effects, since it is, at the municipal level, that policy decisions are made and implemented.

The indicators were collected and systematized through consultations in the Ministry of Social Development's database. After the constitution of the database, organized in an Excel spreadsheet, descriptive statistics of the indicators was performed, in terms of mean and frequency, using the SPSS (Software Statistical Package for the Social Sciences) software, through graphical and tabular analyses. This survey provided a more comprehensive understanding of a given indicator, considering the existing information, in addition to allowing greater knowledge about the researched reality.

In the second stage of the research, spatial reading was performed, using the Geographic Information System (GIS), specifically QGIS 3.10, which allowed the visualization of data through thematic maps, referring to the indicators. As highlighted by Bondezan et al [19], Seffrin [20], Santos and Nour [21], Nunes [22], Almeida et al [23], Silva and Fracolli [15], among others, the delimitation of socioeconomic and environmental data in a certain geographic region it has become increasingly common due to the availability of GIS, which makes it possible to focus on the different contexts of the territory, favoring knowing the place of the data; in addition to explaining the spatial distribution of problems and indicators of socioeconomic and environmental interaction, which are not addressed by traditional and classical models. Thus, they represent a georeferenced methodology for analyzing the basin's territory, through indicators/variables, with conditions to indicate the degree of human and socioeconomic development.

According to Barros Neto, et al [24], Geographic Information Systems (GIS) allow "capturing, modeling, retrieving, manipulating, consulting, presenting and analyzing databases connected to geographic information" or spatial data; enabling the spatialization of a phenomenon/indicator, to support the decision-making process. In other words, as pointed out by Silva et al [12], analysis through GIS is an important tool for planning and social management, and its use is fundamental for the better use of public resources aimed at the socio-environmental and economic area.

III. RESULTS AND DISCUSSION

III.I. Poverty and Vulnerability Indicators of Individuals Registered in the Cadúnico: The Reality of the Tocantins Araguaia Basin, in the Center-West Region

Based on data from the Ministry of Social Development, data referring to the CADÚNICO of the 178 municipalities, which are part of the Central-West Region of the Tocantins-Araguaia Basin, were collected, as well as the monthly per capita income of the individuals enrolled, as it may be seen in Table 02.

Table 02 – Poverty and Vulnerability Indicators of Individuals Registered in the CADÚNICO of the Tocantins Araguaia Basin, Midwest Region, 2020

COUNTIES	STATE	TOTAL PEOPLE REGISTERED IN THE REGISTER / POPULATION ESTIMATE	MONTHLY PER CAPITA INCOME BRL 0.00 TO BRL 89.00 / POPULATION ESTIMATE	MONTHLY PER CAPITA INCOME R$89.01 AND R$178.00 / POPULATION ESTIMATE	MONTHLY PER CAPITA INCOME R$ 178.01 AND 1/2 MINIMUM SALARY / POPULATION ESTIMATE	INDEX AVERAGE OF VULNERABILITY (%)
		APR/20				
ADELÂNDIA	GO	49,44%	17,13%	9,34%	14,23%	13,57%
ÁGUA FRIA DE GOIÁS	GO	48,96%	25,14%	6,38%	10,03%	13,85%
ÁGUAS LINDAS DE GOIÁS	GO	43,07%	28,64%	4,33%	7,00%	13,32%
ALTO HORIZONTE	GO	64,02%	26,13%	3,68%	16,84%	15,55%
ALTO PARAÍSO DE GOIÁS	GO	49,61%	9,98%	11,63%	18,72%	13,44%
ALVORADA DO NORTE	GO	52,67%	24,26%	8,30%	13,05%	15,20%
AMARALINA	GO	59,05%	28,12%	5,12%	17,47%	16,90%

