

Evidence of Brazilian metropolization captured in the 2022 Census*

Evidências da metropolização brasileira captadas no Censo 2022

Rosa MOURA [1]

Abstract

Data from the 2022 Population Census, already available, allowed us to analyze the main evidence of metropolization in Brazil, reflected in the evolution of population distribution, the degree of urbanization, the consolidation of large urban clusters, both metropolitan and non-metropolitan, and their vectors of expansion. The analysis is complemented by a description of the characteristics, in 2022, of households, their sanitation conditions, and residents (race or skin color, age profile, and gender ratio). Four analysis segments encompassed the 5,570 Brazilian municipalities, meticulously covered by the Census. The exploration of these data, in addition to portraying population processes, highlights major challenges for research, policy-making, and urban governance.

Keywords: metropolization; urbanization; population processes; 2022 Population Census.

Resumo

Dados do Censo Demográfico de 2022, já disponibilizados, permitiram uma leitura das principais evidências da metropolização no País, percebidas na evolução da distribuição da população, do grau de urbanização, na consolidação das grandes concentrações urbanas, metropolitanas e não metropolitanas, e em seus vetores de expansão. Tal leitura se complementa apontando as principais características, em 2022, dos domicílios e suas condições de saneamento, e das pessoas residentes, em sua composição por cor ou raça, perfil etário e razão de sexos. Foram considerados quatro recortes de análise, que abrangem os 5.570 municípios brasileiros, minuciosamente cobertos pelo Censo. Como resultado da exploração desses dados, além de um retrato sucinto dos processos populacionais, pode-se apontar grandes desafios para a pesquisa, formulação de políticas públicas e gestão urbana.

Palavras-chave: metropolização; urbanização; processos populacionais; Censo Demográfico 2022.



Introduction

The essence of this work lies in the origin and timeliness of the information from the 2022 Population Census, made available by the Brazilian Institute of Geography and Statistics (IBGE) for all Brazilian municipalities, as of 2024, which were explored in search of characteristics of the metropolization process in Brazil. Metropolization is understood as the most advanced stage of urbanization, involving the entire territory and engendering dynamics of urban concentration and expansion. A process that has metropolises as its best-known products, going further, whether in the composition of extensive urban conglomerates or in the expansion of urbanized space to increasingly distant areas.

Some questions guided the analyses: what transformations did the distribution and growth of the population and households cause in the country's territorial configuration? What vectors of expansion are pointed out and what morphological changes result from the process? Can the consolidation of metropolises be confirmed, or do they lose importance in population growth and concentration, in the face of high growth rates of medium-sized cities? What characteristics of the population and households differentiate the metropolitan space from the rest of the country? The data already published offer preliminary answers to these questions and induce hypotheses about the current stage and paths of metropolization in the national territory.

The records selected, organized and analyzed for the 5,570 municipalities, include information that deals with: distribution, evolution and growth of the population, housing situation, characteristics of residents by color or race, age and sex, growth of households by type of use, average number of residents and basic sanitation conditions (water supply, internal plumbing, sewage disposal, garbage collection and the existence of a bathroom).

As analysis segments, the municipalities were organized between those that integrate large and medium urban concentrations (IBGE, 2016) and the other municipalities. The large concentrations are composed of "urban units" with more than 750 thousand inhabitants, the medium concentrations, by units with a population between 100 thousand and 750 thousand inhabitants. "Urban units" correspond to both population arrangements (PAs) and municipalities that do not constitute PAs, understanding that a population arrangement is the grouping of two or more municipalities where there is a strong population integration due to commuting movements for work or study, or due to contiguity between the main urbanized areas. (IBGE, 2016, p. 22)

The first analysis segment is formed by large metropolitan concentrations (LMCs). It aggregates the 15 units classified in the urban hierarchy as metropolises (IBGE, 2020): Belém/PA (state of Pará), Belo Horizonte/MG (state of Minas Gerais), Brasília/DF (Federal District), Campinas/SP (state of São Paulo), Curitiba/PR (state of Paraná), Florianópolis/SC (state of Santa Catarina), Fortaleza/CE (state of Ceará), Goiânia/GO (state of Goiás), Manaus/AM (state of Amazonas), Porto Alegre/RS (state of Rio Grande do Sul), Recife/PE (state of Pernambuco), Rio de Janeiro/RJ (state of Rio de Janeiro), Salvador/BA (state of Bahia), São Paulo/SP (state of São Paulo) and Vitória/ES (state of Espírito Santo). Except for Campinas, all of them are capitals of Federation Units (or states). It brings together 213 municipalities in 14 PAs, in addition to Manaus, the only unit not to conform to PA.

The second analysis segment is composed of the large non-metropolitan concentrations (LNMCS) that correspond to the capitals of states – Aracaju/SE (state of Sergipe), Campo Grande/MS (state of Mato Grosso do Sul), Cuiabá/MT (state of Mato Grosso), João Pessoa/PB (state of Paraíba), Maceió/AL (state of Alagoas), Natal/

RN (state of Rio Grande do Norte), Porto Velho/RO (state of Rondônia), São Luís/MA (state of Maranhão) and Teresina/PI (state of Piauí) – as well as to five inland units in the state of São Paulo – Baixada Santista/SP, Jundiaí/SP, Ribeirão Preto/SP, São José dos Campos/SP and Sorocaba/SP. The four other states capitals considered medium concentrations – Boa Vista/RR (state of Roraima), Macapá/AP (state of Amapá), Palmas/TO (state of Tocantins) and Rio Branco/AC (state of Acre) – were included in the same segment due to the functional relevance they acquire within their respective states. The segment adds up to 84 municipalities in 18 units classified by the IBGE in the urban hierarchy as regional centers, of which only four do not constitute PAs – Boa Vista, Campo Grande, Palmas e Rio Branco.

The other medium urban concentrations (MCs) are part of the third analysis segment, which incorporates 402 municipalities, 306 of which are members of 82 PAs.¹ According to the classification in the urban hierarchy, 76 units are regional centers and 101 are sub-regional centers. The set of units with a population of less than 100 thousand inhabitants, or other municipalities (OMs), makes up the fourth segment. There are 4,870 municipalities, among which 364 are inserted into PAs.

The organized information went through a comparative reading of the analytical segments and, later, for the case of large urban concentrations, the component internal units were analyzed. The simple organization of the data highlighted the high presence of multi-municipal urban units, the PAs, which generically peculiarize the process of metropolization. They predominate in the LMCs and LNMCS, are strongly incident in the MCs, and emergent in the rest of the territory.

The text is organized into five sections: the first results from this introduction, with notes on the operational procedures of the analysis; the second focuses on the distribution and evolution of population growth and urbanization; in the

third, the resident population is characterized; in the fourth, it turns to households and their sanitation conditions, reserving the final considerations for the fifth section.

