DOI http://dx.doi.org/10.20947/S0102-3098a0247

ORIGINAL ARTICLE

Racial and economic segregation in Brazil: a nationwide analysis of socioeconomic and socio-spatial inequalities

José Firmino de Sousa Filho*
Sara Costa Pedeira**
Gervásio F. dos Santos***
Joanna M. N. Guimarães****
Andrêa J. F. Ferreira*****
Flávia Jôse O. Alves******
Gabrielle R. Nascimento*******
Aureliano S. S. Paiva********
Roberto F. S. Andrade*********
Emanuelle F. Góes**********
Maurício L. Barreto***********
Estela M. L. Aquino************

* Universidade Federal da Bahia; Centro de Integração de Dados e Conhecimentos para a Saúde (CIDACS, Fiocruz-BA), Salvador-BA, Brazil (jose.sousa@ufba.br; https://orcid.org/0000-0001-5057-385X).

** Universidade Federal da Bahia (UFBA), Salvador-BA, Brazil (sarapedreira00@gmail.com; https://orcid.org/0000-0003-3888-5740).

*** Universidade Federal da Bahia (UFBA), Salvador-BA, Brazil (gervasiofsantos@gmail.com; https://orcid.org/0000-0002-3545-3590).

**** Centro de Integração de Dados e Conhecimentos para a Saúde (CIDACS, Fiocruz-BA), Salvador-BA, Brazil (joannaguimaraes@hotmail.com; https://orcid.org/0000-0002-6283-1008).

***** Centro de Integração de Dados e Conhecimentos para a Saúde (CIDACS, Fiocruz-BA), Salvador-BA, Brazil (andreaferreiracv@gmail.com; https://orcid.org/0000-0002-6884-3624).

****** Centro de Integração de Dados e Conhecimentos para a Saúde (CIDACS, Fiocruz-BA), Salvador-BA, Brazil (flaviajosy1@gmail.com; https://orcid.org/0000-0003-1613-2270).

******* Insper – Instituto de Ensino e Pesquisa, São Paulo-SP, Brazil (g_reboucas15@hotmail.com; https://orcid.org/0000-0003-3365-3350).

******** Centro de Integração de Dados e Conhecimentos para a Saúde (CIDACS, Fiocruz-BA), Salvador-BA, Brazil (sanchobuendia@gmail.com; https://orcid.org/0000-0002-4638-4199).

********* Centro de Integração de Dados e Conhecimentos para a Saúde (CIDACS, Fiocruz-BA), Salvador-BA, Brazil (randrade@ufba.br; https://orcid.org/0000-0002-9323-1400).

********** Centro de Integração de Dados e Conhecimentos para a Saúde (CIDACS, Fiocruz-BA), Salvador-BA, Brazil (emanuelle.goes@fiocruz.br; https://orcid.org/0000-0001-9288-6723).

*********** Centro de Integração de Dados e Conhecimentos para a Saúde (CIDACS, Fiocruz-BA), Salvador-BA, Brazil (mauricio@ufba.br; https://orcid.org/0000-0002-0215-4930).

************ Centro de Integração de Dados e Conhecimentos para a Saúde (CIDACS, Fiocruz-BA), Salvador-BA, Brazil (estela@ufba.br; https://orcid.org/0000-0002-8204-1249).

This article aims to analyze residential segregation by race (racial segregation) and income (economic segregation) in Brazil and explore its relationship with socioeconomic and socio-spatial factors. Residential segregation was assessed using the dissimilarity index based on the 2010 demographic census and considering urban census tracts since segregation is sociologically considered an urban problem. The results for racial segregation showed that it is more evident in cities in the South and Southeast of Brazil and mainly affects the self-declared black population. The approach used to calculate economic segregation involved examining the income level of different low-income groups. Therefore, we consider families that earned between 0 and 1 minimum wage as the group with the greatest social vulnerability. We did not find significant correlations between racial and income segregation indices with aspects such as urbanization (urban population size). Finally, we present the racial segregation indices stratifying families by income thresholds for the 27 Brazilian capitals and conclude that *per capita* household income is a preponderant factor for the segregation of the poorest, especially in families whose residents self-identify as black.

Keywords: Urban segregation. Racial and economic segregation. Brazil. Demographic census.

Introduction

The absence of personal interactions between social groups can define segregation in the sociological sense. In the geographical sense, it is the uneven distribution of social groups in a physical space. For the most part, sociological segregation and geographic segregation are correlated (WHITE, 1983). Reardon and Bischoff (2011) conceptualize income segregation as a complex multidimensional phenomenon caused by income inequality and with a direct effect on the lives and well-being of families. The extent to which people live separated from one another in urban spaces, whether according to race/skin color (racial segregation) or income (economic segregation), influences access to opportunities, social capital, housing conditions, and health.

Marques (2015) proposes an integrated analysis of social connections and urban space, exploring how these factors contribute to poverty and segregation in Brazilian metropolises. The cases of São Paulo and Salvador reveal that the greater the network connections, the better living conditions and accessibility for individuals. The effects of these attributes on socialization networks are indirect and combined, resulting in heterogeneous links. In this regard, some networks of connections in segregated spaces tend to be more local and less varied. These factors lead to a perpetuating effect on lasting inequalities and limit access to people's "structure of opportunities" or "sources of well-being" (KAZTMAN, 2003; MUSTERED; MURIE; KESTELOOT, 2006).

The adverse effects of segregation have already been identified in the literature regarding unemployment, education, health, drug use, crime, poverty, and racism, among others (KING; MIESZKOWSKI, 1973; MASSEY; DENTON, 1988; DANZIGER; HAVEMAN, 2001; CHARLES; DINWIDDIE; MASSEY, 2004; DAWKINS; SHEN; SANCHEZ, 2005; KRIVO; PETERSON;

KUHL, 2009). However, few studies addressed such matters in Brazilian urban centers or even Latin American cities, including racial outlooks, which are widely analyzed in the USA but not in Brazil (ROBERTS; WILSON, 2009).

Telles (1992) used the 1980 Brazilian demographic census to examine segregation by income and race in the country's major metropolitan regions. The author found a high segregation between white and black people, followed by segregation between brown and black people and, finally, between white and brown people. Regarding segregation by income, the research points out that segregation increases according to income level, indicating a tendency to distance the wealthier classes from the other social strata. Telles (1992) still compares the North American and Brazilian segregation processes. Although unlike in the US, there were no segregationist laws in Brazil, residential segregation has remained prevalent since the abolition of slavery in 1888.[1] According to the author, Brazilian rulers avoided passing legislation that mentioned racial aspects, and there was no interest in building public policies on education and employment for the black population after abolition.

Considering urban space, there was no national housing policy to reduce residential segregation, and affirmative actions or social reparations were scarce (TELLES, 2004; VARGAS, 2005). Regarding public health, there were no policies in the post-abolition period directed towards this population, and racism operated as a tool to increase inequalities in health processes. Oliveira and Magalhães (2022) argue that structural racism is manifested through impediments to the preventive or curative benefits of treatments and medicines promoted by the universal public health policies in Brazil.

Torres (2006) and Feitosa *et al.* (2021) measured the evolution of urban residential segregation in the metropolitan region of São Paulo. Despite using different methods and census bases, the studies concluded that Residential segregation based on income and social status had increased considerably. It suggested a trend of social distancing of those with greater purchasing power from broad spaces of society. This movement has been observed in other large cities in Latin America with the expansion of "gated communities" (SABATINI; CÁCERES; CERDA, 2001; PETERS; SKOP, 2007; FIGUEROA *et al.*, 2021).

Valente and Berry (2020) used the dissimilarity index to calculate segregation by race and income in the metropolitan regions of Brazil in 2010 and compared it to the results

[1] There were no explicit segregationist laws in Brazil. However, the government had created laws to repress the culture of the enslaved population and their descendants. The laws limited the coexistence and well-being of the black population and disregarded the social abyss caused by slavery. In this sense, since 1805, the black population was prohibited from practicing their religious cults or any cults that were not linked to the Catholic religion, including religious manifestations of African origin that could be considered "crimes against public health". Until 1972, Umbanda and Candomblé "terreiros" could only be opened in Bahia if there was an operating license from the "Delegacia de Jogos e Costumes". It is essential to highlight the creation of "Lei de terras" (1850), shortly after the end of slavery, which established that land ownership should be solely through purchase. Besides, it excluded the so-called "sesmarias", abandoned land belonging to the Portuguese crown handed over to the land occupations of communities, later divided according to the number of inhabitants of the place. Also, at the end of the 19th century, in 1890, the Brazilian criminal code began to criminalize "capoeira," one of the best-known Afro-Brazilian cultural manifestations worldwide. In 1942, the "Lei da vadiagem" criminalized anyone who was found to be living idle or not having enough income to provide themselves with means of subsistence (GADELHA, 1989; PIRRO, 2012; SANTOS, 2013; GONÇALVES NETO; SILVA, 2019; OLIVEIRA; FISCHER, 2017; ANTUNES, 2022).

found by Telles (1992). There has been a decrease in segregation indices for both race and income in the last 30 years. However, residential integration may not be sufficient to promote political, educational, income, and other assimilation between social classes or ethnic groups despite this decline. The social gains obtained in the early 2000s must continue to facilitate integration and connections between groups. The reduction of the indicator may also not translate precisely into improvements in access to essential services such as culture, leisure, and public goods related to the built environment, health, and others.