AMERICANO DO BRASIL	GO	35,13%	14,42%	5,55%	10,31%	10,09%
AMORINÓPOLIS	GO	52,08%	34,77%	2,82%	5,34%	14,31%
ANÁPOLIS	GO	25,98%	1,66%	7,32%	11,97%	6,98%
ARAGARÇAS	GO	49,06%	30,13%	2,55%	6,95%	13,21%
ARAGUAPAZ	GO	52,12%	13,63%	10,76%	18,02%	14,14%
ARENÓPOLIS	GO	51,95%	13,67%	4,86%	18,03%	12,19%
ARUANÃ	GO	38,59%	8,01%	10,58%	12,12%	10,24%
AURILÂNDIA	GO	57,76%	18,75%	7,98%	16,06%	14,26%
BALIZA	GO	43,27%	13,29%	8,82%	10,94%	11,02%
BARRO ALTO	GO	38,44%	17,83%	4,83%	10,07%	10,91%
BOM JARDIM DE GOIÁS	GO	59,76%	28,03%	4,89%	12,42%	15,11%
BONÓPOLIS	GO	40,02%	25,40%	1,70%	5,90%	11,00%
BRITÂNIA	GO	59,94%	19,54%	4,67%	16,94%	13,72%
BURITI DE GOIÁS	GO	46,18%	15,84%	4,82%	15,39%	12,02%
BURITINÓPOLIS	GO	63,64%	41,28%	3,80%	11,85%	18,98%
CACHOEIRA DE GOIÁS	GO	61,29%	38,79%	4,37%	8,59%	17,25%
CAIAPÔNIA	GO	36,95%	6,42%	7,04%	12,57%	8,67%
CAMPINAÇU	GO	52,77%	31,46%	7,28%	8,41%	15,71%
CAMPINORTE	GO	41,58%	15,65%	11,51%	9,39%	12,18%
CAMPO LIMPO DE GOIÁS	GO	55,12%	35,96%	6,80%	7,93%	16,90%
CAMPOS BELOS	GO	53,77%	17,36%	16,18%	12,17%	15,24%
CAMPOS VERDES	GO	67,79%	46,43%	2,40%	8,60%	19,14%
CARMO DO RIO VERDE	GO	31,98%	9,97%	6,12%	8,46%	8,18%
CAVALCANTE	GO	58,38%	19,26%	15,10%	15,44%	16,60%
CERES	GO	33,22%	5,25%	4,75%	13,41%	7,80%
COCALZINHO DE GOIÁS	GO	59,09%	37,27%	6,81%	9,52%	17,87%
COLINAS DO SUL	GO	61,95%	34,54%	11,74%	10,32%	18,86%
CÓRREGO DO OURO	GO	49,55%	17,58%	8,29%	13,11%	12,99%
CORUMBÁ DE GOIÁS	GO	43,96%	27,79%	3,20%	7,34%	12,78%
CRIXÁS	GO	33,94%	12,21%	6,48%	9,52%	9,40%
DAMIANÓPOLIS	GO	74,63%	42,83%	6,67%	18,97%	22,82%
DAMOLÂNDIA	GO	57,08%	25,19%	7,42%	15,38%	16,00%
DIORAMA	GO	38,97%	21,62%	1,05%	7,85%	10,17%
DIVINÓPOLIS DE GOIÁS	GO	78,27%	53,96%	2,25%	10,03%	22,08%
DOVERLÂNDIA	GO	47,38%	22,33%	4,98%	9,75%	12,36%
ESTRELA DO NORTE	GO	48,00%	19,27%	5,92%	12,76%	12,65%
FAINA	GO	49,84%	15,62%	8,65%	17,04%	13,77%
FAZENDA NOVA	GO	46,55%	40,41%	1,08%	1,99%	14,49%
FIRMINÓPOLIS	GO	25,37%	10,25%	2,45%	8,34%	7,01%
FLORES DE GOIÁS	GO	47,00%	21,93%	5,10%	10,52%	12,52%