Distribution and evolution of growth and urbanization

The 2022 Population Census registered 203,080,756 people residing in Brazil, with an increase, compared to the 2010 Census, of 12,324,957 people. 177,508,417 people living in urban areas, placing the degree of urbanization at 87.4%, while the Brazilian rural still houses a high population of 25,572,339 people.

Considered in the four analysis segments specified, the total population had the highest proportion in the set of OMs (37.4%), which is composed of 87.4% of the total number of Brazilian municipalities (Table 1). The urban population was found in greater proportion and concentrated in the municipalities in the LMCs (39.2%), which is densified in 3.8% of the total municipalities in the country.

The population size of each unit of the major concentrations highlights, among the LMCs, the PAs of São Paulo, with 20,673,280 inhabitants, and that of Rio de Janeiro, with 11,760,550 (Graph 1). They are followed by the PAs of Belo Horizonte (4,963,704 inhabitants) and Brasília (3,858,760).

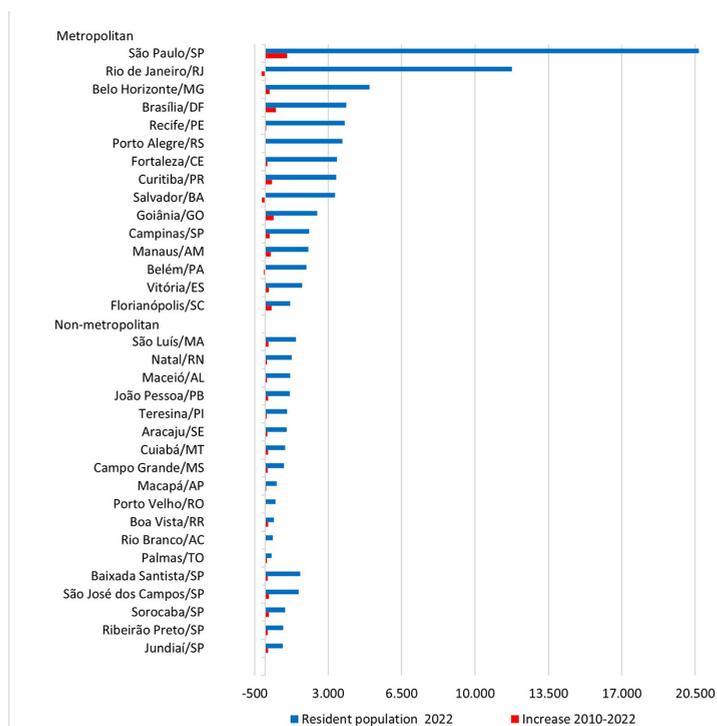
Among the LMCs, a significant population increase was observed in the period 2010-2022, particularly in some units that were already very populous in 2010, such as the Pas of São Paulo (1,043,886 new residents), Brasília (498,216), Goiânia (402,605) and Curitiba (328,134), as well as Florianópolis (300,066). On the contrary, among those that showed losses, the largest decreases occurred in the PAs of Rio de Janeiro and Salvador, respectively, with 186,064 and 162,239 inhabitants.

Table 1 – Brazil: number of municipalities and population in 2022, according to analysis segments

Analysis segments	Municipalities 2022		Population 2022			
	Number	% of the country's total	Total	% of the country's total	Urban	% of the country's total
Large metropolitan concentrations	214	3,8	70.382.416	34,7	69.534.435	39,2
Large non-metropolitan concentrations	84	1,5	17.026.271	8,4	16.610.526	9,4
Medium concentrations	402	7,2	39.732.654	19,6	37.201.641	21,0
Other municipalities	4.870	87,4	75.939.415	37,4	54.161.815	30,5
Brazil	5.570	100,0	203.080.756	100,0	177.508.417	100,0

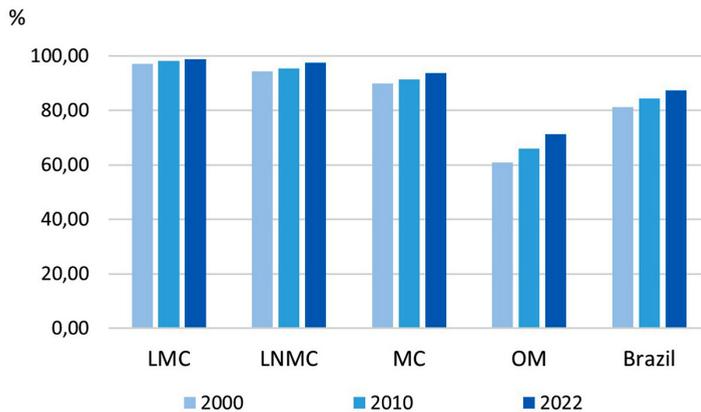
Source: IBGE – Population Census 2022.

Graph 1 – Brazil: resident population 2022 and population increase 2010-2022 in large urban concentrations (in 1 thousand inhabitants)



Source: IBGE – Population Census.

Graph 2 – Brazil: evolution of the degree of urbanization according to analysis segments - 2000, 2010 and 2022



Source: IBGE – Population Census.

Of the units that make up the LNMCs, the PA of São Luís was the most populous among the state capitals, with 1,458,836 residents; the PA of Baixada Santista, with 1,672,991 inhabitants in 2022, was the largest among non-capitals. It is worth mentioning Boa Vista, which obtained a high population increase of 129,173 new residents over its population of 284,313 inhabitants in 2010.

The domicile situation of the Brazilian population is predominantly urban, with the country maintaining the degree of urbanization above 80% since the year 2000, with segments in its territory that exceed 90% in the three periods analyzed, in the case of LMCs and LNMCs, or in the two most recent periods, such as MCs (Graph 2). These analysis segments demonstrate a more gradual evolution over time, while OMs experience a more abrupt and later evolution, rising from 60.9% in 2000 to 71.3% in 2022.

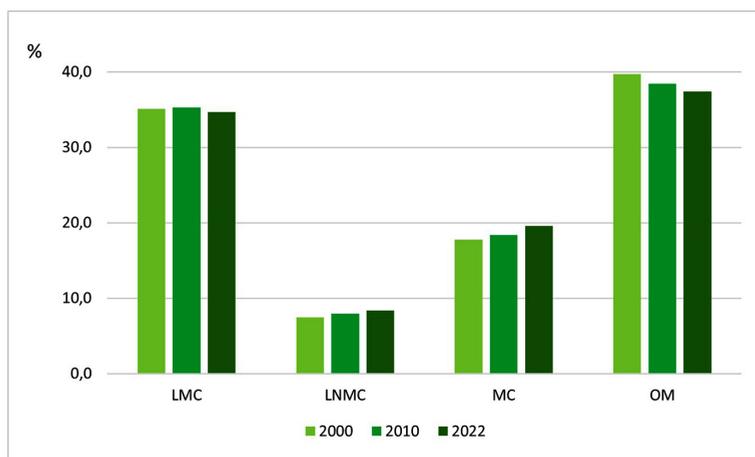
Across all LMCs, 97.1% of the population lived in urban areas in 2000, reaching 98.8% in 2022. Eight of their units exceeded the 99% urbanization rate during this period. The PAs of

Curitiba and Brasília had the lowest urbanization rates in 2022, at 95.9% and 96.8%, respectively. These units were also among the three least urbanized in the year 2000, with rates of 93.5% and 95.4%, respectively. The PA of Florianópolis then had a rate of 94.6%, surpassing them in 2022, with 97.8% of the population living in urban areas.

