



Challenges of reducing urban social inequality in an Amazonian city

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ABSTRACT

This study assesses the evolution of social exclusion in the urban area of Macapá, Amapá, between 1991 and 2010. This is an associational research approach with interference between variables, based on statistical data and quantitative and comparative methods. The study highlights the debate on intraurban social conditions within the context of medium-sized cities in the Amazon. The results indicate that social exclusion in Macapá is more strongly correlated with indicators of quality of life than income autonomy, and that process of social integration occurred slowly. Here, we conclude that despite some significant advancements, the social inclusion process in Macapá has been low, particularly in terms of basic sanitation indicators.

KEYWORDS: Social exclusion/inclusion. Economic inequality Indicator system.

1 INTRODUCTION

In the current context of a health, economic, and environmental crisis, the issue of social inequality is one of the main causes for concern among global populations, especially for Brazilians (IPSOS, 2022). Part of the complexity of Brazil is since the model of urban-regional development adopted for a long time has served as an instrument for maintaining the structure of inequality and promoting processes of social exclusion (MARICATO, 2021b; ROLNIK, 2002).

Exclusion is a process that describes the negative aspects of the social inequality structure, implying the annulment of social rights and, at times, the banishment and/or marginalization of groups. In contrast, there is the concept of social inclusion, which, in turn, represents the process of full integration into the social structure and the fulfillment of the collective's vital needs. The dialectical relationship between exclusion and inclusion describes a dynamic, complex, multifaceted, and temporally and spatially extensive process that can or cannot be altered (GUERRA, 2012; VIEIRA et al., 2010).

Due to its multifaceted and transdisciplinary nature, the study of the process of social exclusion and inclusion allows for various approaches and methods of analysis. Among the most widespread in the quantitative approach are those based on the construction of social indicator systems. Many research studies start by using indices or social indicator systems to understand how their various dimensions (both material and immaterial) are presented and related to each other.

In this type of study, the analysis approaches are basically divided into quantitative and subjective qualitative objectives (NAHAS, 2015). Subjective approach research (primary data) analyzes social and urban phenomena based on individuals' perceptions and satisfaction with the characteristics of the city. Meanwhile, the objective approach (secondary data/statistical data) is based on the evaluation of the urban environment and available resources (urban infrastructure, income, education, longevity). Notable examples include the Atlas of Social Exclusion in Brazil (2004; 2014) and the Map of Social Exclusion/Inclusion in the City of São Paulo (SPOSATI, 1996).

Through the construction of the Social Exclusion/Inclusion Index (IEX), Sposati (1996) assesses the spatial dimension of social exclusion at an intraurban scale, serving as a reference for numerous studies that analyze the processes of social exclusion and inclusion within Brazilian cities. The use of 'territory' to address the spatial dimension of social exclusion is based on the

premise that "territorial production as a social production is a significant process in social differentiation" (MELLAZZO; GUIMARÃES, 2010).

Since the differences in living conditions in Brazilian regions are significant, and each city has its own unique 'territorial structure' (GUERRA; POCHMANN; SILVA, 2014; VILLAÇA, 2001), investigating the processes of social exclusion in the context of Amazonian cities is essential for the development of policies to address social inequality, taking into account the various scales of the Brazilian territory.

At the local level, research on the topic of social exclusion in the capital of the state of Amapá often takes a qualitative approach or focuses on specific localities or social groups (SERRÃO; LIMA, 2013; PEREIRA; SOUSA; SILVA, 2016; SILVA; LIMA, 2019; SOUZA, 2017). Seeking a broader social perspective of the city, the research begins with the question: How has the process of social exclusion been systematically manifested in the city of Macapá in recent decades?

Therefore, this study assesses the manifestation of social exclusion from 1991 to 2010 in the urban area of Macapá, the capital of Amapá. Specifically: analyze the key indicators that influenced urban exclusion and inclusion in Macapá, identify the demands that enhance social inclusion in the city of Macapá, and analyze the distribution of the population in areas of social exclusion and inclusion.

It is believed that the research results can complement other studies on the topic of social exclusion, especially at the local and regional levels. And, in fact, spark a discussion on the development of local tools for monitoring the internal social conditions of the city.