Thus, this article aims to analyze the relationships between income and racial segregation in Brazil and explore their regional and urban patterns. We calculated the dissimilarity index with data from the Brazilian demographic census 2010 for a sample of 4595 Brazilian cities, considering only the urban census tracts. Therefore, we sought a more accurate measurement of segregation in urban areas of the country, since, conceptually, residential segregation is seen as a severe problem in urbanized society (CORRÊA, 2004; TELLES, 2004; BAYER; MCMILLAN; RUEBEN, 2004; ROYUELA; VARGAS, 2010). The analysis was carried out exploring segregation patterns by Brazilian macroregions and state capitals, generally the most urbanized cities in the country. We offer a broad view of segregation patterns in Brazilian cities since, as evidenced by previous studies, there is a positive correlation between population growth and segregation (MATA *et al.*, 2005, 2007; SOUSA FILHO *et al.*, 2022). However, most studies limit their analyses to metropolitan regions or urban agglomerations.

We contribute to the existing literature by providing nationwide evidence on urban population patterns associated with residential segregation. It is worth noting that quantitative studies on racial and income segregation in Brazil are still scarce. Therefore, an approach capable of generating relevant discussions on racial and income segregation is needed, which can point out ways for future studies and public policies focused on reducing inequalities.

Recent developments in race and income segregation

The growth of cities in Brazil and other developing countries has been the subject of relevant studies on the increase in socioeconomic and racial inequalities (OSORIO, 2004; SOARES, 2009; REHBEIN, 2011; MCGRANAHAN; SCHENSUL; SINGH, 2016; RIBEIRO, 2016; JELIN; MOTTA; COSTA, 2018; AMARAL; AMARAL, 2019; FISCHER, 2020). Accelerated population growth, or urbanization itself, has caused social problems and exacerbated inequalities between cities and regions. About 85% of the Brazilian population lived in urban areas in 2010, and it is estimated to have increased to 90% in 2020 (IBGE, 2017). In this regard, residential segregation is the most visible expression of inequality caused by discrimination, racism, unplanned urbanization, lack of access to housing, income conditions, and urban mobility (SATHLER; LEIVA, 2022).

The way racial discrimination acts in residential segregation is not similar to the several forms of social or economic discrimination. In residential segregation, black individuals do

not pay a higher rent for a house than white individuals. However, they are excluded from implicit and explicit ways of occupying the central areas of cities (ARROW, 1998). Valente and Berry (2020) state that the white elite used the fact that there were no segregationist laws in Brazil, unlike in the US and South Africa, for example, to create and spread the "myth of Brazilian racial democracy". However, racial discrimination and oppression for black and brown people are part of Brazil's historical socioeconomic development (NASCIMENTO, 1989; SKIDMORE, 1993).

Telles (2004) compared indicators of racial inequalities between Brazil, the USA, and South Africa with a focus on the structure and distribution of income between white and non-white individuals. The author highlights the high degree of income inequality, measured by the Gini, in Brazil, positioned between countries like Sierra Leone, Swaziland, and South Africa. In the early 2000s, the wealthiest 10% of the Brazilian population earned around 52% of everyone else's total income. While in South Africa, the wealthiest 10% earned around 47% of the total income. The situation is even more asymmetrical when the population's income is divided between white and non-white individuals. However, in this case, South Africa and the US are more unequal countries than Brazil.

In addition to the traditional factors that explain income inequality between white and black people, such as income from work and education, parental wealth is a crucial factor for analysis, as it is transmitted intergenerationally, reproducing historical inequalities. Oliver and Shapiro (2006) state that wealth explains the differences in wages between white and black individuals who have the same educational standards and occupy the same positions. In the US, while black individuals earn around 75% compared to white individuals' earnings, their net worth is just 18% compared to white individuals.

There is also consistent evidence of an association between residential segregation and inequalities in health outcomes (ACEVEDO-GARCIA *et al.*, 2003; SMITH *et al.*, 2022; SANTOS *et al.*, 2021; GUIMARÃES *et al.*, 2022). Santos *et al.* (2021) used the dissimilarity index to measure income segregation in 152 large urban centers and its relationship to homicide rates in Brazil. Segregation has played a central role in limiting social mobility over years and generations, determining access to health, safety, and public services. Additionally, in regions more deprived of goods and services, people are more exposed to violence (WILKINSON, 2004).

Finally, this literature review addresses important racial and socioeconomic segregation issues in Brazilian cities and other urban centers worldwide. However, there are still gaps concerning socioeconomic and racial segregation patterns in Brazil, given the country's conflicting regional and urban characteristics. Thereby, our research intends to contribute in multiple ways to studies on residential segregation. First, a quantitative analysis of socioeconomic and racial segregation with the calculation of the dissimilarity index at the urban census tract level enables an accurate measurement of segregation in urban areas of the country. In addition, the analysis of segregation at city level distinguishing regional and capitals is essential, as the development of cities is directly linked to local wealth

and racial patterns. Finally, the analysis of racial segregation by socioeconomic stratum is explored for Brazilian capitals since the disarranged growth of these cities has potentiated the effects of racial and income segregation in the daily lives of populations.

Methodology

Database

We used the *per capita* household income database and the race/skin color database aggregated at the census tract level from the 2010 Brazilian demographic census (IBGE, 2011).[2] This database includes a series of variables that describe the situation of families residing in each geographic area. We considered the urban census tracts characterized by the Brazilian Institute of Geography and Statistics (IBGE) as urbanized areas of cities. IBGE technically defines a census tract as a territorial unit established for cadastral control purposes, formed by a continuous area and located in a single urban or rural framework. The calculation of segregation indices with urban census tracts excludes cities with less than four urban census tracts in the index measurement. For this reason, our sample includes 4,595 cities from a total of 5,565 municipalities.

The income ordinal categorical variables used to calculate the dissimilarity index were permanent private households without nominal monthly income added with the categories of households with income of up to ⅛, ¼, ½, 1, and 2 minimum wages, each low-income group confronted with the remaining households in the city. The race variable was considered as the resident's self-declared skin color/race: white, black or brown. For the non-white category, the number of black and brown people were added together (SOARES; SILVA, 1897; SILVEIRA; TOMAS, 2019).

Method

There is a wide range of residential segregation indicators and spatial and local extensions of the dissimilarity index. However, we chose the standard version (DUNCAN; DUNCAN, 1955) because it is the most used index and can facilitate comparisons with previous studies. The dissimilarity index measures how homogeneous the distribution of groups is in geographic space (GARCIA-LÓPEZ; MORENO-MONROY, 2018). It is possible to capture the proportion of individuals that should be rearranged in the urban area so that the groups are equitable in the available space (ICELAND; WEINBERG; STEINMETZ, 2002). This index, formulated by Duncan and Duncan (1955), denotes zero for full integration and one for total segregation. Therefore, values closer to zero indicate that smaller population parcels need to be relocated to homogenize the region, while results closer to one reveal the opposite. Formally, the similarity index can be calculated by the following formula:

[2] The database includes a sample of the universe of the 2010 demographic census. The details of the statistical weighting of the sample and the characteristics of the applied questionnaire are publicly available. See IBGE (2011).

$$D=\frac{\sum_{i=1}^{n}\left[t_i\left|(p_i-P)\right|\right]}{\left[2TP(1-P)\right]} \quad (1)$$

According to equation 1, n is the number of areas (census tracts) in each city, t_i is the total of families in area i, T is the total sum of families, p_i is the proportion of the minority group in area i, and P is the proportion of families in the city that will be considered a comparison group. We present the distribution of economic and racial segregation indices, according to the population size of the cities (category 1: 0-10,000; category 2: 10,001-50,000; category 3: 50,001-100,000; category 4: 100,001-500,000; and category 5: more than 500,000 inhabitants), by Brazilian macroregions, and *per capita* income threshold (in minimum wages).

The index for racial groups was compared with people who self-identified as white. Thus, there is the segregation of blacks *versus* whites, browns *versus* whites, and non-white *versus* whites. Although the Brazilian census also considers two other race categories (Asian and Indigenous people), we calculated racial segregation only for the white, brown and black categories, as they represent the vast majority (almost 99%) of Brazilians.