The set of LNMCs increased their degree of urbanization from 94.5% in 2000 to 97.6% in 2022. It contains the units with the lowest degrees of urbanization among the large Brazilian urban concentrations: the PAs of Porto Velho (91.8%), Teresina (93.9%), Macapá (94.8%), and Rio Branco (93.5%). In 2000, the segment of MCs already had 89.9% of its population in urban areas, reaching 93.6% in 2022.

Similarly to the degree of urbanization, the participation of the population of the analysis segments in the total Brazilian population makes it evident that the set of LMCs remained at the highest level, above 35% in 2000 and 2010, touching this percentage in 2022, when they participated with 34.7% (Graph 3).

Graph 3 – Brazil: evolution of participation in the total population, according to analysis segments - 2000, 2010 and 2022



Source: IBGE – Population Census.

This was the analysis segment that suffered the most abrupt decrease in the geometric annual growth rate (GAGR) of the population, from 1.22% per year (p.a.) between 2000 and 2010 to 0.38% p.a. between 2010 and 2022, while absorbing 25.5% of the country's population increase during the period (Table 2). The OMs declined their participation from 39.7% to 37.4% during

the same periods, as did the GAGRs, now by 0.29% p.a., remaining below the country's rate. These small losses in the share of these two most populous segments resulted in relative gains for the others. Even with GAGRs declining, MCs incorporated the largest contingent of the population increase during the period, 37.8%, which, unlike the metropolises, was distributed across a larger portion of the territory.

Table 2 – Brazil: geometric annual growth rate and population increase 2000-2010 and 2010-2022, according to analysis segments

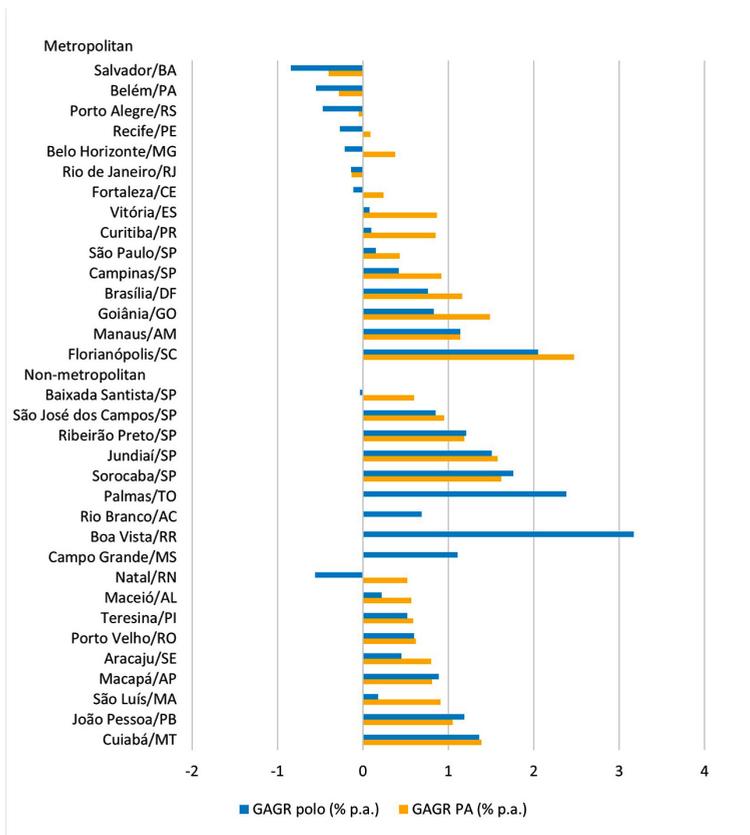
Analysis segments	GAGR (% p.a.)		Increase 2010-2022
	2000-2010	2010-2022	
Large metropolitan concentrations	1,22	0,38	3.147.911
Large non-metropolitan concentrations	1,82	0,99	1.893.876
Medium concentrations	1,52	1,04	4.659.188
Other municipalities	0,84	0,29	2.623.982
Brazil	1,17	0,52	12.324.957

Fonte: IBGE – Censos Demográficos 2000, 2010 e 2022.

In this last period, taking the GAGR of the Brazilian population (0.52% p.a.) as a reference, it can be seen that 25% of municipalities grew up to the value of this rate for the country; 15.1% reached double its growth rate (1.04% p.a.); and 17.1% reached rates greater than double, mostly occurring in large and medium-sized urban concentrations. In contrast, 42.8% of Brazilian municipalities lost population, the majority among the OMs.

Within large urban centers, the behavior of GAGRs was quite diverse (Graph 4). Eleven of the 15 units classified as metropolitan continued to grow, despite the decrease in the GAGRs of the polo municipalities; some stabilized or declined the pace of growth, contributing to the increase observed in new metropolises or non-metropolitan units.

Graph 4 – Brazil: GAGR of the population arrangements and polos municipalities of large urban concentrations, 2010-2022



Source: IBGE - Population Census.

Some behavior patterns, according to Moura (2024), can be summarized in the analysis segments:

Among the oldest units of the LMCs:

- population losses in both the polos and in the other municipalities of the PAs as a whole: the cases of Belém, Porto Alegre, Rio de Janeiro, and Salvador;

- deceleration in the pace of growth: the case of the PAs of Belo Horizonte, Fortaleza and Recife, with negative growth in the poles and lower than the country in the other municipalities;

- low growth as a whole: the case of the PAs of Curitiba and São Paulo, with poles at rates, respectively, of 0.10% p.a. and 0.15% p.a., and in the whole, of 0.85% p.a. in the first, a rate higher than in the country, and 0.43% p.a. in the second.

Among the most recent metropolises, there is a general trend of high growth, with greater weight in peripheral municipalities:

- Florianópolis, with the highest GAGRs, both in the main municipality (2.05% p.a.) and in the PA (2.47% p.a.); Campinas and Vitória, with the PAs growing more than the main municipalities, particularly Vitória, whose rate is the lowest among the metropolitan poles (0.08% p.a.);

- Manaus, and the PAs of Brasília and Goiânia, with the poles growing at rates higher than the country (respectively 1.14% p.a., 0.76% p.a. and 0.83% p.a.) and the related PAs at rates higher than double that.

Among the LNMCS, growth exceeded Brazil's GAGR:

- Boa Vista, the capital of the state with the highest GAGR (3.17% p.a.), also experienced a high population increase, certainly due to the migratory flows of Venezuelans;

- Palmas, Campo Grande and the PAs of Cuiabá and João Pessoa also grew at rates more than double that of the country, the first

two with, respectively, rates of 2.38% p.a. and 1.11% p.a., and the PAs of the last two, 1.39% p.a. and 1.05% p.a.