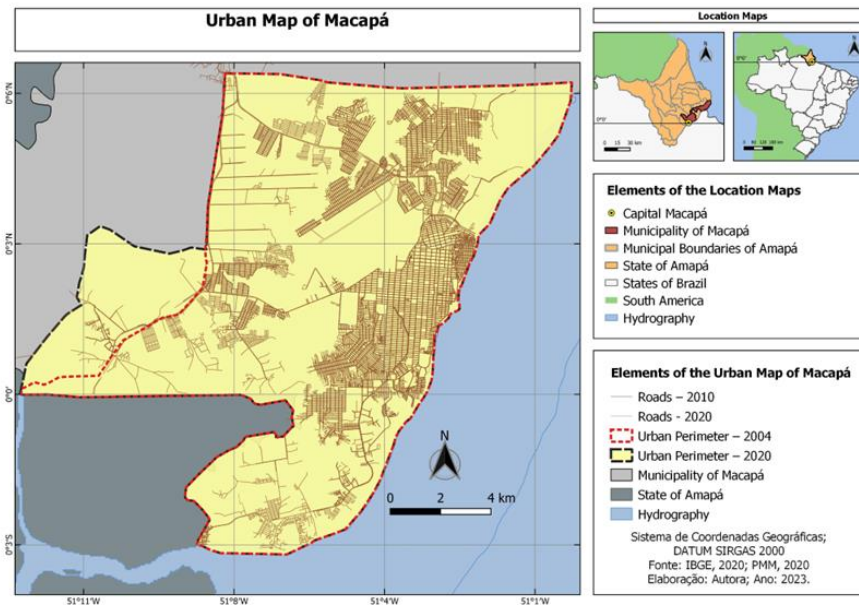
The rest of this article is organized as follows. Section 2 presents the methodology, including study area, design, procedures, and methods of analysis. In section 3, the results and discussion are presented. Finally, the main conclusions and the references used are provided.

2 METHODOLOGY

2.1 Study area

The study refers to the urban perimeter of the municipality of Macapá (Figure 1), capital of the state of Amapá, in the far north of Brazil. This is the most populous city in the state, accounting for approximately 60% of the Amapá's population in 2010 (IBGE, 2013).

Figure 1 – Map of the urban area of Macapá, Amapá



Source: Elaborated by the authors, 2023.

Macapá is a medium-sized city in the Brazilian Amazon, which has been characterized by the implementation of political projects aimed at regional and local development, while also contributing to demographic growth and unregulated urban expansion (TOSTES, 2013). Currently, the cities of Macapá and Santana form an influential hub that extends beyond the political-administrative boundaries of the state of Amapá and exerts a significant degree of influence in the northernmost part of the Brazilian Amazon (AMORIM; SANTOS, 2017).

2.2 Study design, specific procedures, and data analysis

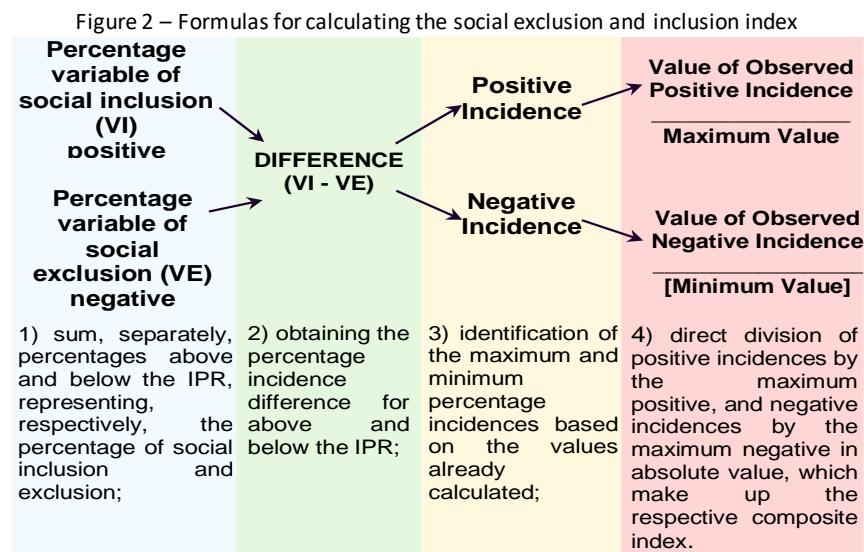
To achieve the research objectives, the method of association with interference was chosen (VOLPATO, 2015). Since the theoretical-conceptual foundations of the research are based on Sposati (1996), exclusion was assessed based on its dependence on economic, environmental, and social variables.