In addition, we stratified the census tracts at the *per capita* household income level to calculate racial segregation indices by socioeconomic group. The procedures adopted follow the seminal works of Telles (1992) and Valente and Berry (2020). Since the variables for analysis are ordinal categorical, we stratified the census tracts according to the intended income level and merged them with the race database. As a result, each set of census tracts will exclusively contain families that have self-declared their belonging to a particular race/skin color for each considered income threshold. We define these income thresholds as follows: up to 1 minimum wage, 1 to 2 minimum wages, 3 to 5 minimum wages, 5 to 10 minimum wages, and above ten minimum wages. In summary, we are organizing the data according to the intended income and the race/skin color of the families, ensuring that each set of census tracts contains only families that fall within a specific income threshold.

Results[3]

Composition of the Brazilian population by ethnic-racial group

According to the last 2010 IBGE demographic census, approximately 85% of the Brazilian population lived in urban areas. Of these, 42% identified as white, 34.7% brown, 6.5% black, 0.95% yellow and 0.17% indigenous. The southern states and São Paulo have the highest percentages of self-declared white population. About 70% of Rio Grande do Sul, and Santa Catarina's population declare being white. The highest percentages

[3] In addition to the results presented in this section, readers interested in deepening the theme can find more descriptive statistics and an example of calculating the dissimilarity index in *R* software in the repository link https://github.com/FirminoFilho/segregation-indexes-for-brazilian-cities.

of self-identified brown population are in the northern states; approximately 58.4% of Amapá's population identified as brown, 55% of Amazonas' population, and 50% of Roraima's population.

The highest percentages of the urban population identified as black are in Bahia and Rio de Janeiro, 13.4% and 11.9%, respectively. 8% of Minas Gerais's population also identified as black. We highlight that Bahia is the state with the highest number of people identifying as black, even in absolute numbers. Only after the 1991 census IBGE included information on the indigenous population in race statistics (DIAS JÚNIOR; VERONA, 2018). In 2010,[4] 305 indigenous communities were counted, or 869,917 people (0.47% of Brazil's population), of which 324,834 lived in cities and 572,083 lived in rural areas. Essentially, the indigenous population is located in the North region. About 1.9% of the population of the North region declared being indigenous. In the country, only 0.17% of the indigenous population resides in urban areas (IBGE, 2010).

On the other hand, the Asian population (or of Asian descent) was more evenly distributed among Brazilian states, and its concentration was mostly in urban areas. The state with the highest percentage of the self-declared yellow population is Piauí, with 2.1%, followed by Acre and the Tocantins with 2%, and the Federal District and Goiás with 1.7%. Considering the whole country, about 0.95% of the population identified as Asian resides in urban areas (IBGE, 2010).

Results for racial segregation in Brazil

Table 1 presents the results of the racial segregation by region and Brazilian capitals. Segregation for the black population is more prominent in the southern region. We noticed greater segregation in the capitals than in other cities, including the capitals of the Northeast, North, and Southeast. For the self-declared brown population, the highest segregation rates are also found in the South region and the capitals of the Southeast region.

TABLE 1
Racial segregation index, by macro-regions
Brazil – 2010

Regions	Mean		Median		SD	
	General	Capitals	General	Capitals	General	Capitals
Blacks vs. whites						
Brazil	**0.27**	**0.28**	**0.27**	**0.29**	**0.09**	**0.09**
Midwest	0.25	0.21	0.25	0.22	0.09	0.11
Northeast	0.26	0.28	0.26	0.29	0.09	0.06
North	0.27	0.29	0.26	0.25	0.10	0.09
Southeast	0.26	0.29	0.26	0.29	0.08	0.09
South	0.33	0.36	0.32	0.37	0.11	0.06

(continue)

[4] The 2010 Census introduced major innovations for the identification of this population. See Santos *et al.* (2019) "The identification of the Indigenous population in Brazil's official statistics, with an emphasis on demographic censuses".

(continued)

Regions	Mean		Median		SD	
	General	Capitals	General	Capitals	General	Capitals
Browns vs. whites						
Brazil	**0.18**	**0.19**	**0.17**	**0.19**	**0.08**	**0.09**
Midwest	0.16	0.20	0.15	0.21	0.06	0.05
Northeast	0.14	0.16	0.14	0.16	0.06	0.07
North	0.14	0.13	0.13	0.15	0.06	0.05
Southeast	0.20	0.29	0.20	0.29	0.07	0.11
South	0.26	0.27	0.25	0.21	0.09	0.11
Non-white (black + brown) vs. whites						
Brazil	**0.18**	**0.18**	**0.17**	**0.18**	**0.08**	**0.08**
Midwest	0.15	0.20	0.15	0.20	0.06	0.05
Northeast	0.14	0.15	0.13	0.17	0.05	0.07
North	0.14	0.13	0.13	0.14	0.05	0.05
Southeast	0.19	0.28	0.19	0.28	0.07	0.11
South	0.24	0.26	0.24	0.21	0.09	0.10

Source: IBGE (2011). Research results. Elaboration of the authors.

Figure 1 shows the racial segregation distribution of black *versus* white people in Brazilian cities spatially. The urban segregation of the black population is more distributed throughout the country. However, some concentration is noticeable for the highest indicators in the South region and some cities in the North and Northeast regions. Despite the high value of the segregation index, only 12% of the cities are in this last quartile.

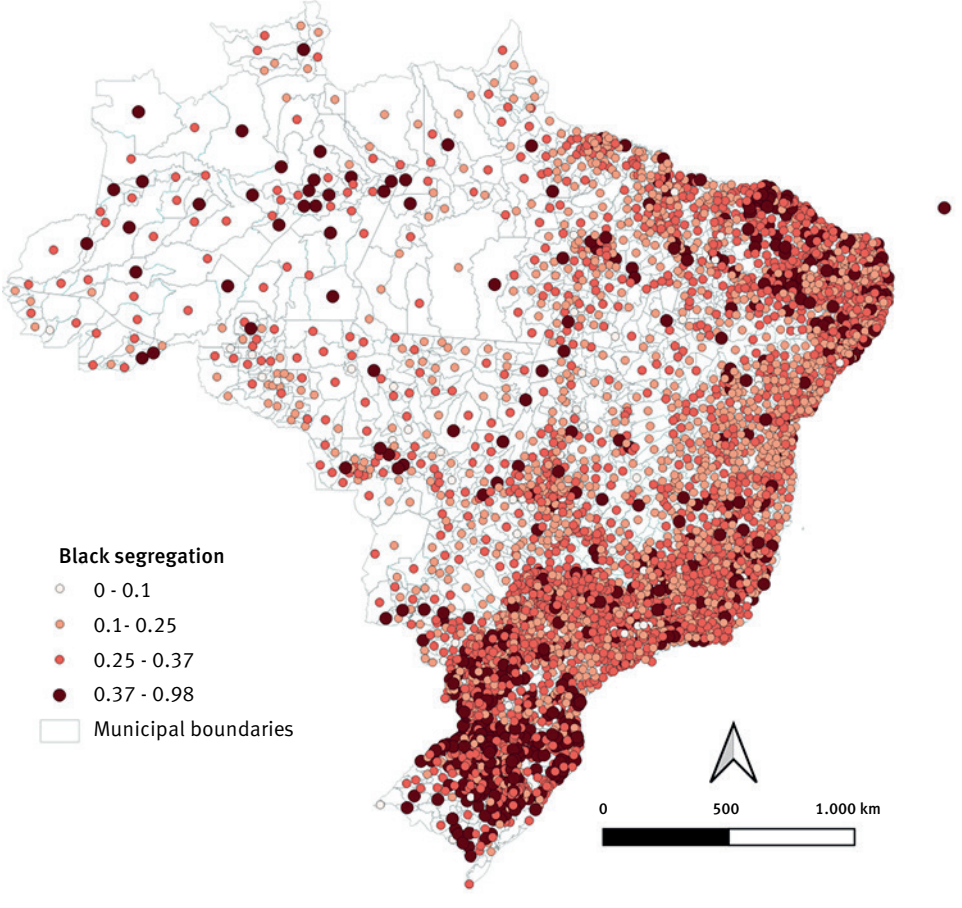
Regarding the relationship between racial segregation and the size of the urban population, no relevant linear association was found between the indicators. It seems that the urban area, represented here by the urban population size, does not affect the magnitude of racial segregation. We could only notice minor variations in the mean or median of the indicators. For example, the segregation of blacks *vs.* whites in cities with up to 10,000 inhabitants was 0.26, whereas, for cities with more than 500,000 inhabitants the value increased to 0.28. The segregation of browns for the smallest category of cities was 0.18, changing to 0.21 in the largest cities (see the supplementary material in the GitHub repository). Thus, the results suggest that factors other than population size may be relevant to explain segregation in Brazilian cities.[5]

As the index of dissimilarity compares the local population composition (census tract) with the global one (city as a whole), the discrepancy between local and global tends to be smaller in smaller cities. However, weighted spatial indices such as the rank-order information theory index (H) presented by Garcia-Lopéz and Moreno-Monroy (2018) for Brazilian cities showed strong similarities with the results brought by other studies on

[5] França (2017) discusses the theoretical relations between racial segregation and Brazilian urbanization in depth. The constant struggle for central space in cities is an aspect of domination that has shaped its structures, moving the black population and the poorest population away from the city centers, with the high-income white population concentrated in a single area. It is what Villaça (1998) calls "spatial configuration to enable domination through space". Recent forms of urbanization based on racial aspects are also discussed by Sabatini, Cáceres, and Cerda (2001), Marques (2015), and others.

income segregation (SANTOS *et al.*, 2021; SOUSA FILHO *et al.*, 2022). We emphasize that the magnitude of the indicators is not always the ideal focus to be followed by researchers, but the conceptual and theoretical conception of the indicator.