FORMOSA	GO	33,69%	17,58%	4,75%	7,01%	9,78%
FORMOSO	GO	62,50%	35,36%	9,37%	8,47%	17,73%
GOIANÉSIA	GO	24,13%	7,21%	5,75%	7,11%	6,69%
GOIÁS	GO	40,65%	13,75%	7,03%	11,22%	10,67%
GUARAÍTA	GO	76,10%	35,57%	7,52%	20,09%	21,06%
GUARANI DE GOIÁS	GO	64,58%	40,92%	3,42%	12,56%	18,97%
GUARINOS	GO	59,48%	37,07%	2,17%	13,04%	17,43%
HEITORAÍ	GO	64,37%	33,16%	9,80%	12,38%	18,45%
HIDROLINA	GO	51,35%	17,37%	8,02%	18,10%	14,50%
IACIARA	GO	55,98%	33,64%	7,09%	9,72%	16,82%
INHUMAS	GO	41,70%	9,53%	6,66%	15,54%	10,58%
IPIRANGA DE GOIÁS	GO	65,40%	30,35%	4,15%	16,11%	16,87%
IPORÁ	GO	25,01%	1,30%	5,61%	10,02%	5,64%
ISRAELÂNDIA	GO	35,86%	12,50%	4,89%	9,57%	8,99%
ITABERAÍ	GO	42,72%	15,29%	7,92%	12,09%	11,77%
ITAGUARI	GO	50,30%	13,41%	14,03%	16,53%	14,66%
ITAGUARU	GO	47,16%	18,67%	3,99%	15,72%	12,79%
ITAPACI	GO	36,53%	3,87%	8,17%	15,63%	9,22%
ITAPIRAPUÃ	GO	80,05%	39,18%	10,35%	15,97%	21,83%
ITAPURANGA	GO	41,78%	20,46%	1,98%	13,09%	11,84%
ITAUÇU	GO	34,66%	13,85%	3,65%	10,48%	9,33%
IVOLÂNDIA	GO	55,19%	28,14%	4,64%	10,59%	14,46%
JARAGUÁ	GO	38,49%	17,11%	5,92%	10,98%	11,34%
JAUPACI	GO	58,21%	26,15%	4,62%	15,35%	15,38%
JESÚPOLIS	GO	61,73%	37,15%	2,17%	12,37%	17,23%
JUSSARA	GO	47,23%	13,57%	6,99%	15,73%	12,10%
MAMBAÍ	GO	49,88%	35,98%	2,32%	8,48%	15,59%
MARA ROSA	GO	49,56%	17,56%	10,86%	13,02%	13,81%
MATRINCHÃ	GO	53,69%	39,99%	2,67%	4,41%	15,69%
MIMOSO DE GOIÁS	GO	64,30%	30,15%	6,82%	15,17%	17,38%
MINAÇU	GO	42,34%	18,95%	2,99%	10,98%	10,98%
MINEIROS	GO	30,95%	9,65%	5,84%	9,04%	8,17%
MOIPORÁ	GO	61,94%	35,32%	3,60%	12,30%	17,07%
MONTE ALEGRE DE GOIÁS	GO	59,21%	34,12%	5,25%	11,05%	16,81%
MONTES CLAROS DE GOIÁS	GO	38,21%	3,66%	9,15%	14,59%	9,13%
MONTIVIDIU	GO	23,48%	6,47%	4,34%	8,11%	6,31%
MONTIVIDIU DO NORTE	GO	68,72%	49,23%	3,10%	5,27%	19,20%
MORRO AGUDO DE GOIÁS	GO	68,86%	37,59%	6,67%	16,06%	20,11%
MOSSÂMEDES	GO	39,98%	12,49%	10,68%	9,25%	10,81%
MOZARLÂNDIA	GO	37,91%	23,48%	3,76%	6,00%	11,08%
MUNDO NOVO	GO	66,22%	26,01%	10,64%	17,13%	17,93%

MUTUNÓPOLIS	GO	55,53%	25,04%	7,60%	13,61%	15,41%
NIQUELÂNDIA	GO	31,61%	5,82%	9,00%	10,26%	8,36%
NOVA AMÉRICA	GO	69,47%	15,43%	6,21%	25,98%	15,87%
NOVA CRIXÁS	GO	43,92%	13,40%	8,23%	13,66%	11,76%
NOVA GLÓRIA	GO	49,40%	30,13%	2,52%	8,98%	13,88%
NOVA IGUAÇU DE GOIÁS	GO	33,49%	14,24%	4,44%	9,12%	9,26%
NOVA ROMA	GO	72,79%	42,34%	4,50%	14,37%	20,40%
NOVO BRASIL	GO	57,09%	19,74%	7,35%	19,16%	15,41%
NOVO PLANALTO	GO	51,70%	30,61%	4,34%	8,28%	14,41%
OURO VERDE DE GOIÁS	GO	54,30%	20,64%	6,52%	15,27%	14,14%
PADRE BERNARDO	GO	34,41%	15,54%	5,05%	8,21%	9,60%
PALESTINA DE GOIÁS	GO	43,76%	22,83%	5,46%	9,56%	12,62%
PARAÚNA	GO	36,97%	9,93%	6,69%	12,78%	9,80%
PETROLINA DE GOIÁS	GO	31,60%	4,18%	8,54%	14,04%	8,92%
PILAR DE GOIÁS	GO	55,48%	31,51%	7,32%	11,36%	16,73%
PIRANHAS	GO	48,01%	20,75%	4,40%	11,44%	12,20%
PIRENÓPOLIS	GO	38,93%	7,44%	10,93%	14,62%	11,00%
PLANALTINA	GO	44,34%	14,80%	11,00%	12,77%	12,86%
PORANGATU	GO	36,19%	12,53%	6,91%	10,26%	9,90%
PORTELÂNDIA	GO	35,28%	17,13%	4,39%	7,63%	9,71%
POSSE	GO	40,93%	25,43%	2,94%	7,67%	12,01%
RIALMA	GO	36,23%	8,86%	5,65%	14,16%	9,56%
RIANÁPOLIS	GO	39,30%	6,85%	7,42%	16,75%	10,34%
RUBIATABA	GO	38,55%	4,91%	9,11%	15,43%	9,82%
SANCLERLÂNDIA	GO	44,55%	4,31%	10,55%	17,36%	10,74%
SANTA FÉ DE GOIÁS	GO	35,15%	16,05%	4,76%	8,77%	9,86%
SANTA ISABEL	GO	61,51%	26,75%	4,67%	15,38%	15,60%
SANTA RITA DO ARAGUAIA	GO	32,88%	9,96%	6,53%	9,00%	8,50%
SANTA RITA DO NOVO DESTINO	GO	43,94%	20,91%	9,09%	8,64%	12,88%
SANTA ROSA DE GOIÁS	GO	76,54%	25,05%	15,27%	21,26%	20,53%
SANTA TEREZA DE GOIÁS	GO	54,40%	19,76%	5,31%	15,26%	13,44%
SANTA TEREZINHA DE GOIÁS	GO	70,05%	49,14%	4,91%	8,91%	20,99%
SÃO DOMINGOS	GO	45,38%	30,33%	2,85%	6,09%	13,09%
SÃO FRANCISCO DE GOIÁS	GO	47,45%	14,78%	9,23%	17,05%	13,69%
SÃO JOÃO DA PARAÚNA	GO	57,06%	25,13%	9,63%	13,40%	16,05%
SÃO JOÃO D'ALIANÇA	GO	46,97%	29,86%	5,31%	7,58%	14,25%
SÃO LUIS DE MONTES BELOS	GO	27,91%	7,72%	5,62%	8,97%	7,44%
SÃO LUIZ DO NORTE	GO	48,77%	15,54%	12,06%	13,22%	13,61%