The research was conducted in five stages. In the first stage, socioeconomic data from the census universe of the city of Macapá for the years 1991, 2000, and 2010 were collected, provided by the Brazilian Institute of Geography and Statistics - IBGE. A total of 96 census tracts were analyzed for the year 1991, 206 for 2000, and 426 for 2010.

In the second stage, variables compatible with the three census periods, related to Sposati's (1996) four utopias of social inclusion, were selected: income autonomy, human development, housing quality, and equity. Income autonomy refers to the financial independence of individuals to meet their basic needs. Human development is related to the educational and longevity conditions of the population. Quality of life refers to the overall living conditions available to individuals. Equity alludes to the possibilities for gender differences (female) to be expressed and respected without discrimination.

Following the relational concept of exclusion and inclusion, Sposati (1996) defines that each of these utopias has an Inclusion Pattern of Reference (IPR), which represents the 'point of mutation' of a given condition of social inclusion or exclusion. According to the author, IPR values are not universal for all Brazilian cities and may not always remain the same over time.

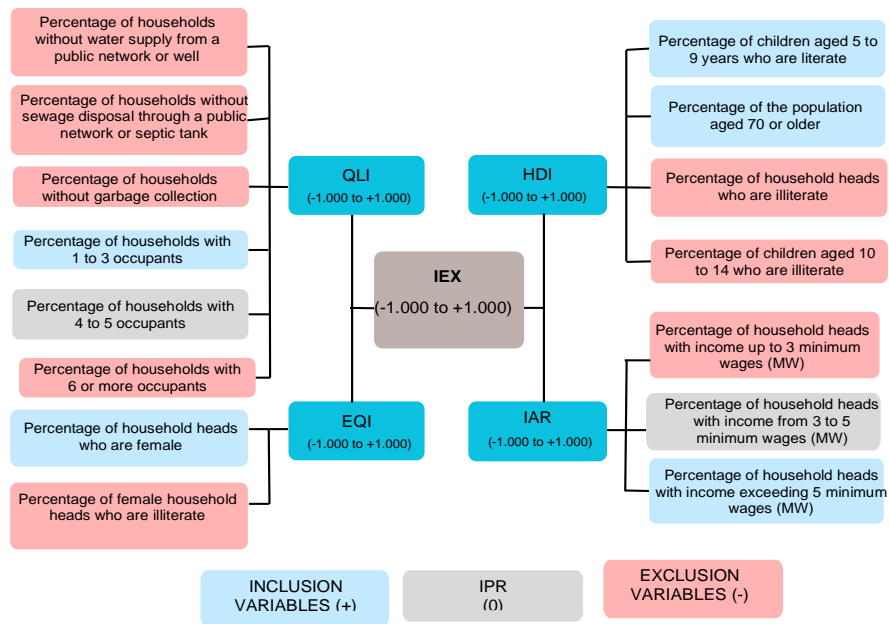
For the third stage, the research was based on the adaptations made by Genovez (2002) to the IEX (Figure 2). The author chose to use percentage values to measure negative (exclusion) and positive (inclusion) characteristics to enhance statistical accuracy for calculating social exclusion indices.



Source: Created by Genovez, 2002.

Thirteen social indicators were created from the raw variables, expressing variables of exclusion or inclusion, divided among the four utopias. The variables defined as IPR were disregarded as they are mathematically represented by 0 (zero). These indicators were transformed into social exclusion and inclusion indices related to income autonomy (IAR), human development (HDI), quality of life (QLI), and equity (EQI). The aggregation of these indices was synthesized into the final value of the Social Exclusion/Inclusion Index (IEX) of Macapá (Figure 3).

Figure 3 – Diagram of the construction of the Social Exclusion/Inclusion Index



Source: Elaborated by the authors, 2023

In this circumstance, the negative and positive incidences of each dimension are separately summed and then the differential value (positive or negative) is obtained. This value is divided by the maximum or minimum values (in absolute terms) to obtain the synthetic index within the representation scale of -1 to +1 for the IEX in Macapá (Table 1).