FIGURE 1
Map of racial segregation blacks vs. whites by cities
Brazil – 2010



Source: IBGE (2011). Research results. Elaboration of the authors.

Results for economic segregation

Analyzing residential segregation by income level, the results showed different characteristics regarding groups of wage threshold. The low-income group that earned from 0 to ⅛ wage represents 5.9% of the population; the group up to ¼ wage encompasses 11.4% of the total population; the group up to ½ wage encompasses 27.8%, up to 1 wage represents 56.4%; and 80% of the Brazilian population earned up to two wages.

The segregation indicators' distribution of households that earn from 0 to ½ wage or from 0 to 1 wage presents a closer normal statistical distribution. Table 2 presents the descriptive statistics for the segregation indicators of these low-income groups. However, descriptive statistics for the other wage threshold are presented in the GitHub repository, since there is no consensus established in the literature on which income group is the 'ideal' to establish comparisons between income segregation and other socioeconomic indicators (SOUSA FILHO *et al.*, 2022).

TABLE 2
Income-based urban segregation index, by macro-regions
Brazil – 2010

Regions	Mean		Median		SD	
	General	Capitals	General	Capitals	General	Capitals
***Per capita* income of ½ wage**						
Brazil	**0.22**	**0.25**	**0.22**	**0.22**	**0.07**	**0.10**
Midwest	0.20	0.27	0.20	0.26	0.06	0.10
Northeast	0.21	0.23	0.21	0.21	0.06	0.12
North	0.21	0.20	0.21	0.22	0.06	0.08
Southeast	0.21	0.33	0.22	0.34	0.07	0.08
South	0.24	0.26	0.25	0.22	0.08	0.06
***Per capita* income of 1 wage**						
Brazil	**0.25**	**0.27**	**0.25**	**0.23**	**0,08**	**0.11**
Midwest	0.22	0.32	0.22	0.29	0.07	0.12
Northeast	0.28	0.31	0.29	0.29	0.08	0.13
North	0.25	0.20	0.25	0.17	0.08	0.09
Southeast	0.23	0.33	0.24	0.33	0.08	0.13
South	0.23	0.26	0.23	0.26	0.08	0.05

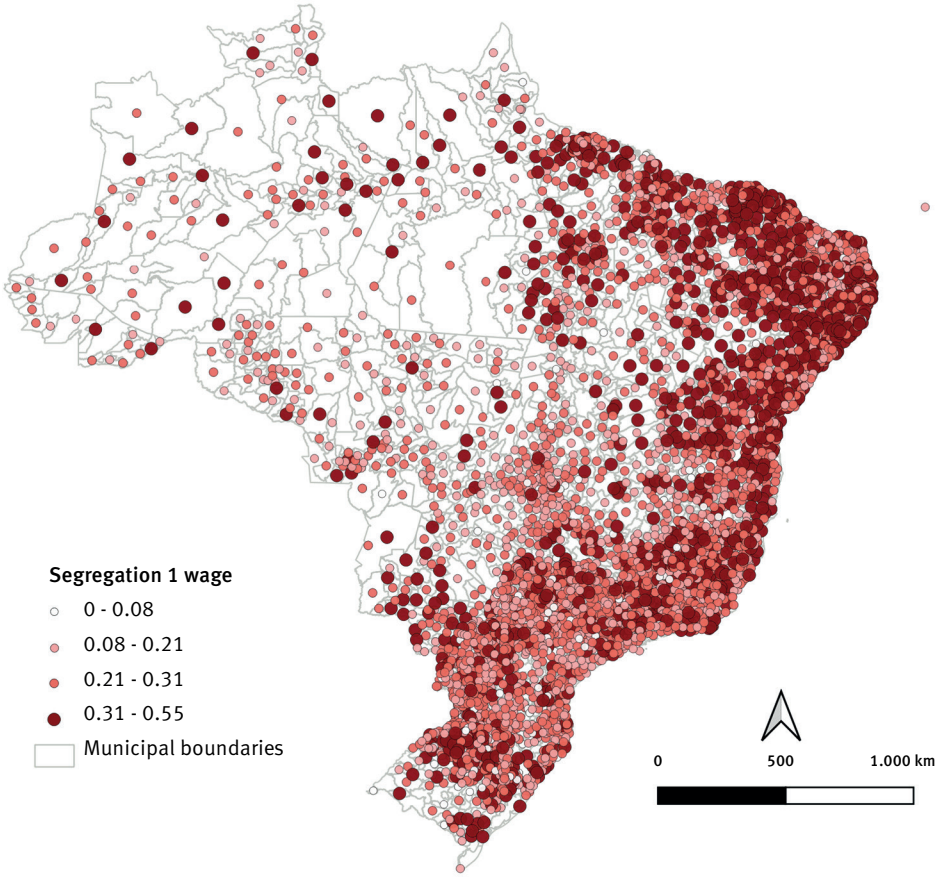
Source: IBGE (2011). Research results. Elaboration of the authors.

We observe that the Brazilian capitals have higher rates of income segregation than other cities analyzed. However, there are no significant differences between these categories. For the urban segregation indicator of *per capita* household income of up to ½ minimum wage, the regions have patterns similar to the average level of segregation, between 0.20 and 0.24. The capitals of the Southeast region have the highest median of segregation, around 0.34. As for the group's index that earns up to 1 minimum wage, the North and Northeast regions have the highest rates. On average, about 28% of the low-income population, or the population that earns up to 1 minimum wage, would have to be relocated within the city to make the income distribution more homogeneous. Families living in capitals in the Southeast, Northeast, and Central-West regions experience more significant effects of segregation. Approximately 33% of families residing in the Southeast's capitals should be relocated within cities, a similar ratio to the Northeast region, on average, 31%.

Figure 2 shows the distribution of economic segregation in Brazilian cities. For the families earning up to 1 minimum wage, segregation is present in all regions of the country,

including high levels of segregation in cities in the countryside or that do not constitute a metropolitan region. Thus, it reinforces the importance of densifying studies on residential segregation also for small and medium-sized cities.

FIGURE 2
Map of income segregation, by cities
Brazil – 2010



Source: IBGE (2011). Research results. Elaboration of the authors.

In addition, we did not find a linear relationship between income segregation and the urban population size. In the supplementary material on GitHub repository are descriptive statistics by population group, region and state's capitals, and other cities. It is possible to notice small changes in the levels of segregation by city size. For example, for the group representing the low-income of up to ½ salary, the value was 0.21; in the largest cities, it increased to 0.25. In the threshold of families earning up to 1 minimum wage, the indicator showed a value of 0.24 for the smallest cities. In the largest cities, with more than 500,000 inhabitants, the index was 0.28.

Racial segregation by socioeconomic category

According to Figure 3 we can observe that for most Brazilian capitals, the segregation of the self-declared black population is greater, regardless of income level. However, it is worth noting that we did not find a segregation pattern at the regional level between the capitals. Therefore, segregation should have different characteristics for families in each city, regardless of a pre-established regional socioeconomic pattern. Even so, the capitals in the Southeast, Belo Horizonte, Rio de Janeiro, São Paulo, and Vitória, have a high segregation indicator for low-income non-white families. In Rio de Janeiro, non-white families earning less than one minimum wage have a segregation index of 0.36. In São Paulo, the segregation for this category is even higher, around 0.47; for families where residents declare to be black and have a *per capita* income between 1 and 2 minimum wages, segregation is around 0.35.