SÃO MIGUEL DO ARAGUAIA	GO	58,65%	18,28%	9,74%	16,90%	14,97%
SÃO PATRÍCIO	GO	50,69%	17,53%	9,14%	15,28%	13,98%
SIMOLÂNDIA	GO	66,82%	47,30%	4,55%	8,08%	19,98%
SÍTIO D'ABADIA	GO	49,55%	35,76%	2,14%	5,55%	14,49%
TAQUARAL DE GOIÁS	GO	51,88%	21,00%	5,67%	14,59%	13,75%
TERESINA DE GOIÁS	GO	72,24%	47,80%	6,48%	8,73%	21,00%
TROMBAS	GO	54,80%	16,03%	11,77%	15,74%	14,51%
UIRAPURU	GO	46,43%	32,97%	2,92%	6,01%	13,97%
URUAÇU	GO	37,84%	2,44%	8,18%	17,50%	9,38%
URUANA	GO	47,97%	23,20%	6,57%	11,02%	13,59%
VILA BOA	GO	49,77%	24,68%	5,59%	11,55%	13,94%
VILA PROPÍCIO	GO	48,20%	20,58%	11,13%	10,94%	14,22%
ÁGUA BOA	MT	32,71%	4,19%	4,73%	11,82%	6,91%
ALTO ARAGUAIA	MT	28,17%	8,06%	4,72%	8,86%	7,21%
ALTO BOA VISTA	MT	45,56%	22,19%	4,41%	8,52%	11,71%
ALTO GARÇAS	MT	40,92%	22,98%	3,21%	8,27%	11,49%
ALTO TAQUARI	MT	30,38%	6,61%	5,89%	12,51%	8,34%
ARAGUAIANA	MT	48,03%	19,19%	5,06%	13,58%	12,61%
ARAGUAINHA	MT	51,23%	27,06%	1,60%	7,59%	12,09%
BARRA DO GARÇAS	MT	50,36%	12,56%	9,11%	15,90%	12,52%
BOM JESUS DO ARAGUAIA	MT	65,46%	17,64%	21,81%	13,66%	17,71%
CAMPINÁPOLIS	MT	49,51%	30,20%	8,35%	7,25%	15,26%
CAMPO VERDE	MT	30,00%	2,34%	3,86%	13,49%	6,56%
CANABRAVA DO NORTE	MT	56,31%	11,57%	10,82%	18,34%	13,58%
CANARANA	MT	37,52%	11,99%	5,90%	12,04%	9,98%
COCALINHO	MT	38,09%	8,51%	8,56%	12,46%	9,84%
CONFRESA	MT	42,97%	21,69%	6,07%	9,27%	12,34%
DOM AQUINO	MT	46,96%	27,88%	1,66%	7,92%	12,49%
GENERAL CARNEIRO	MT	58,32%	19,64%	14,86%	14,42%	16,31%
GUIRATINGA	MT	32,91%	16,90%	2,19%	6,99%	8,70%
JACIARA	MT	37,82%	10,84%	6,03%	10,90%	9,25%
LUCIARA	MT	67,36%	34,95%	4,48%	17,53%	18,99%
NOVA BRASILÂNDIA	MT	81,20%	2,38%	16,79%	31,68%	16,95%
NOVA NAZARÉ	MT	76,15%	43,34%	10,24%	12,68%	22,08%
NOVA XAVANTINA	MT	31,99%	4,79%	4,20%	12,02%	7,00%
NOVO SANTO ANTÔNIO	MT	51,78%	33,94%	1,44%	7,61%	14,33%
NOVO SÃO JOAQUIM	MT	64,88%	19,49%	11,33%	21,13%	17,32%
PONTAL DO ARAGUAIA	MT	57,31%	17,69%	7,17%	15,96%	13,60%
PONTE BRANCA	MT	57,93%	24,30%	4,19%	12,82%	13,77%
PORTO ALEGRE	MT	41,56%	17,26%	5,76%	10,91%	11,31%