Tabela 1 - Exemplo do cálculo para o IEX (2000)

SECTOR	I	H	Q	E	SUM	I	H	Q	E	SUM	(D)	IEX	
	A	D	L	Q		A	D	L	Q				
	R	I	I	I	%+ (a)	R	I	I	I	%- (b)	[a-b]		
	%	%	%	%		%	%	%	%				
	+	+	+	+		-	-	-	-				
000005	7	9	4	3	250,020	1	2	2	6	42,386	207,633	1,000	
	8	4	4	2		0	2	2	6				
	,	,	,	,		,	,	,	,				,
	5	0	7	6		5	7	9	1				
	9	0	5	6		0	2	8	7				
000012	9	1	8	1	87,513	6	4	4	3	215,836	128,322	0,618	
	1	6	5	6		6	7	4	3				
	7	5	5	6		7	0	4	4				
	,	,	,	,		,	,	,	,				,
	9	8	9	7		1	4	0	1				
000109	3	9	3	4	143,704	7	9	6	0	141,089	2,615	0,013	
	9	4	9	2		6	9	1	0				
	3	4	3	3		4	1	6	1				
	4	6	1	0		7	5	2	5				
	,	,	,	,		,	,	,	,				,
000050	7	9	6	3	173,288	9	0	8	2	175,922	-2,633	-0,007	
	1	6	4	8		3	7	2	6				
	1	8	6	0		4	8	9	8				
	3	6	4	3		4	1	1	1				
	2	1	0	8		6	2	1	5				
000090	,	,	,	,	144,772	,	,	,	,	353,966	209,194	-0,537	
	6	6	5	4		3	7	2	6				
	5	5	4	3		5	4	0	2				
	3	6	1	8		6	0	1	5				
	1	4	3	4		7	1	2	1				
000043	4	9	0	9	72,289	2	3	5	2	461,873	389,584	-1,000	
	,	,	,	,		,	,	,	,				,
	7	4	6	8		4	8	5	8				
	5	9	9	3		5	0	1	8				
	4	0	3	5		9	9	6	3				
000043	1	2	2	1	72,289	9	4	2	3	461,873	389,584	-1,000	
	,	,	,	,		,	,	,	,				,
	9	6	9	6		9	6	2	0				
	6	5	8	8		1	7	8	0				
	9	1	4	5		3	6	8	0				

Vmax = 207,633 Positive Value/Max Value

[Vmin] = 389,584 Negative value/ [Min value]

Source: Elaborated by the authors, 2023

In the fourth stage, with the help of specific electronic programs, a database was created for each census period that related census tracts to the values of the utopia indices and the IEX, organized on a scale. To determine the degree of social exclusion and inclusion in the

cells, the classification scale suggested by Nascimento (2008) was applied, categorizing exclusion and inclusion into four levels each (Table 2).

Table 2 - Range of IEX Assessment

Rating scale	Acronym	Class Interval (Index)	Color Scale
High Exclusion	AE	- 1.000 to -0.750	Red
Medium-High Exclusion	MAE	-0.750 to -0.500	Dark orange
Medium-Low Exclusion	MBE	-0.500 to -0.250	Light Orange
Low Exclusion	BE	-0.250 to 0.000	Light yellow
Low Inclusion	BI	0.000 to 0.250	Light Green
Medium-Low Inclusion	MBI	0.250 to 0.500	Green
Medium-High Inclusion	MAI	0.500 to 0.750	Blue Green
High Inclusion	AI	0.750 to 1.000	Dark Blue

Source: Elaborated by the authors based on Nascimento, 2008.

Considering that the same territory can exhibit different degrees of social exclusion or inclusion depending on the dimension being analyzed. The application of the scale allowed for the evaluation of different circumstances of social exclusion/inclusion, beyond situations of extreme exclusion or complete inclusion, identifying various levels of social vulnerability.

The methodology developed by Sposati (1996) emphasizes the spatial dimension of the exclusion process, but due to the unavailability of vector data for the 1991 sectors, it was decided to analyze only the statistical data. The quantitative research aimed to analyze the conditions of social exclusion and inclusion in Macapá using statistical and comparative methods.

In the statistical analysis, in addition to Genovez's (2002) model for creating the IEX, the percentage distribution of sectors by evaluation ranges and the correlational matrix between the values of the utopia indices and the final index were conducted, based on the Pearson correlation coefficient (r).