- growth of peripheral municipalities in PAs of the state capitals at rates greater than twice that of the country and much higher than those of the poles, particularly in the PAs of São Luís, Maceió and Aracaju;

- population loss between 2010-2022 only in the Natal pole (-0.56% p.a.), while Extremoz, a municipality in its PA, had the highest GAGR among the municipalities of PAs in the capitals of states (7.96% p.a.).

In the case of MCs, high growth in 42.8% of the units, with GAGRs more than double that of the country, and 24.8% at rates between the average and twice that of the country, pointing out some specificities:

- the highest GAGRs in units located in agribusiness and mining areas, as well as on the Santa Catarina coast;

- population increase of more than 100 thousand people in units located in areas related to mining, agribusiness and agroindustry, and in coastal/port areas;

- GAGR of more than 2% p.a. in units with a population above 200 thousand inhabitants classified as regional centers, consolidating inland centralities;

- growth higher than that of the country in coastal units in continuity, close to metropolises or integrated with existing or forming metropolitan conglomerates;

- growth higher than the country in cross-border units.

In conclusion, even if observing a deceleration in the growth rate of large urban concentrations, particularly metropolitan ones, and even the presence of negative rates in some poles, sharing a trend already observed in other countries and continents, its importance in relation to the participation in the total Brazilian

population remains. These units have enormous potential for population redistribution of the, whether within their PAs or among neighboring units that, although growing less, many of their municipalities continue to drive Brazilian demographic growth (Cunha et al., 2020).

The census information analyzed points to the permanence of recurrent dynamics in the most recent LMCs and LNMCS, with reproduction of the peripheral growth pattern in the municipalities surrounding the poles, as support for the physical expansion of these units. The spatial distribution of the municipalities and PAs that showed population gains in the period also reinforces the pattern of occupation of the Brazilian territory, clearly distributed around metropolises and capitals of states, in continuous and semi-continuous occupation patches, fundamentally along the coastline.

This process, which signals internal densification and regional extension, in some cases results in new spatial configurations peculiar to metropolization, as confirmed by the permanence of the growth of the São Paulo metropolis, which brings together other metropolises and urban concentrations to the metropolitan PA, giving rise to the metropolitan conglomerate recognized as a "macrometropolis" – a unit formed, in addition to the São Paulo PA, by the metropolitan PA of Campinas and by the non-metropolitan PAs of Baixada Santista, Jundiaí, São José dos Campos and Sorocaba (Abdal, 2009). Other conglomerates can be identified in the areas surrounding Rio de Janeiro, Brasília-Goiânia, Porto Alegre, among others.

In the medium-size urban concentrations and the other municipalities, unimunicipal units and PAs exponents of growth have become part and densify these continuous patches of expansion, constituting vectors of the advance

of metropolization across the territory. They demarcate predominant locations along roads that connect the large concentrations, as well as those that traverse the interior of the territory, in stretches that group activities of industry, ports, commerce and services, and in areas of agricultural production, agroindustry and mineral resources exploration, expanding inland towards the national borders and crossing them. They also emerge at some places amidst the large patches, also continuous, formed by the units that have experienced population loss.

Characteristics of the population

The population in each analysis segment acquires particular features, without breaking the pattern of the Brazilian population's composition by color or race, with a predominance of people who declare themselves to be brown (45.3%) or white (43.5%). Specificities occur in relation to the presence of more than 10% of the self-declared black population in LMCs and LNMCS, in a way conditioning the proportion of the country; the self-declared Asian population in the metropolitan units; and the self-declared as indigenous, more significant in the other Brazilian municipalities (Table 3).

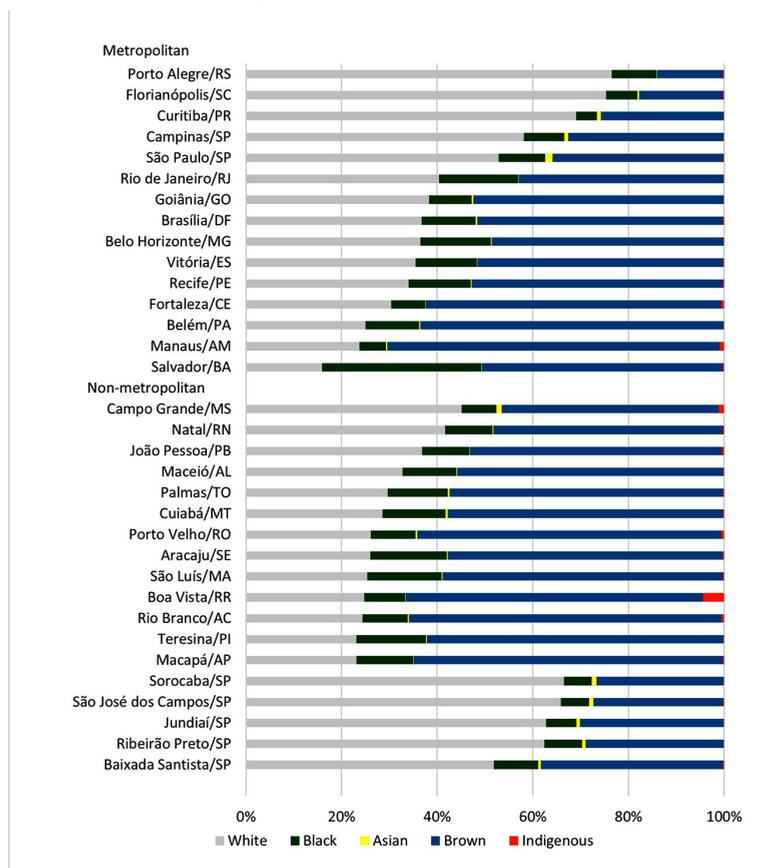
Focusing specifically on units within LMCs and LNMCS, striking particularities are observed. In 2022, the white population predominated in units in the state of São Paulo, in other states in the Southeast region, and in the South, reaching 76.5% in the metropolitan PA of Porto Alegre. Except in these areas, the brown population made up more than 45% of all units, peaking at 69.6% in the metropolis of Manaus (Graph 5).

Table 3 – Brazil: composition (in %) of the population by color or race in 2022, according to analysis segments

Analysis segments	White	Black	Asian	Brown	Indigenous
Large metropolitan concentrations	44,8	12,1	0,7	42,2	0,2
Large non-metropolitan concentrations	41,4	10,3	0,4	47,5	0,3
Medium concentrations	50,5	9,1	0,4	39,7	0,3
Other municipalities	39,0	8,9	0,2	50,7	1,2
Brazil	43,5	10,2	0,4	45,3	0,6

Source: IBGE – Population Census 2022.

Graph 5 – Brazil: proportion of the population by color or race in large urban concentrations, 2022



Source: IBGE – Population Census.