DO NORTE						
POXORÉO	MT	58,63%	34,61%	5,16%	8,13%	15,97%
PRIMAVERA DO LESTE	MT	39,23%	7,42%	6,81%	14,91%	9,71%
RIBEIRÃO CASCALHEIRA	MT	50,47%	15,54%	11,29%	10,95%	12,59%
RIBEIRÃOZINHO	MT	36,76%	14,47%	2,66%	9,77%	8,97%
SANTA TEREZINHA	MT	47,29%	25,70%	6,50%	8,52%	13,57%
SANTO ANTÔNIO DO LESTE	MT	33,90%	18,40%	3,15%	7,85%	9,80%
SÃO FELIX DO ARAGUAIA	MT	44,55%	5,86%	8,87%	16,70%	10,47%
SERRA NOVA DOURADA	MT	83,33%	36,67%	11,09%	19,27%	22,34%
TESOURO	MT	32,85%	10,43%	6,83%	7,46%	8,24%
TORIXORÉU	MT	38,99%	14,57%	2,55%	9,95%	9,02%
VILA RICA	MT	23,24%	1,38%	6,38%	9,74%	5,84%
DISTRITO FEDERAL	DF	14,92%	7,61%	2,26%	3,41%	4,43%

Source: MDS (2020).

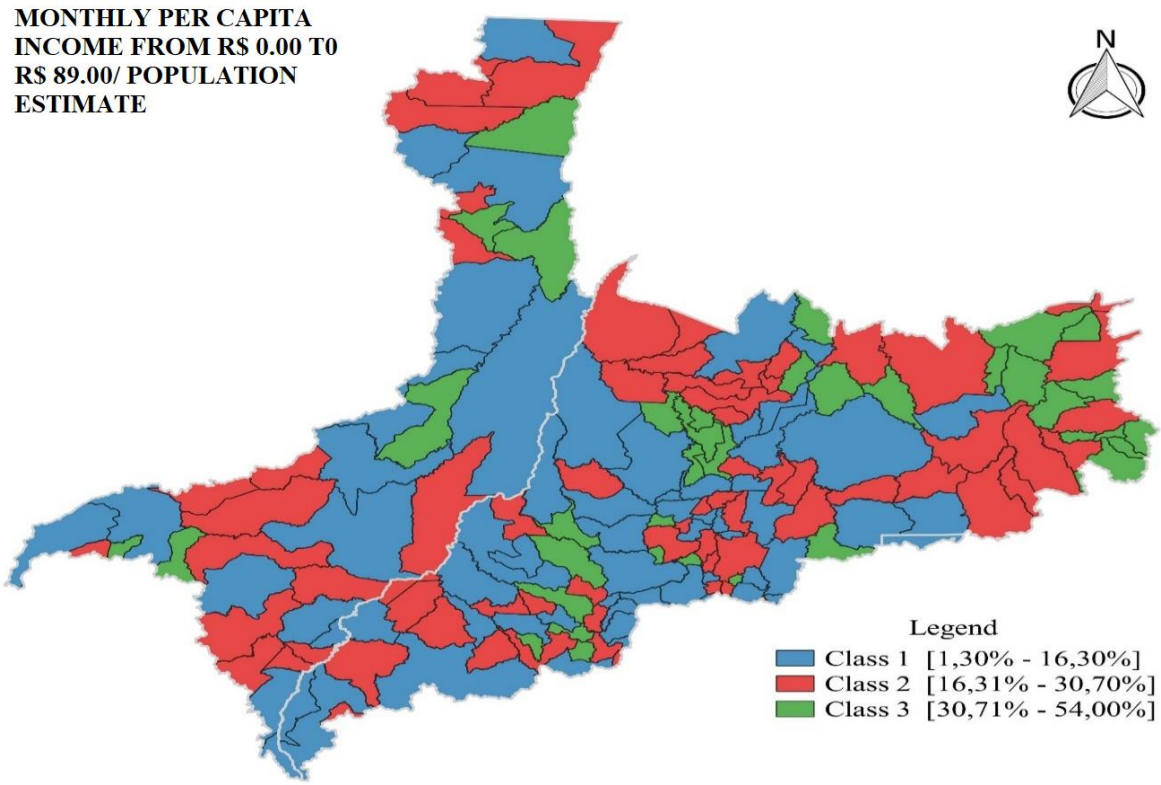
The results showed that, on average, 48.59% of individuals in this region were enrolled in CADÚNICO, and, on average, 21.09% of these individuals received between R$0.00 and R$89.00; that is, they were in a situation of extreme poverty. On the other hand, 6.53%, with a monthly per capita income of R$89.01 to R$178.00, were seen as poor; while 12.05%, with an income of R$ 178.01 to ½ monthly minimum wage, as vulnerable.