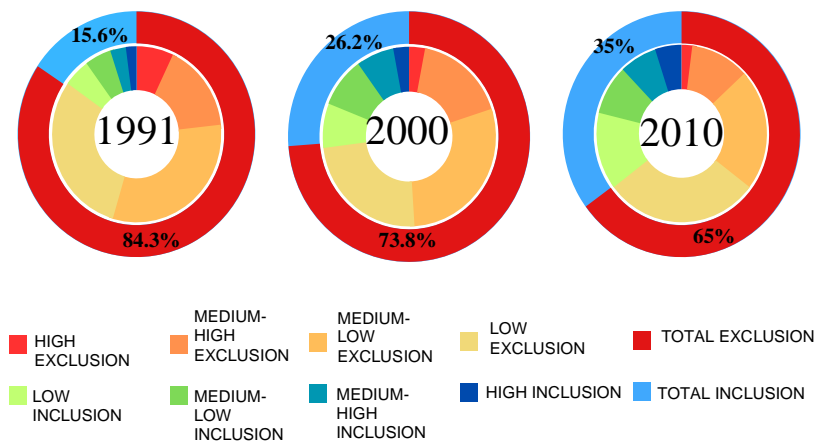
$$r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{(\sum (x_i - \bar{x})^2)(\sum (y_i - \bar{y})^2)}}$$

A comparative method was also used to assess the evolution of social conditions and the percentage of the population in areas of exclusion and inclusion within the specified time frame. Finally, the results were interpreted using graphs and infographics.

3 RESULTS AND DISCUSSION

The results (Figure 4) show that the proportion of sectors classified with degrees of exclusion was over 50% in all three periods analyzed. Despite the decrease in the percentage of sectors in the High Exclusion range, the majority were in the Medium-Low or Low Exclusion range.

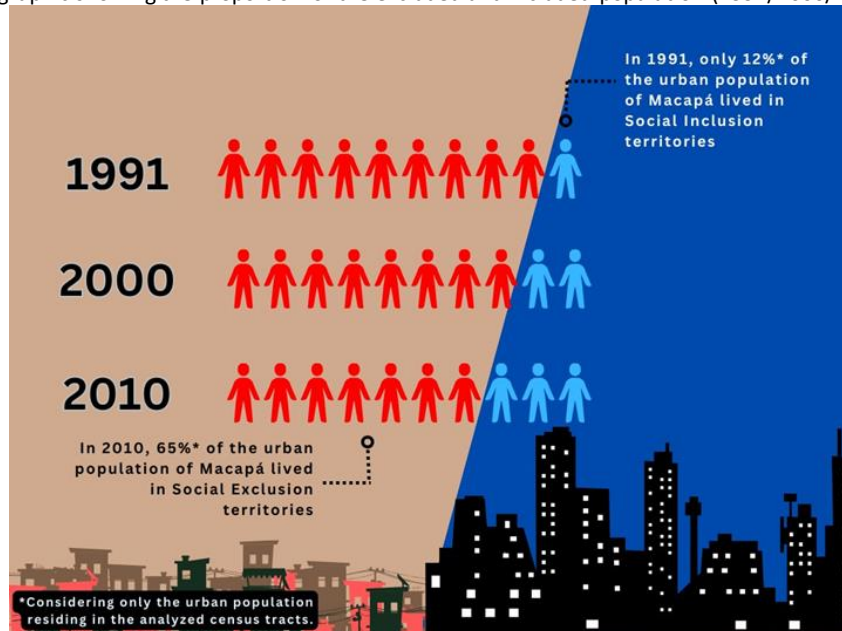
Figure 4 – Chart showing the proportion of census tracts by IEX degrees



Source: Elaborated by the authors, 2023.

The figure shows the gradual growth of social inclusion sectors, with a positive variation of 68% from 1991 to 2000 and 33% from 2000 to 2010. However, this increase was mainly in the Low Inclusion range, which may indicate the precariousness of social inclusion processes in Macapá over twenty years. This perception becomes clearer when analyzing the distribution of the population in areas of social exclusion and inclusion (Figure 5), which suggests that this process was also slow in achieving its goal of serving the population.

Figure 5 – Infographic showing the proportion of the excluded and included population (1991/2000/2010)



Source: Elaborated by the authors, 2023

When analyzing the degree of correlation between the utopia indices and the final index (Figure 6), it was found that the Quality of Life Index showed the strongest correlation among the utopia indices, even surpassing income autonomy, which was also strongly

correlated with social exclusion. On the other hand, the Equity Index went from a moderate correlation in 1991 and 2000 to a weak correlation in 2010.