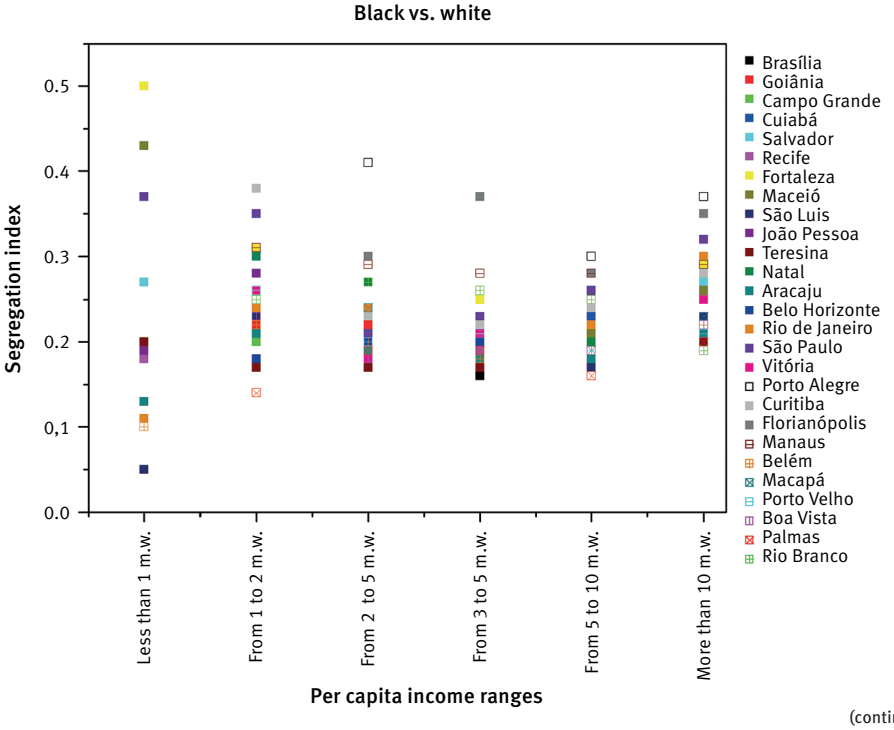
In the capitals of the Northeast, Salvador, Recife, São Luís, and Teresina have the highest segregation rates for low-income families of up to 1 minimum wage in which residents declare to be non-white. However, Recife and São Luís' segregation of black families is accentuated more intensely in the other socioeconomic groups. In Fortaleza, Maceió, and Natal, segregation of families of black identified residents is higher in all income categories. We also highlight that Fortaleza presented the highest segregation index among all Brazilian capitals for families that earn less than one minimum wage with their black identified residents. For Fortaleza's socioeconomic and racial category, the segregation index reached 0.50, even higher than São Paulo.

Brazilian capitals in the South also have higher segregation rates for families where residents declare to be black. In none of the three cities, Porto Alegre, Curitiba, and Florianópolis it was possible to calculate the segregation index for black or brown families with less than one minimum wage as few or no families were located in the urban area with a permanent private domicile. We have already highlighted that in these cities, the income level can be considered a key factor of isolation of low-income black or brown families in urban areas. For all three cities, segregation rates for families with black residents are higher in all socioeconomic categories. Likewise, it was not possible to calculate the segregation index for black or brown families with a *per capita* household income of less than one minimum wage in any of the capitals in the Central-West region. In Goiânia, segregation is higher for black families at all socioeconomic levels. For Brasília, Campo Grande, and Cuiabá, the segregation of families earning between 1 and 2 minimum wages is more pronounced.

Among the capitals in the North, Manaus and Rio Branco have the highest segregation rates for families with black residents in all socioeconomic thresholds. In Belém, families in which residents identify as brown and have a *per capita* household income of less than one minimum wage, are more segregated, a unique pattern among all Brazilian capitals. However, for all other socioeconomic stratifications, segregation of black families is more accentuated in the city and in Porto Velho, Palmas, and Rio Branco.

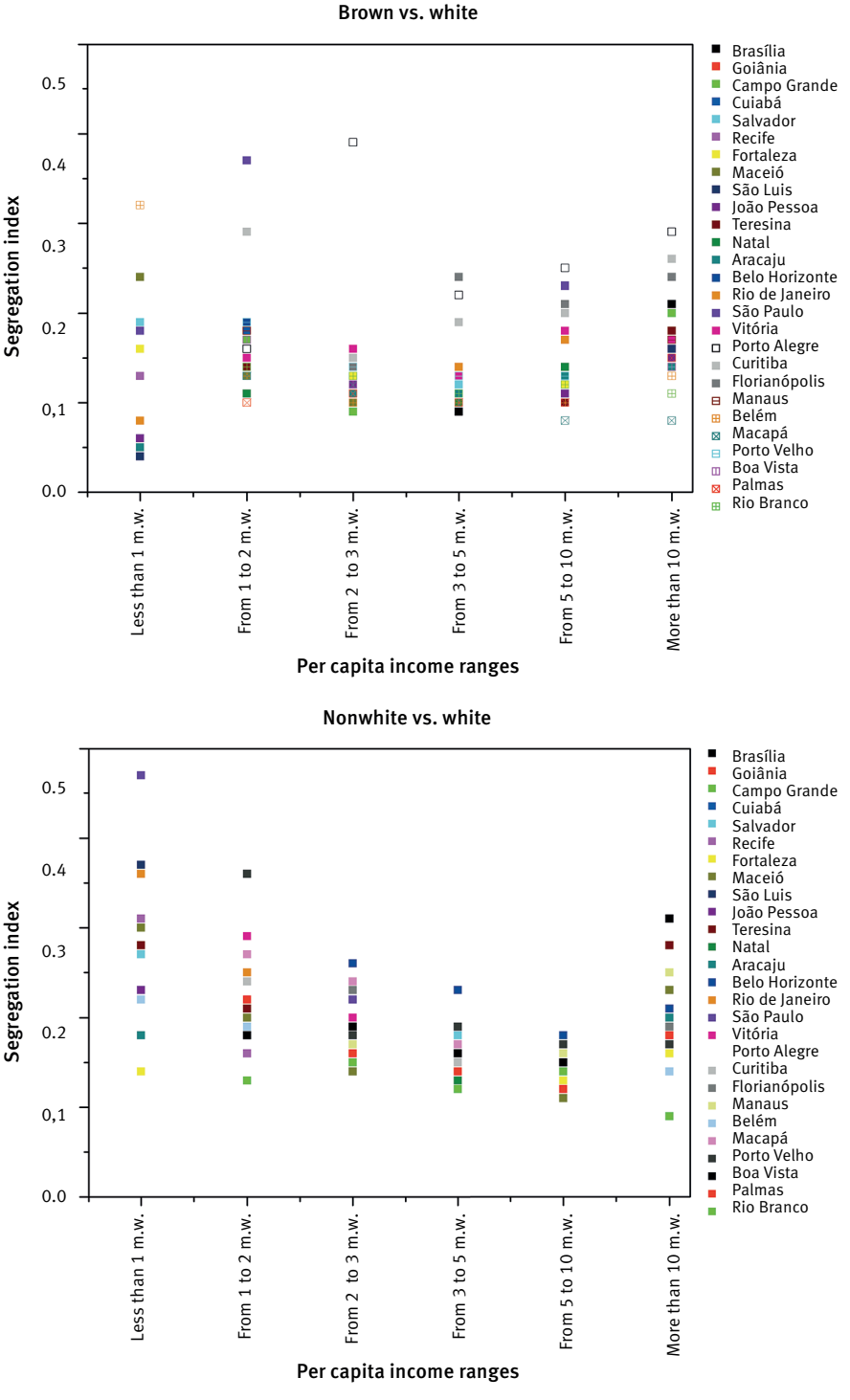
Regarding the segregation of black and brown families, or non-white families earning more than ten minimum wages, a thought on socioeconomic conditions seems necessary. Like high-income white families, the economic condition of black and brown families in this income category allow them to choose where to live. In this sense, families "self-segregate" seeking places with more security and convenience in commuting to and from work, among other reasons. However, there is some evidence and discussion on the segregation of wealthier families (SABATINI; CÁCERES; CERDA, 2001; TORRES, 2006; WATSON, 2009; BRUCH, 2014). In the analysis presented here, for all capitals, except for Boa Vista and Teresina, families where residents identify as black have higher rates of segregation in the socioeconomic threshold of more than ten minimum wages.

FIGURE 3
Racial segregation index for Brazilian capitals, by income level
Brazil – 2010



(continue)

(continued)



Source: IBGE (2011). Research results. Elaboration of the authors.

Final remarks

We analyzed economic and racial segregation in Brazilian cities through the dissimilarity index at urban census tract level. It was evident that the Brazilian population's ethnic-racial composition influences regional inequality and segregation patterns. Notably, there is a greater concentration of white population in southern Brazilian states (Rio Grande do Sul, Santa Catarina, and Paraná) and São Paulo. These states had lower Gini indices; however, they also had the most significant indicator of racial segregation. We highlight the South and Southeast capitals as the cities with the highest segregation for the black, brown and the whole non-white population.