Among the minority populations, the black population was present in all units, accounting for over 4% of the population. In greater proportions, in the Northeast region, where it corresponded to 33.3% of the population in the metropolitan PA of Salvador, and it exceeded 15% in the PAs of the non-metropolitan capitals Aracaju and São Luís, a proportion like to the PA of Rio de Janeiro, in the Southeast region. The Asian population were prominent among the inhabitants of the units of the state of São Paulo, particularly in the metropolitan PA, where it made up 1.6% of the population. It was also significant in Campo Grande (1.1%) and in the PA of Curitiba (0.8%), units of neighboring states. The presence of indigenous people was found in the population composition of all the units, being more prominent in those in the North and Central-West regions, with the highest proportion in the state capitals Boa Vista (4.4%) and Campo Grande (1.1%).

There is greater diversity in the composition by color or race in the PAs of the two largest Brazilian metropolises, São

Paulo and Rio de Janeiro, as well as a greater distribution of indigenous and quilombola people in the large urban concentrations. In the case of these two populations, in Brazil in general, many people lived outside their specific territories. The data indicate that only 36.7% of the 1.7 million indigenous people lived in officially delimited Indigenous Lands, and, in an even smaller proportion, only 12.6% of the 1.3 million quilombolas lived in recognized territories.

Differences in the age profile and sex ratio (SR) are clear between the analyzed segments. In 2022, the presence of women exceeded that of men in Brazil as a whole, in an SR of the order of 94.2 men per 100 women. SR is accentuated in the LMCs segment, with a greater predominance of women (90.2), decreasing in the OMs, where it corresponded to 99 (Table 4). Among the LMCs, the PA of Salvador had the lowest SR (85.6%), while Manaus, the highest (93.8); in the LNMCS, the highest and lowest ratios were found, respectively, in Boa Vista (97.4) and in the PA of Aracaju (87.7).

Table 4 – Brazil: aging index, median age, and sex ratio of the total population in 2022, according to analysis segments

Analysis segments	Sex ratio ¹	Aging index ²	Median age (years) ³
Large metropolitan concentrations	90,2	59,9	35,0
Large non-metropolitan concentrations	91,5	48,1	33,6
Medium concentrations	93,9	54,8	36,0
Other municipalities	99,0	53,3	35,4
Brazil	94,2	55,2	35,0

Source: IBGE – Population Census 2022.

1) Ratio: number of men for every 100 women.

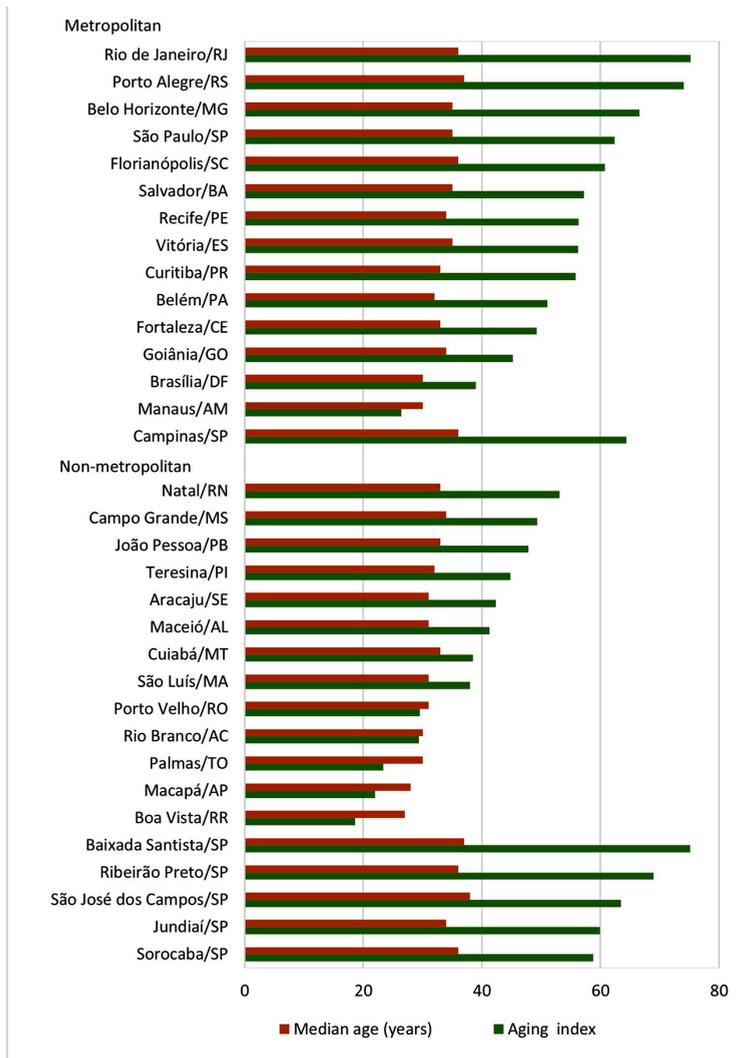
2) Ratio: people 65 or older for every 100 people aged 0 to 14.

3) Median: age that separates the youngest from the oldest half of the population.

The aging index (AI) and median age (MA) no longer show such a linear differentiation between the segments. In 2022, the LMCs had an older population than the other segments, with an AI of 59.9; and the LNMCS had the youngest, with an AI of 48.1. This is also the segment with the lowest MA, 33.6 years, while the highest is in the MCS segment, 36 years.

Regarding SR, a more homogeneous behavior is observed among the units of the large concentrations under analysis. However, the heterogeneity of the other two indicators is notorious. Among the LMCs, the PA of Rio de Janeiro had the highest AI, at a ratio of 75.2, and Manaus the lowest, 26.4; in the LNMCS, the PA of Baixada Santista had an AI of 75.2, while Boa Vista, an AI of 18.3 (Graph 6). It is also Boa

Graph 6 – Brazil: aging index and median age in large urban concentrations, 2022



Source: IBGE – Population Census.

Vista that accounted for the lowest MA of this segment, 27 years, and São José dos Campos PA had the highest, 38 years. Among the LMCs, the PA of Porto Alegre stood out with the highest MA, 37 years, and the PA of Brasília and Manaus with the lowest, 30 years.

It is important to note that the set of metropolitan units describes a curve with the upper and lower extremes higher than the set of state capitals, and it is possible to confirm the aging of the population and attribute it to a more advanced stage of metropolization. The behavior of the units in the State of São Paulo, which do not play the role of state capitals, is noteworthy. Among them, the metropolitan PA of Campinas, with AIs and MAs higher than those of many of the metropolitan units. Conversely, evidencing younger and less urbanized units, the lowest extreme values

occur in the non-metropolitan capitals of the North region, adding to these the metropolitan Manaus.