Figura 6 – Gráfico da matriz de correlação entre os índices (1991/2000/2010)

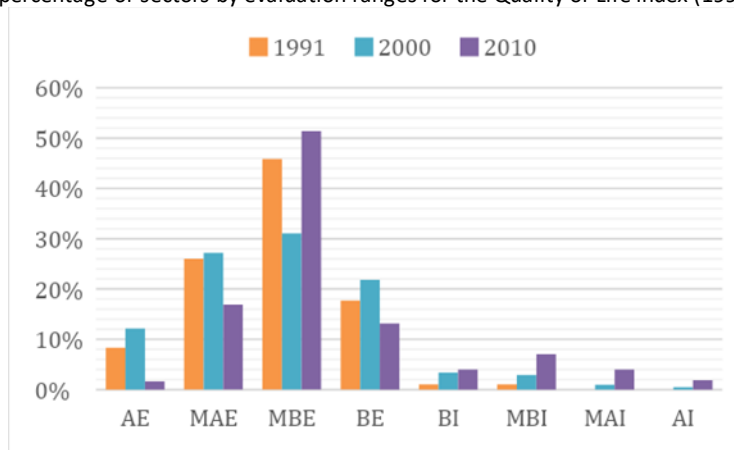
1991	IEX	IAR	HDI	EQI	QLI	2000	IEX	IAR	HDI	EQI	QLI
IEX	1					IEX	1				
IAR	0.84	1				IAR	0.92	1			
HDI	0.73	0.60	1			HDI	0.82	0.75	1		
EQI	0.66	0.52	0.60	1		EQI	0.54	0.43	0.61	1	
QLI	0.93	0.73	0.52	0.60	1	QLI	0.93	0.78	0.69	0.42	1

2010	IEX	IAR	HDI	EQI	QLI	Value of r	Interpretation
IEX	1					0.90 to 1	very strong correlation
IAR	0.84	1				0.70 to 0.90	strong correlation
HDI	0.78	0.65	1			0.50 to 0.70	moderate correlation
EQI	0.42	0.17	0.36	1		0.30 to 0.50	weak correlation
QLI	0.88	0.59	0.51	0.29	1	0.00 to 0.30	very weak correlation

Source: Elaborated by the authors, 2023

Based on the proportion of sectors in relation to the Quality of Life Index (Figure 7), there is a concentration in the Medium-Low Exclusion range. The percentage of inclusion territories in this index was less than 10% in 1991 and 2000 and reached 17% in 2010, representing the worst results among the utopias.

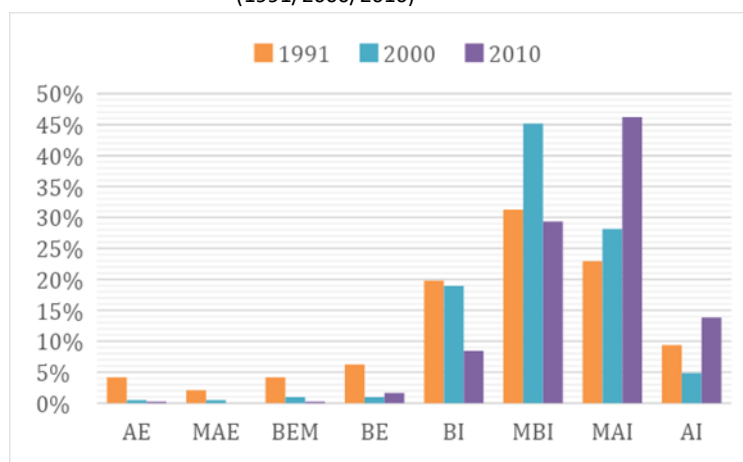
Figure 7 – Graph of the percentage of sectors by evaluation ranges for the Quality of Life Index (1991/2000/2010)



Source: Elaborated by the authors, 2023

On the other hand, the results of the Human Development Index showed a progressive evolution (Figure 8), indicating an increase in access to basic education and an increase in life expectancy. These results are consistent with the assessment of the Municipal Human Development Index (HDIM) of Macapá between 1991 and 2010, which increased from 0.525 to 0.733, being the highest among the municipalities in Amapá (ATLAS BRASIL, 2022).