Concerning indicators of income segregation, we analyzed families' segregation by different socioeconomic levels. Segregation more incisively affects families that earned up to 1 minimum wage in 2010, or R$ 510.00. However, it is worth noting that we see segregation as a multidimensional phenomenon with adverse effects, essentially limiting the most vulnerable populations from accessing basic health, education, housing, and infrastructure. The analyses with other income cuts would be valid, depending on the work structure and the populations analyzed by researchers, taking into account aspects beyond the quantitative one.

Using the indicator of *per capita* household income of up to 1 minimum wage, we find that segregation is also slightly higher for Brazilian capitals. Cities located in the Southeast, Midwest, and Northeast regions were the ones with most remarkable economic segregation. A relevant contrast is that one of the poorest regions of the country, the Northeast region, and the wealthiest region, the Southeast, are among the most segregated. It is a relevant finding since residential segregation reflects factors beyond poverty or the concentration of wealth. Therefore, we can say that segregation's aspects must be considered for improvement of distributive policies, as they affect vulnerable families, whether they are in more affluent cities or not.

Analyzing racial segregation stratified by income, we notice that the population that declared they were black are the most segregated in most Brazilian capitals and by socioeconomic threshold. We highlight that in the cities of Fortaleza, Goiânia, Maceió, Porto Alegre, Curitiba, Florianópolis, Manaus, and Rio Branco, the black population is more segregated irrespective of income level. In Fortaleza, the index reached 0.50 for families with a *per capita* income of less than one minimum wage. Specifically, in the income level of families earning less than one minimum wage *per capita*, the non-white population is more segregated in most cities. In cities such as Recife, São Luís, Teresina, Rio de Janeiro, and São Paulo, the non-white population with less than one wage has the highest levels of segregation. São Paulo is the Brazilian capital with the highest segregation index for the non-white population in this socioeconomic threshold, approximately 0.47. Families with self-declared black residents earning more than ten minimum wages are also segregated.

Similarly to white families, mainly for security and access to various services, those families "self-segregate".[6]

We explored correlations between income segregation indicators with urban population. Nevertheless, we did not find a relevant relationship among the variables. Therefore, the urban segregation index for cities seems to have a pattern that attenuates possible effects of population size. Another possibility is that Brazilian cities could have reached a possible depletion of population size since the country's medium-sized cities are already gaining more economic importance and attracting more migrants (HENDERSON, 1997; MATA, 2005).

The urban population size did not explain the complexity of racial segregation. In addition to socioeconomic factors, cultural and historical issues must be considered to deepen discussions on racial segregation (DE JESUS; HOFFMANN, 2020). New urban spaces or centralities in cities are also dynamic causes that affect individuals' mobility and sociability. In this regard, the dynamics of the spatial context and the actions taken by the State in constructing public policies are essential to broaden discussions on residential segregation and reveal economic, social, and racial contradictions in contemporary society.

We highlight the seminal work by Telles (1992) calculating racial segregation by income level for 7 Brazilian metropolitan regions in 1980. However, we must propose that Brazilian racial segregation should not be compared with North American segregation in quantitative standards of a lower or higher dissimilarity index level. In addition to social and historical processes triggering differently, Brazil's black and brown population corresponds to a much more representative percentage. Therefore, the magnitude of the segregation index does not necessarily correspond to a more negligible effect of segregation on the life and well-being of black and brown populations in Brazil concerning a higher index in the United States. The same criticism can be made of income segregation patterns in Brazil since the population considered poor, or below the poverty line, is more significant than in the US.

Finally, we do not intend to exhaust the discussions on residential segregation in Brazil. This research has theoretical and methodological limitations that need to be considered. Firstly, a greater theoretical depth is necessary on the development of racial and income segregation in Brazil through a historical and sociological overview. Political aspects and the interests of the Brazilian elite must be discussed to understand how Brazil became one of the world's more unequal countries, despite generating so much agricultural and industrial wealth. Regarding the dissimilarity index, the method used here to calculate segregation also presents challenges to overcome in methodological terms (ROYUELA; VARGAS, 2010). It is known that the indicator may be biased when a minority group is not very representative in the geographic area under analysis or when the geographic area is

[6] Few studies discuss the segregation of the richest, especially in the so-called "gated communities", or the creation of actual "gated neighborhoods within cities". Sabatini *et al.* (2001) state that the "self-segregation" of the wealthiest families has intensified in Latin America after trade liberalization, accentuating income inequality since then, and the escalation of violence in the large cities. However, studies do not focus on the race for the self-segregation of the richest. Thus, this theoretical limitation implies that we must carefully analyze what we call the "self-segregation" of black or non-white families earning more than ten minimum wages in Brazil.

extensive, causing an unreliable weighting and impairing comparability between regions (ALLEN, 2015; MAZZA, 2017; TIVADAR, 2019). Even census tracts may show an imbalance in terms of the number of families in peripheral and central areas, for example (SOUSA FILHO *et al.*, 2022). Future research needs to advance in using alternative indicators that measure residential segregation and other spaces of social interactions between racial/social groups in their daily activities (LISBOA; FEITOSA, 2016). It is also essential to discuss agendas that include racial and income segregation issues as focal points to grant the most vulnerable populations access to essential services such as health, education, employment, and housing, in order to develop a more equitable society.

References

ACEVEDO-GARCIA, D. *et al.* Future directions in residential segregation and health research: a multilevel approach. **American Journal of Public Health**, v. 93, n. 2, p. 215-221, 2003. http://doi.org/10.2105/AJPH.93.2.215.

ALLEN, R. *et al.* More reliable inference for the dissimilarity index of segregation. **Econometric Journal,** v. 18, p. 40-66, 2015. http://doi.org/10.1111/ectj.12039.

AMARAL, E. F. L.; AMARAL, C. V. L. Estruturas invisíveis de segregação na Região Metropolitana de Góias. **Revista Brasileira de Estudos de População**, v. 36, p. 1-31, 2019. http://doi.org/10.20947/S0102-3098a0089.

ANTUNES, M. E. R. **Longe do tronco, perto das grades**: a criminalização da capoeira no código penal de 1890 e o controle social na pós-abolição. 2022. 50f. Dissertação (Mestrado em História) – Programa de Pós-Graduação em História, Universidade Católica de Pernambuco, Recife, 2022.

ARROW, K. J. What has economics to say about racial discrimination? **Journal of Economic Perspectives**, v. 12, n. 2, p. 91-100, 1998. http://doi.org/10.1257/jep.12.2.91.

BAYER, P.; MCMILLAN, R.; RUEBEN, K. S. What drives racial segregation? New evidence using Census microdata. **Journal of Urban Economics**, v. 56, n. 3, p. 514-535, Nov. 2004.

BRUCH, E. E. How population structure shapes neighborhood segregation. **American Journal of Sociology**, v. 119, n. 5, p. 1221-1278, 2014. http://doi.org/10.1086/675411.

CHARLES, C. Z.; DINWIDDIE, G.; MASSEY, D. S. The continuing consequences of segregation: family stress and college academic performance. **Social Science Quarterly**, v. 85, n. 5 (spec. iss.), p. 1353-1373, 2004. http://doi.org/10.1111/j.0038-4941.2004.00280.x.

CORRÊA, R. L. **O espaço urbano**. 4 ed. São Paulo: Ática, 2004.

DANZIGER, S. H.; HAVEMAN, R. H. **Understanding poverty**. London: Russel Sage Foundation, 2001.

DAWKINS, C. J.; SHEN, Q.; SANCHEZ, T. W. Race, space, and unemployment duration. **Journal of Urban Economics**, v. 58, n. 1, p. 91-113, 2005. http://doi.org/10.1016/j.jue.2005.02.001.

DE JESUS, G. J.; HOFFMANN, R. De norte a sul, de leste a oeste: mudança na identificação racial no Brasil. **Revista Brasileira de Estudos de População**, v. 37, p.1-25, 2020.http://doi.org/10.20947/S0102-3098a0132.

DIAS JÚNIOR, C. S.; VERONA, A. P. Os indígenas nos censos demográficos brasileiros pré-1991. **Revista Brasileira de Estudos de População**, v. 35, n. 3, p. 1-9, 2018. http://dx.doi.org/10.20947/S0102-3098a0058.

DUNCAN, O.; DUNCAN, B. A methodological analysis of segregation indexes. **American Sociological Review**, v. 20, p. 210-217, 1955.

FEITOSA, F. *et al.* Measuring changes in residential segregation in São Paulo in the 2000s. *In*: VAN HAM, M. *et al.* (Ed.). **Urban socio-economic segregation and income inequality**. Springer International Publishing, 2021. p. 507-523.

FIGUEROA, A. R. *et al.* Segregations: inhabiting popular periphery in Santiago, Concepción and Talca, Bitacora. **Urbano Territorial**, v. 31, n. 1, p. 223-235, 2021. http://doi.org/10.15446/bitacora.v31n1.86855.