Households and sanitation conditions

Of the total of 90,704,582 households registered in the country by the 2022 Population Census, 79.9% were occupied permanent private households (OPPH), 12.6% were vacant, 7.4% were for occasional use, only 0.1% were improvised private households and another 0.1% for collective use. In the total of OPPHs, the LMCs had the highest proportion of occupied households, 83.8%, and the OMs the highest proportion of vacant households, 13% (Table 5).

Table 5 – Brazil: share in total households, average number of residents in 2010 and 2022, and annual growth rates 2010-2022 of occupied households and population, according to analysis segments

Analysis segments	Permanent private household 2022 (% in total segment)		Average number of residents		GAGR 2010-2022 (% p.a.)	
	% occupied	% vacant	2010	2022	Occupied households	Population
Large metropolitan concentrations	83,8	12,3	3,20	2,70	1,81	0,38
Large non-metropolitan concentrations	79,5	12,4	3,40	2,86	2,44	0,99
Medium concentrations	79,9	12,2	3,25	2,76	2,42	1,04
Other municipalities	76,4	13,0	3,43	2,87	1,79	0,29
Brazil	79,9	12,6	3,31	2,79	1,97	0,52

Source: IBGE – Population Census 2010 and 2022.

Compared to the 2010 Census, the average number of residents per household declined in all segments, remaining quite balanced at around 2.7 to 2.9 residents. In 2010, the country had an average of 3.3 residents per household, reducing to 2.8 in 2022. In that year, the highest averages were found in LLMCs and OMs – both 2.9 residents.

Analyses carried out on the units of the LLMCs indicate that the largest reductions occurred in the metropolitan PAs of Belém and Fortaleza, and in Manaus; among the LLMCs, in the PA of São Luís. The units in the North of the country, even with decline, were the ones with the highest averages, such as Macapá, followed by Boa Vista, respectively 3.6 and 3.4 residents per household in 2022; the lowest average was found in the PA of Baixada Santista, 2.5 residents (Moura 2024).

Between 2010-2022, the growth in the number of occupied households in all analysis segments was also general, mostly presenting annual rates higher than the population growth. In the country, the GAGR of the OPPHs was 1.97% p.a., much higher than that of the population, 0.52% p.a. The differential between the rates is more significant in LLMCs and OMs. Even units experiencing population losses had an increase in the number of households (Graph 7), which signals the need for an analysis of what induced this behavior. Following the population growth, the growth in the number of OPPHs in the LLMCs was higher in PAs than in polos; in LLMCs, however, some units deviated from this pattern, maintaining higher growth in the polos.

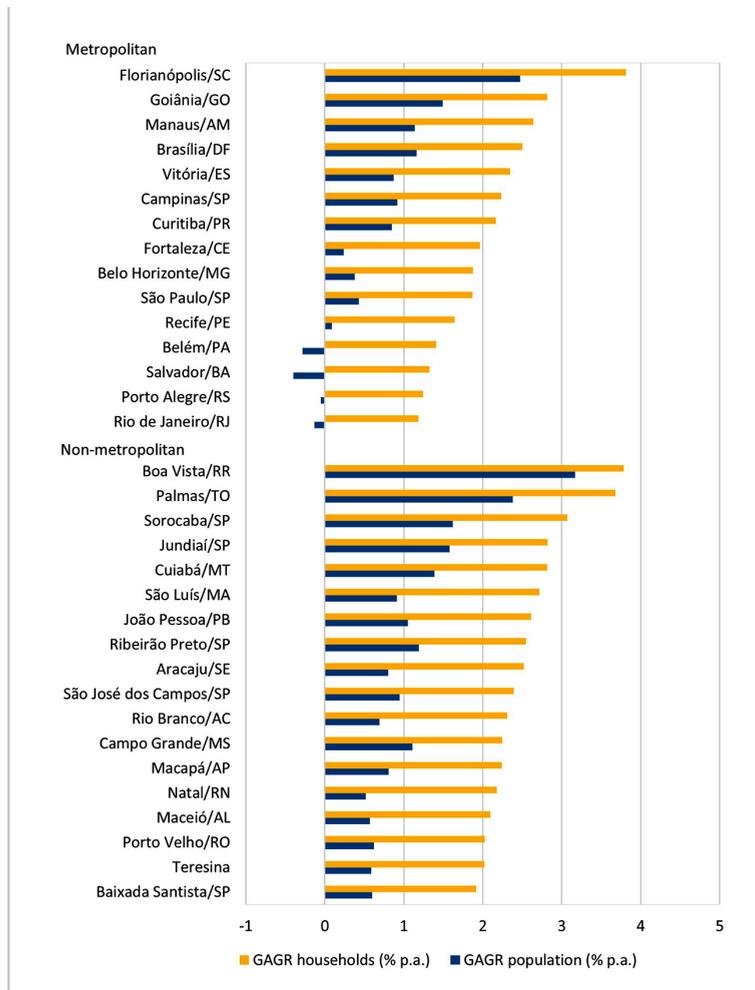
Another Census finding that requires further reflection is the proportion of vacant households, exceeding 12% of the total in all analyzed segments. Among LLMCs, the proportions ranged from 16.8% of the total in the PA of Salvador to 9.9% in the PA of Florianópolis (Graph 8). Among the LLMCs, the PA of Porto Velho had the highest proportion, 18%, and Boa Vista, the lowest, 7.1%.

The PA of Porto Alegre presented the largest difference, with the polo registering 14.7% of the vacant permanent private households compared to 12.8% for the PA. With differences of less than 1 percentage point, the polos of the PAs of São Paulo, Goiânia and Rio de Janeiro also had higher proportions than the respective PAs. Among the LLMCs, the PA of Baixada Santista registered 8.8% of the vacant units, while the pole, Santos, 10.1%; and the PA of João Pessoa registered 14.9%, with the pole registering 15.6% of vacancies.

Among the medium concentrations, the same behavior was observed, with 43 urban units presenting more than 15% of vacant PPHs, which made up 10.7% of the total, with Quixaba, in Paraíba state, with 23% of vacant households as the extreme case.