In terms of the municipalities in the Midwest of the Tocantins-Araguaia Basin, the Federal District had the lowest rate (14.92%) of individuals registered in CADÚNICO, while Serra Nova Dourada (MT) had the highest rate (83.33 %).

Regarding the monthly per capita income ranges among individuals registered in CADÚNICO, it was observed that Iporá (GO) had the lowest rate (1.30%) and Divinópolis de Goiás (GO) the highest rate (53.96%) of individuals with monthly per capita income from R$0.00 to R$89.00; while Diorama (GO) had the lowest rate (1.05%) of individuals with per capita income from R$89.01 to R$178.00, while Bom Jesus do Araguaia (MT) had the highest (21.81%). Finally, among the municipalities where individuals registered in CADÚNICO received from R$ 178.01 to ½ minimum wage, Fazenda Nova (GO) had the lowest rate (1.99%) and Nova Brasilândia (MT) the highest (31 .68%).

In terms of the spatialization of the data, presented in Figure 02, below, it was found that class 1, with the lowest percentage of poor people (blue dots on the map), was concentrated in the central, east and southeast portion of the basin, especially in Goiás (28%), followed by Mato Grosso (10%), in addition to the Federal District. It was highlighted that the municipality of Iporá (GO), with 1.30% of individuals in extreme poverty, represents the lowest rate in the basin of individuals in extreme poverty, who therefore have a monthly per capita income of R$0.00 to R$89.00, residing in the Center-West region of the Tocantins Araguaia Basin.

Figure 02 – Rate of Individuals in Extreme Poverty Situation in the Tocantins Araguaia Basin in the Midwest Region



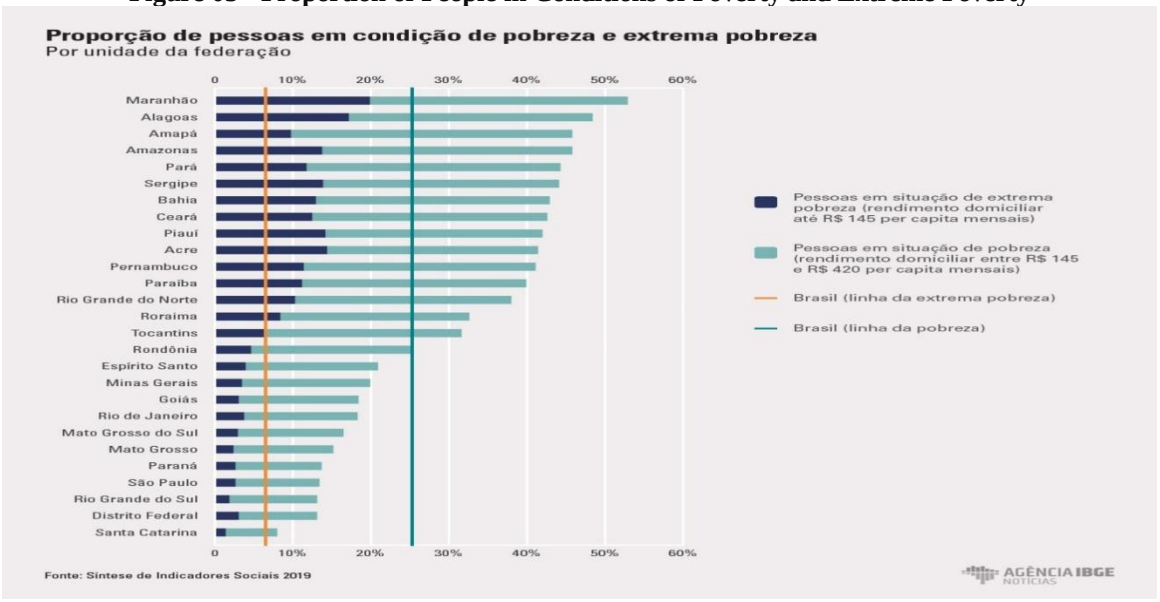
Source: MDS (2020), spatialized with the help of QGIS, 3.10.

The critical points, in terms of poverty, which combine classes 2 and 3 (red and green dots), are concentrated in the northeast of the basin and correspond to 49% of the municipalities of Goiás, with the municipality of Divinópolis de Goiás (GO) standing out. with the highest rate of individuals in extreme poverty (53.96%).