FISCHER, B. M. A ética do silêncio racial no contexto urbano: políticas públicas e desigualdade social no Recife, 1900-1940. **Anais do Museu Paulista: História e Cultura Material**, v. 28, p. 1-45, 2020. http://doi.org/10.1590/1982-02672020v28d1e15.

FRANÇA, D. S. N. **Segregação racial em São Paulo**: residências, redes pessoais e trajetórias urbanas de negros e brancos no século XXI. 2017. 253f. Tese (Doutorado em Sociologia) – Universidade de São Paulo, São Paulo, 2017.

GADELHA, R. M.; D'AQUINO, F. A lei de terras (1850) e a abolição da escravidão: capitalismo e força de trabalho no Brasil do século XIX. **Revista de História**, v. 120, p. 153-162, 1989. http://doi.org/10.11606/issn.2316-9141.v0i120.

GARCIA-LÓPEZ, M. À.; MORENO-MONROY, A. I. Income segregation in monocentric and polycentric cities: does urban form really matter? **Regional Science and Urban Economics**, v. 71, p. 62-79, 2018. http://doi.org/10.1016/j.regsciurbeco.2018.05.003.

GONÇALVES NETO, J. C.; SILVA, K. I. A formação da propriedade fundiária no Brasil: a Lei de Terras de 1850. **Themis**, v. 17, n. 2, p. 173-195, 2019.

GUIMARÃES, J. M. N. *et al.* Racial inequities in self-rated health across Brazilian cities: does residential segregation play a role? **American Journal of Epidemiology**, v. 191, n. 6, p. 1071-1080, 2022. http://doi.org/10.1093/aje/kwac001.

HENDERSON, V. Medium size cities. **Regional Science and Urban Economics**, v. 27, p. 583-612, 1997. https://doi.org/10.1016/S0166-0462(96)02169-2.

IBGE – Instituto Brasileiro de Geografia e Estatística. **Censo Demográfico Brasileiro de 2010**. Rio de Janeiro, 2010. Available in: https://sidra.ibge.gov.br/.

IBGE – Instituto Brasileiro de Geografia e Estatística. **Base de informações do Censo Demográfico 2010**: resultados do universo por setor censitário. Rio de Janeiro, 2011. Available in: https://censo2010.ibge.gov.br/.

IBGE – Instituto Brasileiro de Geografia e Estatística. **Síntese de indicadores sociais**: uma análise das condições de vida da população brasileira. Rio de Janeiro, 2017. Available in: https://biblioteca.ibge.gov.br/.

ICELAND, J.; WEINBERG, D. H.; STEINMETZ, E. **Racial and ethnic residential segregation in the United States**. US Census Bureau, 2002.

JELIN, E.; MOTTA, R.; COSTA, S. **Global entangled inequalities**: conceptual debates and evidence from Latin America. 1. ed. New York: Taylor & Francis Group, 2018.

KAZTMAN, R. **La dimensión espacial en las políticas de superación de la pobreza urbana**. Santiago de Chile: CEPAL-ECLAC, 2003. (Série Medio Ambiente y Desarrollo, 59).

KING, M. C. Occupational segregation by race and sex in Brazil, 1989-2001. **Review of Black Political Economy**, v. 36, n. 2, p. 113-125, 2009. http://doi.org/10.1007/s12114-009-9038-2.

KING, A. T.; MIESZKOWSKI, P. Racial discrimination, segregation, and the price of housing. **Journal of Political Economy**, v. 81, n. 3, p. 590-606, 1973. http://doi.org/10.1086/260060.

KRIVO, L. J.; PETERSON, R. D.; KUHL, D. C. Segregation, racial structure, and neighborhood violent crime. **American Journal of Sociology**, v. 114, n. 6, p. 1765-1802, 2009. http://doi.org/10.1086/597285.

LISBOA, F. S.; FEITOSA, F. F. Para além da perspectiva residencial: a construção de índices de segregação dos espaços de atividades. **Revista Brasileira de Cartografia**, v. 68, n. 4, p. 797-813, 2016.

MASSEY, D.; DENTON, N. The dimensions of residential segregation. **Social Forces**, v. 67, p. 281=315, 1988.

MATA, D. *et al.* **Examining the growth patterns of Brazilian cities**. World Bank Policy Research, 2005. (Working Paper, 3724).

MATA, D. *et al.* Determinants of city growth in Brazil. **Journal of Urban Economics**, v. 62, p. 252-27, 2007. http://doi.org/10.1016/j.jue.2006.08.01.

MARQUES, E. Urban poverty, segregation and social networks in São Paulo and Salvador, Brazil. **International Journal of Urban and Regional Research**, v. 39, n. 6, p. 1067-1083, 2015. http://doi.org/10.1111/1468-2427.12300.

MAZZA, A. Dealing with bias of the dissimilarity index of segregation. **Rivista Italiana di Economia Demografia e Statistica**, LXXI, p. 1-10, 2017.

MCGRANAHAN, G.; SCHENSUL, D.; SINGH, G. Inclusive urbanization: can the 2030 Agenda be delivered without it? **Environment and Urbanization**, v. 28, n. 1, p. 13-34, 2016. http://doi.org/10.1177/0956247815627522.

MUSTERED, S.; MURIE, A.; KESTELOOT, C. **Neighborhoods of poverty**: urban social exclusion and integration in Europe. London: Palgrave, 2006.

NASCIMENTO, A. **Brazil, mixture or massacre**? Essays in the genocide of a black people. Dover, MA: Majority Press, 1989.

OLIVER, M. L.; SHAPIRO, T. M. **Black wealth/white wealth**: a new perspective on racial inequality. 2. ed. New York: Taylor & Francis Group, 2006.

OLIVEIRA, N. A. S.; FISCHER, L. R. C. Segregação espacial urbana e os efeitos da lei de terras de 1850. **Revista Brasileira de História do Direito**, v. 3, n. 1, p. 36-54, 2017. Available at: http://www.redalyc.org/articulo.oa?id=471747524003.

OLIVEIRA, L. G. F.; MAGALHÃES, M. Percurso da implantação da política nacional de saúde integral da população negra no Brasil. **Revista Brasileira de Estudos de População**, v. 39, p. 1-13, 2022.

OSORIO, R. G. **A mobilidade social dos negros brasileiros**. Brasília: Instituto de Pesquisa Econômica Aplicada, 2004. (Texto para Discussão, 1033). Available at: https://repositorio.ipea.gov.br/bitstream/11058/1869/1/TD_1033.pdf.

PETERS, P. A.; SKOP, E. H. Socio-spatial segregation in Metropolitan Lima, Peru. **Journal of Latin American Geography**, v. 6, n. 1, p. 149-171, 2007.

PIRRO, R. F. **Das sesmarias à propriedade liberal**: a Lei de Terras como marco divisório na transição de um modelo proprietário condicionado à propriedade absoluta. 2012. 141 f. Dissertação (Mestrado em Direito) – Programa de Pós-Graduação em Direito, Universidade do Estado do Rio de Janeiro, Rio de Janeiro, 2012.

REARDON, S. F.; BISCHOFF, K. Income inequality and income segregation. **American Journal of Sociology**, v. 116, n. 4, p. 1092-1153, 2011. http://doi.org/10.1086/657114.

REHBEIN, B. **Globalization and inequality in emerging societies**. 1. ed. New York: Palgrave Macmillan, 2011. http://doi.org/10.1057/9780230354531.

RIBEIRO, M. G. Desigualdades urbanas e desigualdades sociais nas metrópoles brasileiras. **Sociologias**, v. 18, n. 42, p. 198-230, 2016. http://doi.org/10.1590/15174522-018004207.

ROBERTS, B. R.; WILSON, R. H. **Urban segregation and governance in the Americas**. 1. ed. New York: Palgrave Macmillan, 2009.

ROYUELA, V.; VARGAS, M. **Residential segregation**: a literature review. [s.l.]: Facultad de Economía y Empresa, Universidad Diego Portales, 2010.

SABATINI, F.; CÁCERES, G.; CERDA, J. Segregación residencial en las principales ciudades chilenas: tendencias de las três últimas décadas y posibles cursos de acción. **Eure**, v. 27, n. 82, p. 21-42, 2001. http://doi.org/10.4067/s0250-71612001008200002.

SANTOS, T. L. Leis e religiões: as ações do Estado sobre as religiões no Brasil do século XIX. **Revista Brasileira de História das Religiões**, v. V, n. 15, p. 1-14, 2013.

SANTOS, R. V. *et al.* The identification of the Indigenous population in Brazil's official statics, with an emphasis in demographic censuses. **Statistical Journal of the IAOS**, v. 35, p. 29-46, 2019.

SANTOS, M. I. dos *et al.* Urban income segregation and homicides: an analysis using Brazilian cities selected by the Salurbal project. **SSM – Population Health**, v. 14, 2021. doi: 10.1016/j.ssmph.2021.100819.