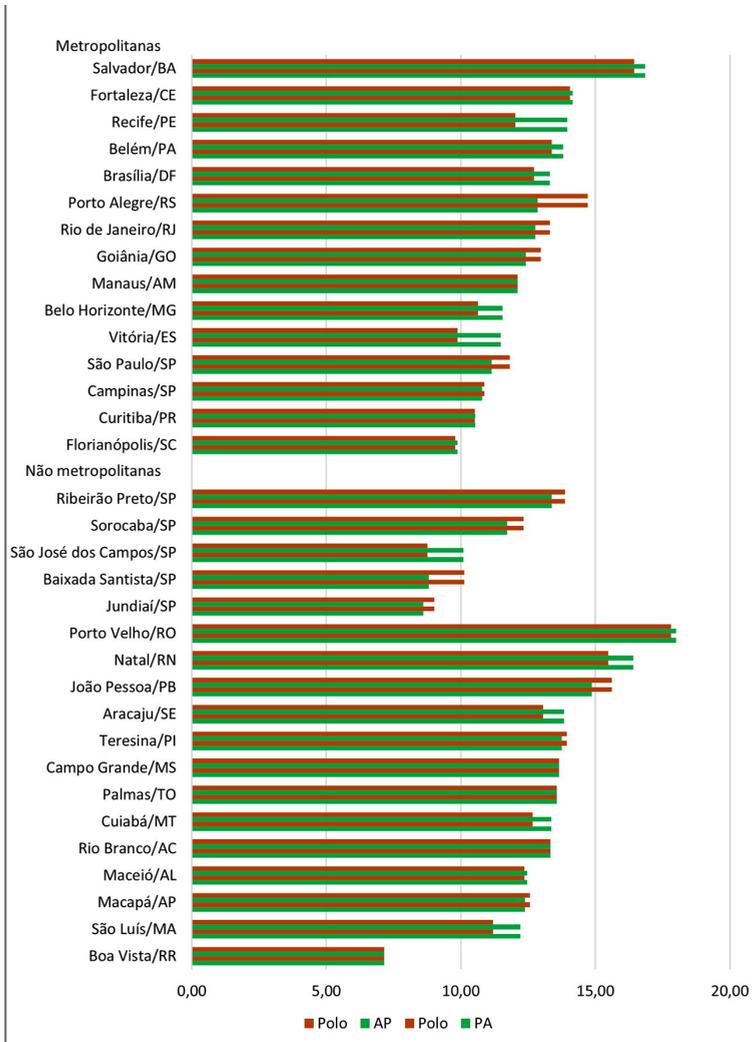
Both the growth in the number of households and the high proportion of vacant households point to the paradox of taking place in a country where, in 2022, there was a housing deficit of 6.2 million households, which represents 8.3% of the total occupied homes in the country (Fundação João Pinheiro, 2024).

Graph 7 – Brazil: geometric annual growth rates of permanent private households and population in large urban concentrations, 2010-2022



Source: IBGE - Population Census.

Graph 8 – Brazil: proportion of vacant permanent private households in the population arrangements and poles municipalities of large urban concentrations, 2022



Source: IBGE - Population Census.

The adequacy of homes, regarding basic sanitation services, the water network was broader than the sanitary sewage network. Even households that used alternative forms of accessing water, that is, those located outside the network, had indoor plumbing. Among the segments, the greatest deficiencies were found in the OMs which, although 91.3% of the OPPHs had indoor plumbing and 80.8% had household garbage collection, only 72.8% were connected to the treated water network and 41.1% to the sewage network (Table 6). Alarming, the country still registered 0.5% of the OPPHs without bathroom or toilet facilities at home, which in absolute numbers corresponds to 336,909 households, of which 91.3% in the OM segment.

Conversely, the LMCs had a water network, indoor plumbing and garbage collection in more than 90% of the OPPHs. However, despite being the best served

segment by a sewage system, the service only served 82.9% of the households. The other segments also had low rates of provision of this service, with MCs having better performance than LLMCs.

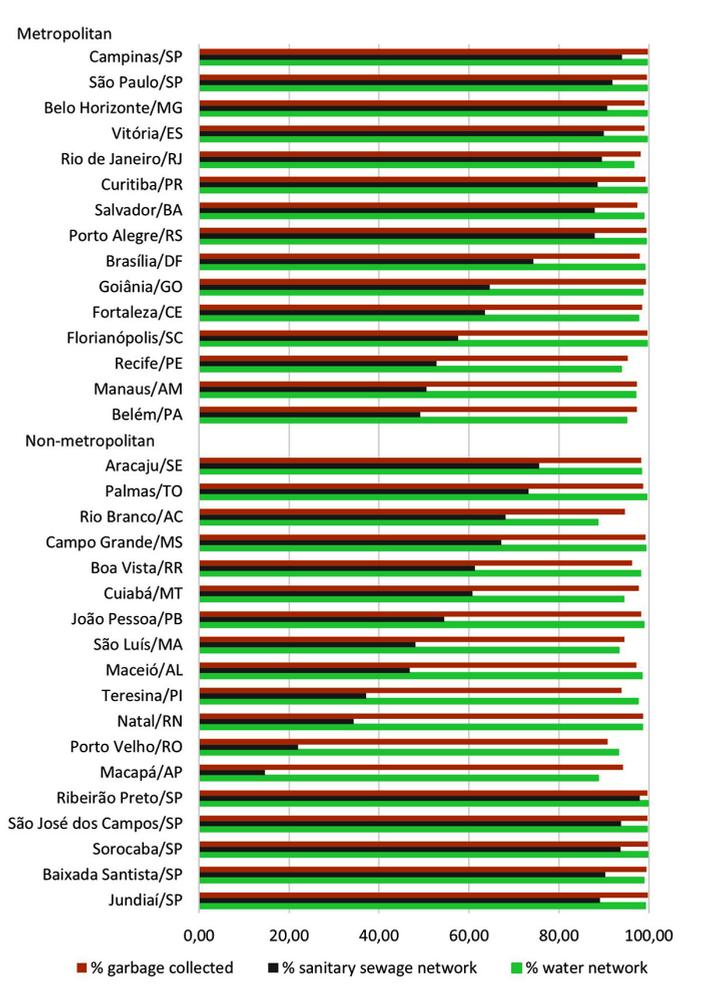
Focusing on the first two segments, the LMCs provide water network service to over 90% of households in all units, with the lowest coverage rates found in the PAs of Recife (93.9% of OPPHs served), Belém (95%) and Rio de Janeiro (96.6%) – Graph 9. The sewage network served more than 90% of the OPPHs in the Southeast region, reducing this coverage, in the other regions, to lower extremes in the Pas of Belém (49.1%), Manaus (50.6%), Recife (52.8%) and Florianópolis (57.6%). Garbage collection was more comprehensive, serving over 99% of the OPPHs in the PA of Goiânia and all units in the South and Southeast regions, except the PA of Rio de Janeiro (98.1%). The lowest coverage occurred in the PA of Recife (95.3%).

Table 6 – Brazil: number of occupied permanent private households and proportion of total by basic sanitation condition in 2022, according to analysis segments

Analysis segments	Total OPPH	% connected to the water network	% connected or off-grid but indoor plumbing	% connected to the sanitary sewage network	% without bathroom or toilet facilities	% garbage collected
Large metropolitan concentrations	25.914.908	91,6	98,4	82,9	0,0	98,7
Large non-metropolitan concentrations	5.919.398	87,7	97,6	66,0	0,1	97,8
Medium concentrations	14.331.167	88,7	98,0	74,4	0,1	96,6
Other municipalities	26.290.895	72,8	91,3	41,1	1,3	80,8
Brazil	72.456.368	83,9	95,7	64,7	0,5	91,7

Source: IBGE – Population Census.

Graph 9 – Brazil: household conditions regarding basic sanitation in large urban concentrations, 2022



Source: IBGE - Demographic Census.