Considering the situation of extreme poverty in Brazil, data from the Brazilian Institute of Geography and Statistics (2019) show that, in 2018, Brazil had 13.5 million people with a monthly per capita income of less than R$145 or U$S 1 .9 per day, a criterion adopted by the World Bank to identify the condition of indigence. This number is equivalent to the population of Bolivia, Belgium, Cuba, Greece and Portugal. Although the percentage was stable compared to 2017, it rose from 5.8% in 2012 to 6.5% in 2018, a record in seven years.

However, in 2012, the highest level of the series for poverty was recorded, 26.5%, followed by a decrease in 2014. From 2015, with the economic and political crisis and the reduction of the labor market, the percentages of poverty began to rise with a slight fall in 2018, which is not a change in trend [25]. In Figure 03, it is possible to observe the proportion of people in poverty and extreme poverty.

Figure 03 - Proportion of People in Conditions of Poverty and Extreme Poverty

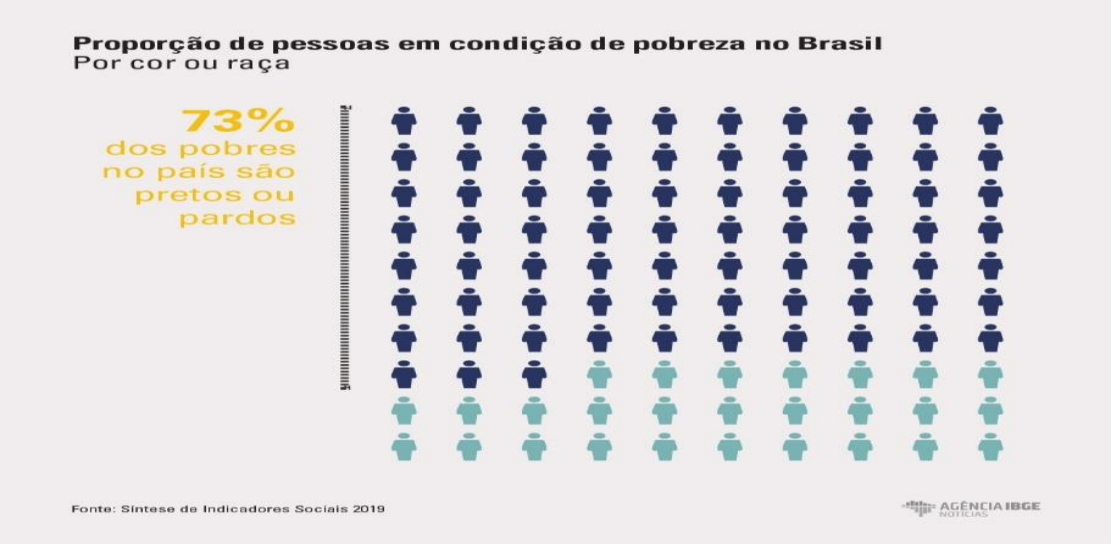


Source: IBGE (2019).

In 2018, poverty reduction took place mainly in the Southeast, which registered fewer 714,000 people in this condition, especially in the state of São Paulo (less 623 thousand). Almost half (47%) of Brazilians below the poverty line in 2018 were in the Northeast region. Maranhão was the state with the highest percentage of people with income below the poverty line (53%). Santa Catarina, which also proved to be the least unequal state, had the lowest percentage of poor people. All states in the North and Northeast regions had poverty indicators above the national average [25].

As can be seen in Figure 04, poverty affects mainly the black or brown population, which represents 72.7% of the poor, in absolute numbers 38.1 million people. And black or brown women make up the largest contingent, 27.2 million people below the poverty line [25].