Figure 8 – Graph of the percentage of sectors by evaluation ranges for the Human Development Index (1991/2000/2010)



Source: Elaborated by the authors, 2023

In the period from 1991 to 2010, Macapá still faces serious challenges in universalizing its basic sanitation services, leading to urban issues of both social and environmental nature. The strategies for universalizing services proved to be insufficient in the face of the significant population growth and expansion of the urban area caused by economic and political projects at the turn of the 21st century in many Amazonian cities, including Macapá (BECKER, 2013; PORTILHO, 2010).

According to Tostes (2016), despite the growth of social housing policies in Macapá between the 1980s and 1990s, they were not sufficient to meet the increasing demand for housing. They were also ineffective from an urban perspective because most housing complexes were located in areas far from the commercial center and lacked basic services and infrastructure for urban life, such as water supply and sewage collection systems (TOSTES, 2016).

These, among other factors, contributed to the urban disarray in Macapá in the 1990s, characterized mainly by the recurrence of informal settlements in places designated for public land development and in areas¹ near established neighborhoods (PORTILHO, 2010; TOSTES, 2016). Local research with a focus on residents of flood-prone areas has shown the effects of social exclusion on this population, who not only face social stigmatization but are also more susceptible to urban violence, health problems, and environmental degradation (PEREIRA; SOUSA; SILVA, 2016; SERRÃO; LIMA, 2013; SILVA; LIMA, 2019).

In 2010, the IBGE (2013) indicated that 59,599 residents of Macapá lived in subnormal clusters, meaning that approximately 16% of the urban population lived in areas with limited occupancy and lacking infrastructure and public services. According to more recent research, IBGE estimates that 24% of occupied households in Macapá were located in subnormal clusters in 2019 (IBGE, 2019).

¹ Typical floodplain areas of the Amazon region are essential for maintaining the local microclimate balance, serving as a breeding environment for species of fauna and flora and as part of the natural water drainage system. These are described by Takiyama et al. (2012, p. 17) as "clogged fluvial physical systems, drained by freshwater, and connected to a main watercourse, strongly influenced by rainfall, and having herbaceous vegetation."

However, factors such as monthly income and basic sanitation still affect the urban population of Macapá in a widespread manner. In terms of income, like in other Amazonian cities (BECKER, 2013), formal employment in Macapá relies primarily on the public services sector. However, the majority of the urban population relies on informal employment, which often does not provide the necessary monthly income to cover basic living needs, such as housing, for example.

According to the latest Sanitation Ranking by the Trata Brasil Institute (2023), based on 2021 data from the Brazilian National System for Water and Sanitation Data (SNIS), Macapá had the worst ranking among the 100 largest cities in the country. And since 2014, it has consistently been among the bottom ten positions in all those ten years (TRATA BRASIL, 2023). This reinforces the chronic problem that affects urban quality of life and contributes to the social exclusion of a significant portion of the population in Macapá.

These results show that, unlike medium-sized cities in other regions of Brazil, the process of social exclusion in this Amazonian city has been consistently more associated with quality of life compared to income autonomy. The precariousness and lack of basic sanitation conditions in a city of intra-regional importance, such as Macapá, reinforce the perspective of the unequal structure of urban-regional development in the Brazilian Amazon, as the majority of the urban population doesn't even have access to the basics necessary for a dignified life.

4 CONCLUSION

When analyzing the evolution of social exclusion and inclusion in Macapá over twenty years, we can see that there have been some advancements in the social integration process, primarily due to increased access to basic education and greater longevity in the population. On the other hand, this process has been slow and closely related to the Quality of Life Index, based on indicators that assess living conditions in both the public and private spheres.

Contemporarily, Macapá still faces several challenges in achieving universal access to basic sanitation services, directly impacting the lives of many residents in the city. Circumstances that have been shown to contribute to the perpetuation of the structure of local and regional social inequality.

Here we conclude that despite some significant progress, the process of social inclusion in Macapá was low, particularly in terms of indicators related to water supply and sewage collection. We recommend that Macapá should develop local instruments, tools, and indicators to monitor the social conditions within its urban space. This measure aids public policies aimed at the population in vulnerable situations and supports the technical-scientific production of social inequality.

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