SATHLER, D.; LEIVA, G. A cidade importa: urbanização, análise regional e segregação urbana em tempos de pandemia de Covid-19. **Revista Brasileira de Estudos de População**, v. 39, p. 1-32, 2022.

SILVEIRA, L. S.; TOMAS, M. C. Fluidez racial na Região Metropolitana de Belo Horizonte: características individuais e contexto local na construção da raça. **Revista Brasileira de Estudos de População**, v. 36, p. 1-22, 2019. http://dx.doi.org/10.20947/S0102-3098a0081.

SKIDMORE, T. E. **Black into white**: race and nationality in Brazilian thought, black into white. Durham, NC: University Press, 1993. http://doi.org/10.2307/j.ctv11hpq5v.

SMITH, R. J. *et al.* Residential segregation, social cohesion, and aging in place: health and mental health inequities. **Gerontologist**, v. 76, p. 1-10, 2022. http://doi.org/10.1093/geront/gnac076.

SOARES, A. M. D. C. Cidade revelada: pobreza urbana em Salvador – BA. **Geografias**, v. 5, n. 1, p. 83-96, 2009. Available at: http://www.cantacantos.com.br/revista/index.php/geografias/article/view/86/84.

SOARES, G. A. D.; SILVA, N. V. Urbanization, race, and class in Brazilian politics. **Latin American Research Review**, v. 22, n. 2, p. 155-176, 1987. https://www.jstor.org/stable/2503489.

SOUSA FILHO, J. F. *et al.* Inequality and income segregation in Brazilian cities: a nationwide analysis. **SN Social Sciences**, v. 2, Article 191, 2022. http://doi.org/10.1007/s43545-022-00491-9.

TELLES, E. E. Residential segregation by skin color in Brazil. **American Sociological Review**, v. 57, n. 2, p. 186-197, 1992.

TELLES, E. E. **Racismo à brasileira**: uma nova perspectiva sociológica. Trad. Ana Arruda Callado, Nadjeda Rodrigues Marques, Camila Olsen. Rio de Janeiro: Relume-Dumará; Fundação Ford, 2003.

TELLES, E. E. **Race in another America**: the significance of skin color in Brazil. New Jersey: Princeton University Press, 2004.

TIVADAR, M. OasisR: an R package to bring some order to the world of segregation measurement. **Journal of Statistical Software**, v. 89, p. 1-39, 2019. http://doi.org/10.18637/jss.v089.i07.

TORRES, G. Residential segregation and public policies: São Paulo in the 1990's. **Revista Brasileira de Ciências Sociais**, v. 2(se), p. 1-14, 2006.

VALENTE, R. R.; BERRY, B. J. L. Residential segregation by skin color: Brazil revisited. **Latin American Research Review**, v. 55, n. 2, p. 207-226, 2020. http://doi.org/10.25222/larr.83.

VARGAS, J. H. C. Apartheid brasileiro: raça e segregação residencial no Rio de Janeiro. **Revista de Antropologia**, v. 48, n. 1, p. 75-131, jun. 2005.

VILLAÇA, F. **Espaço intra-urbano no Brasil**. São Paulo: Studio Nobel, 1998.

WATSON, T. Inequality and the measurement of residential segregation by income in American neighborhoods. **Review of Income and Wealth**, v. 55, n. 3, p. 820-844, 2009. http://doi.org/10.1111/j.1475-4991.2009.00346.x.

WHITE, M. J. The measurement of spatial segregation. **American Journal of Sociology**, v. 88, n. 5, p. 1008-1018, 1983. http://doi.org/10.1086/227768.

WILKINSON, R. Why is violence more common where inequality is greater? **Annals of the New York Academy of Sciences**, v. 1036, p. 1-12, 2004. http://doi.org/10.1196/annals.1330.001.

About the authors

José Firmino Sousa Filho is Ph.D. at Federal University of Bahia (UFBA). Center of Data and Knowledge Integration for Health (CIDACS, Fiocruz-BA).

Sara Costa Pedeira is Economist at Federal University of Bahia (UFBA). Center of Data and Knowledge Integration for Health (CIDACS, Fiocruz-BA).

Gervásio F. dos Santos is Ph.D at São Paulo University (USP). Professor at Federal University of Bahia (UFBA). Center of Data and Knowledge Integration for Health (CIDACS, Fiocruz-BA).

Joanna M. N. Guimarães is Ph.D. at National School of Public Health Sergio Arouca (ENSP/Fiocruz). Center of Data and Knowledge Integration for Health (CIDACS, Fiocruz-BA).

Andrêa J. F. Ferreira is Ph.D. at Federal University of Bahia (UFBA). Center of Data and Knowledge Integration for Health (CIDACS, Fiocruz-BA).

Flávia Jôse O. Alves is Ph.D. at Federal University of Bahia (UFBA). Center of Data and Knowledge Integration for Health (CIDACS, Fiocruz-BA).

Gabrielle R. Nascimento is Economist at Federal University of Bahia. Research Institute – Insper.

Aureliano S. S. Paiva is Ph.D. in Physics at Federal University of Bahia (UFBA). Center of Data and Knowledge Integration for Health (CIDACS, Fiocruz-BA).

Roberto F. S. Andrade is Ph.D. at Regensburg University. Professor at Federal University of Bahia (UFBA). Center of Data and Knowledge Integration for Health (CIDACS, Fiocruz-BA).

Emanuelle F. Góes is Ph.D. at Federal University of Bahia (UFBA). Center of Data and Knowledge Integration for Health (CIDACS, Fiocruz-BA).

Maurício L. Barreto is Ph.D. at University of London. Professor at Federal University of Bahia (UFBA). Center of Data and Knowledge Integration for Health (CIDACS, Fiocruz-BA).

Estela M. L. Aquino is Ph.D. and Professor at Federal University of Bahia (UFBA). Center of Data and Knowledge Integration for Health (CIDACS, Fiocruz-BA).

Contact address for all authors

Parque Tecnológico, Tecnocentro
St. Mundo, 121, Trobogy
41745-715 – Salvador-BA, Brazil

Resumo

Segregação racial e econômica no Brasil: uma análise nacional das desigualdades socioeconômicas e socioespaciais

Este artigo tem como objetivo analisar a segregação residencial por raça (segregação racial) e renda (segregação econômica) no Brasil e explorar sua relação com fatores socioeconômicos e socioespaciais. A segregação residencial foi avaliada pelo índice de dissimilaridade baseado no Censo Demográfico de 2010 e considerando setores censitários urbanos, uma vez que a segregação é entendida sociologicamente como um problema urbano. Os resultados mostram que a segregação racial é mais evidente nas cidades do Sul e Sudeste do Brasil, atingindo principalmente a população autodeclarada preta. A abordagem utilizada para calcular a segregação econômica envolveu examinar o nível de renda de diferentes grupos de baixa renda. Portanto, consideramos as famílias que ganham entre 0 e 1 salário mínimo – o grupo de maior vulnerabilidade social. Não encontramos correlações significativas entre os índices de segregação racial e de renda com fatores como a urbanização (tamanho da população urbana). Por fim, apresentamos os índices de segregação racial estratificando as famílias por faixas de renda para as 27 capitais brasileiras e concluímos que a renda domiciliar *per capita* é fator preponderante para a segregação dos mais pobres, principalmente nas famílias cujos moradores se autodeclaram pretos.

Palavras-chave: Segregação urbana. Segregação econômica e racial. Brasil. Censo demográfico.

Resumen

Segregación racial y económica en Brasil: un análisis nacional de las desigualdades socioeconómicas y socioespaciales

Este artículo tiene como objetivo analizar la segregación residencial por raza (segregación racial) y renta (segregación económica) en Brasil y explorar su relación con factores socioeconómicos y socioespaciales. La segregación residencial se evaluó utilizando el índice de disimilitud con base en el censo demográfico de 2010 y considerando las secciones censales urbanas ya que la segregación es considerada sociológicamente como un problema urbano. Los resultados para la segregación racial mostraron que esta es más evidente en ciudades del sur y del sudeste de Brasil y que afecta principalmente a la población autodeclarada negra. El enfoque usado para calcular la segregación económica implicó examinar el nivel de ingresos de diferentes grupos de bajos ingresos. Por lo tanto, consideramos que las familias que ganaban entre cero y un salario mínimo son el grupo con mayor vulnerabilidad social. No encontramos correlaciones significativas entre los índices de segregación racial y los de ingresos con factores como la urbanización (tamaño de

la población urbana). Finalmente, presentamos los índices de segregación racial estratificando a las familias por umbrales de renta para las 27 capitales brasileñas y concluimos que la renta per cápita de los hogares es un factor preponderante para la segregación de los más pobres, en especial en las familias cuyos habitantes se autodeclaran negros.

Palabras clave: Segregación urbana. Segregación económica y racial. Brasil. Censo demográfico.

Received for publication in 11/11/2022
Approved for publication in 08/06/2023