Figure 04 – Proportion of People in a Condition of Poverty in Brazil



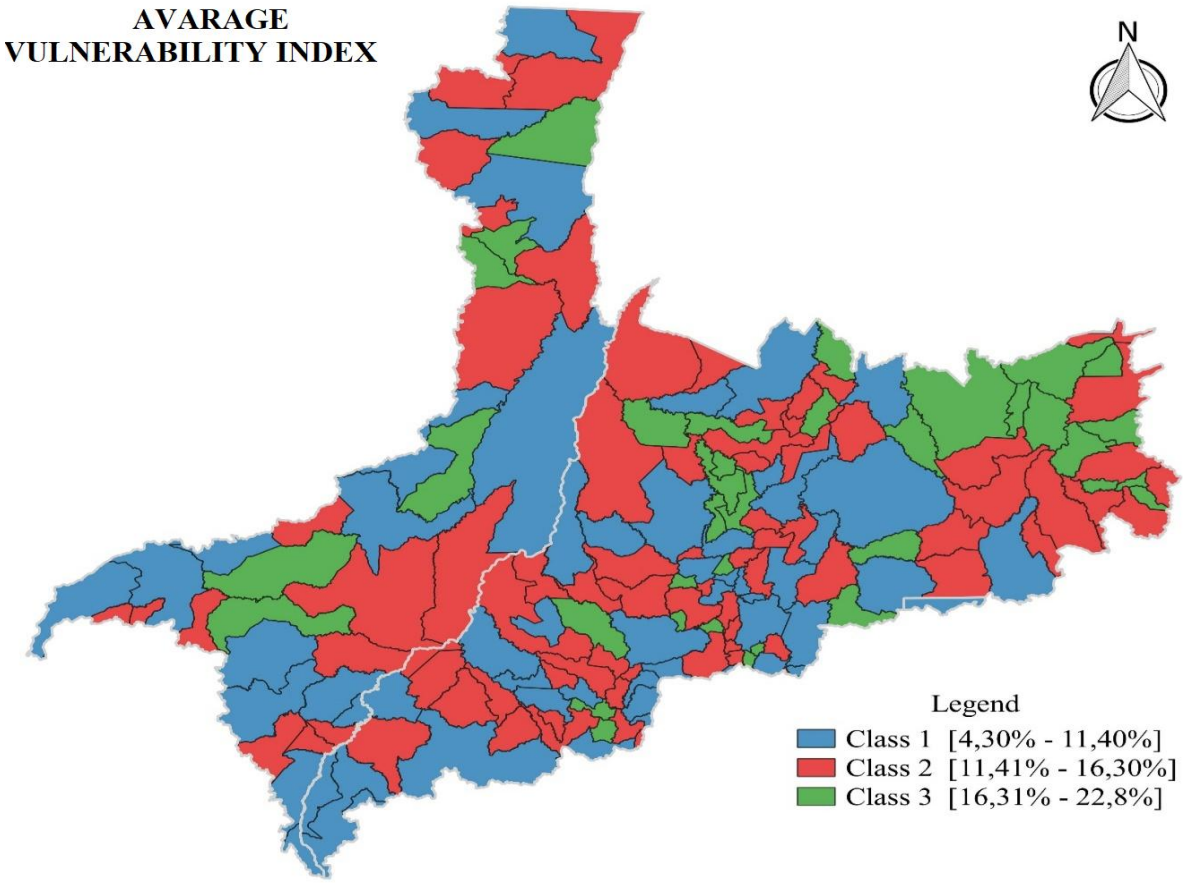
Source: IBGE, 2019.

Specifically in relation to the Average Vulnerability Index, by the income criterion (sum of the rates of individuals by income range - R$0.00 to R$89.00; R$89.01 to R$178.00 and R$ 178.01 up to ½ minimum wage - divided by three), in the Central-West Region of the Tocantins-Araguaia Basin, it was observed that this index had an average of 13.0%, with emphasis on the Federal District with the lowest index (4 .43%) and Damianópolis (GO) with the maximum value (22.82%).

It is noteworthy that, in Class 1 (up to 11.4% of the poor), 24% of the municipalities belonged to the state of Goiás, 10% to Mato Grosso, in addition to the Federal District. In class 2, in the range from 11.41 to 16.30%, 36% of the municipalities belonged to Goiás and 8% to Mato Grosso. Finally, in class 3 (from 16.31 to 22.8%), the index of poor comprised 17% of the municipalities of Goiás and 4% of Mato Grosso.

As can be seen in Figure 05, which shows the spatialization of the Average Vulnerability Index of the municipalities in the Central-West Region of the Tocantins Araguaia Basin, this indicator has the same behavior as that of extreme poverty, since the highest indices are concentrated in the Northeast region of the basin, especially Damianópolis with the highest rate (22.82%).

Figure 05 – Average Vulnerability Index of Tocantins-Araguaia Basin Municipalities in the Midwest Region



Source: MDS (2020), spatialized with the help of QGIS, 3.10.

It is important to point out that, according to Ferrari [26], Brazil reached the lowest poverty rate in 2014, but, after the economic crisis and the great mismatch of public accounts, the index increased until 2017. In these three years, more than 23.3 million people were included in this perverse balance. Projections show that, if the country continues with low economic growth, around 2.5% per year, it will only be possible to return to the level reached in 2014, in 2030, that is, more than a decade and a half of delay.

III. CONCLUSION

The results of the technical and spatial reading of the economic vulnerability of municipalities in the Central-West region of the Tocantins Araguaia Basin demonstrate that the percentage of the basin's population registered in the Federal Government's Single Registry for Social Programs, which is an identification instrument, was significant. and socioeconomic characterization of low-income Brazilian families; the proportion of people in extreme poverty (per capita income of up to R$ 89.00) and poor (per capita family income between R$ 89.01 and R$ 178.00) is significant.

In this sense, the results suggest a situation of social vulnerability in the municipalities, due to the significant percentage of extreme poverty, in the Central-West Region of the Tocantins Araguaia Basin, mainly

in its northeastern portion, demonstrating the need for more investments, which generate employment and income, with possibilities to reduce the poverty rate and promote social inclusion.

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