In the LNMCS, the state capital Campo Grande and all the units of the São Paulo state had over 99% coverage of the OPPHs by garbage collection and water supply by network, in this case also including Palmas. Both services served more than 90% of households in the other units, except for water, in which the AP of Macapá and Rio Branco, with the lowest values,

served 88% of the households. In the case of the sanitary sewage network, the heterogeneity was greater: only the five the LNMCS of São Paulo exceeded 90% of the households served, while six units had less than 50% of OPPHs served, among them, all state capitals in the North and Northeast, with the extreme in the PA of Macapá, with only 14.7% coverage.

Final considerations

The organization and analysis of the results of the 2022 Population Census highlighted important elements that characterize the metropolization process in the country. At the same time, they gave rise to pointing out challenges to be faced in the scope of research, the formulation of public policies and urban management.

One of the major challenges stems from the difficulty in understanding the nature of the demands of multi-municipal units, which have expanded and multiplied across the territory in recent years. The complexity of managing these units requires cooperative practices, which clash with a political-institutional structure that is anachronistic to socio-spatial dynamics.

As captured in the census data, the relevance of large urban concentrations, whether metropolitan or non-metropolitan, in the population dynamics over the territory is undeniable. Even though, as has been generally observed in the country, there was a reduction in the growth rates of the metropolises, with some cases of population losses, the evolution over the analyzed period shows that it has not affected the predominance of these units in the population concentration and the degree of urbanization of the country. Although small, the rates affect high population bases, resulting in large increases in new residents and signaling an internal redistribution among municipalities within the unit (Cunha, et al., 2020). In addition, more recent metropolitan areas or some non-metropolitan state capitals showed very high rates and increases, sometimes more than twice the rate in the country. Small population losses were often incident on a few municipalities.

The spatial distribution of this growth reproduces a pattern of expansion under impulses of implosion – with densification

of the poles and immediate peripheral municipalities – and explosion, reaching increasingly distant areas, continuously or discontinuously (Lefebvre, 1991). A process in which concentrated and extended urbanization persist, forming vast urban regions (Brenner, 2013; 2014) and configuring spatial arrangements in an amalgam of the urban, metropolitan and regional scales (Soja, 2013). At the same time, characteristic metropolitan forms have spread throughout the territory (Lencioni, 2017).

The morphological configuration that is expanding, consolidated in areas of high growth around the large metropolitan concentrations, has as its apex the "macrometropolis" of São Paulo – a superlative unit that brings together a set of large metropolitan and non-metropolitan concentrations. Other macro configurations are pointed out in the territory, in different regions of the country, reproducing similar integration between different urban units. In these morphologies, it is imperative to implement public policies appropriated to the demands of the high population growth and its demands for housing, transportation, sanitation and other public services, which go beyond municipal jurisdiction, and become public functions of common interest to more than one political-administrative unit.

Another important challenge is to provide decent and adequate housing to the growing population, particularly to the deprived income segments, to offset the dizzying speculation in urban land value, amplified in contemporary metropolization. The growth in the number of households units at a faster pace than the population itself, and the high proportion of vacant homes, contrasts with the also high housing deficit present in the country. They confirm the intense dynamics of real estate business, which induces the physical expansion and extensive production of metropolitan built

space, driven largely by the supply of residences for affluent segments of the population, large service, consumption and entertainment facilities, as well as infrastructure essential to the expansion of the occupied land (Lencioni, 2017; Mattos, 2016).

Understanding and confronting the logic of this contradiction and meeting the housing demand for residents with low or no income is, therefore, urgent. Policies aimed at controlling land use and restoring the fulfillment of the social function of urban property must be generalized to all analyzed units, in order to combat speculation on urban real estate, which triggers not only peripheral occupation with the disproportionate physical extension of the city, but also forces certain segments of the population to live in areas lacking the services and infrastructure essential for survival in a healthy and safe environment.

The urgency of this challenge is heightened by the indispensable provision of good sanitation conditions to ensure the health of homes and their residents. Census data indicate that deficiencies are most evident among non-metropolitan units that constitute state capitals, all of which are experiencing rapid urban population growth, particularly in the North and Northeast regions of the country, which have extreme service deficits. They also occur in a generalized way among municipalities where urbanization is still somewhat slower.

Another challenge highlighted by this analysis is embracing and investing in the potential of a diverse country like Brazil, as portrayed by census data. The population's characteristics reinforce the need for urban policies to be tailored to the diversity and heterogeneity of Brazilian territory. Each segment of analysis, and within them, each urban concentration or municipality, requires policies specific to its composition by color or race, population's age profile and gender ratio.

About color or race, a marked presence of the brown and white population was observed, in proportions that reverse as one leaves from the South and São Paulo units and enters the other regions of the country. Black, indigenous, and Asian populations demarcate standouts: black, strongly present in the Salvador unit and others in the Northeast; Asian, mainly in those of the state of São Paulo; and the indigenous, with a strong presence in the units of the North and Central-West regions of Brazil. Regarding black people (black and brown) and indigenous populations, this composition by color or race requires affirmative policies. They also need policies that are imperative in the defense of the homologation of their specific territories, in view of the large contingent of populations unprotected from the guarantees of housing, particularly the indigenous and quilombolas.

The diversity in the age profile of the population is evident throughout the territory. The metropolitan units with the highest aging rates and the highest median ages are found in the South and Southeast units. The youngest, with the lowest aging rates, are found in the North and Central-West units, with Boa Vista being the youngest capital. Thus, there are units in which policies for the population up to 14 years of age are more pressing, in others, policies aimed at the elderly population are urgent, which has been changing the age pyramid of many states. Generally, policies are needed that accommodate the female predominance in the population, subsidize their insertion into the labor market, and address their gender vulnerability.

The census information already released proved to be precious to draw this portrait of the country in 2022, as well as its evolution in the early decades of the 2000s. In addition to data already published after the completion of this report, on the population's social profile

and migration processes, information on the commuting movements of the population for work and study is still awaited. This set of data will certainly inform new characterizations, new hypotheses and the redesign of spatial configurations based on the flows and connections between the analyzed units.

It is unequivocal to emphasize that the Census is the only source that provides information for each territorial unit of the country, collected in the same periods,

systematically every decade (despite the recent two years delay) and under the same methodology, which is constantly improved and adjusted, without compromising the possibility of evolutionary and comparative analyses. Information that is easy to access and operationalize, essential for research and formulation of public policies, particularly for a country as large as Brazil. In possession of them, not knowing the territory or ignoring its needs will be, in fact, negligence.

[1] <https://orcid.org/0000-0003-1702-0617>

Pesquisadora autônoma. Curitiba, PR/Brasil.

rmoura.pr@gmail.com

Notes

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(1) For this work, the population adjustment was anticipated, with data from 2022, to classify municipalities and PAs among urban concentrations, which led to the inclusion of 19 municipalities and 9 PAs among the MCs, therefore differing from the original list made available by IBGE, which has not yet been updated.

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