Chapter 26
Measuring Changes in Residential Segregation in São Paulo in the 2000s

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Abstract Residential segregation is known as one of the most prevalent problems of Latin American and Brazilian cities. This chapter looks into the changes in segregation levels in the Metropolitan Region of São Paulo between 2000 and 2010. This period was marked by economic growth and decreasing social inequalities in Brazil with consequent improvement to the quality of life of lower income classes. Despite those improvements, general patterns of urban segregation in Brazilian cities showed remarkable stability, albeit with important changes in the details of segregation patterns. This chapter explores the spatial relationship between socio-occupational groups using global and local segregation indices. The analysis confirmed a highly segregated distribution of social groups in the Metropolitan Region and revealed increased levels of segregation, with global indices figures for 2010 higher than for 2000. Analysis demonstrated that peripheral areas of the Metropolitan Region became more fragmented and heterogeneous in that period, and revealed that their increased heterogeneity is mainly composed of classes with close social proximity, rather than polarised ones. Results showed that while middle classes became more integrated amongst themselves and with lower classes, the separation between lower and upper classes was not only maintained but also increased during the period. All these findings suggest a reconfiguration of the concentric pattern of segregation that

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maintained a spatial structure of strong social isolation during the period, although with greater complexity.

26.1 Introduction

Residential segregation is known as one of the most prevalent problems of Latin American and Brazilian cities, together with poverty and precarious housing conditions. It is also known that residential segregation is an urban feature that reduces opportunities for the poor and contributes substantially to poverty reproduction (Wilson 1987; Massey and Denton 1993; Briggs 2005).

Although the spatial pattern of Latin American cities often has roots in their colonial formation, the case of São Paulo is peculiar since the city had no demographic nor economic importance by the mid-nineteenth century. It was after the boom of coffee plantations at the end of that century and the industrialisation of the first decades of the twentieth century that São Paulo gradually became the most important city in the country. São Paulo is rivalled with Rio de Janeiro, which was, for centuries, the colonial and later imperial capital of Brazil. The largest proportion of the territories of metropolitan São Paulo were formed during the decades of intense migration and fast urbanisation from the 1950s to the 1980s (Caldeira 2016). At that time, the city became the primary metropolis of a highly urbanised Brazil, even though it has never been the capital city. Since the 1930s, housing policies were mostly focused on the construction of new units, although slum upgrading programmes were started as well in the last 20 years. However, this double emphasis on property and on unit construction left most of the population with no housing solutions except squatting or buying an irregular plot, since buying or renting from the private sector was beyond the reach of most urban dwellers. This historical process produced metropolitan structures with clear core-periphery segregation patterns, with high-income groups located in central and well-serviced areas and lower income groups in more distant and less serviced areas intensely populated by precarious self-constructed houses in favelas (squatted areas) and irregular settlements. Such patterns have been resilient to long periods of fast urban growth and societal changes (Kowarick 1979; Bonduki and Rolnik 1982).

Although most cities in Latin America have a similar concentric spatial pattern of segregation, recent studies of Brazilian cities have highlighted changes to this macro-segregation structure. While the overall spatial structure remains radial and concentric, the spatial structure of segregation now also presents a number of sub-centralities and peripheral areas that are increasingly more heterogeneous (Marques 2016; Preteceille and Cardoso 2008), echoing classical statements of territorial heterogeneity in
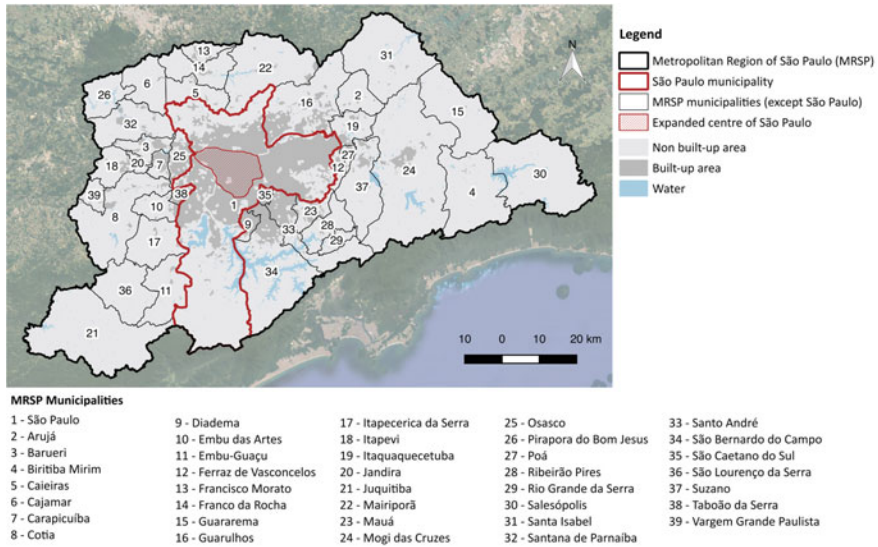
Brazilian cities (Valladares and Preteceille 2000). Such fragmentation in the core-periphery spatial pattern is understood to be a consequence of the combination of changes in residential preferences of higher income groups for gated communities (Caldeira 2000) and transformations in lower income residential regions caused by the political and economic dynamics in the country since the return to democracy in the 1980s (Arretche 2019).

In general terms, the recent democratic period that started in 1980s brought social improvements as a product of a cycle of increasing political activism and electoral accountability (since the 1980s), economic stability (since the 1990s) and better and broader social policies (also in the 1990s but especially in the 2000s), integrated in national federalist systems (Arretche 2019; Marques et al. 2012). In cities, this involved a slow but continuous expansion of public policies and services in traditionally under-serviced areas. Even areas of precarious housing conditions such as favelas and irregular settlements have experienced substantial and systematic improvements in recent decades with slum upgrading and infrastructure policies, although maintaining levels of inequalities (Marques and Saraiva 2017). The presence of precarious housing decreased relatively in the Metropolitan Region of São Paulo from 15% in 2000 to 14.5% in 2010, reaching around 800,000 precarious households in favelas and irregular settlements amongst a total of 6 million households in the region (CEM 2014). It is important to add that from 2009 to 2015, a federal housing programme has built approximately 100,000 housing units in the Metropolitan Region of São Paulo, possibly reducing the stock of precarious housing, but there are no recent statistics yet that can measure this effect (Marques 2016).

In economic terms, the average income rose from R$630 to R$1283 between 1991 and 2014 (Jannuzzi 2016), although it has decreased more recently due to a continuous economic and political crisis since 2016. Income inequality, as measured by Gini Index, also declined from 0.606 in 1992 to 0.517 in 2014, while poverty rates reduced from 31.1% in 1991 to 7% in 2014 due to the combination of economic growth, strong social policies and the continuous increase of the minimum salary during the 2000s (Jannuzzi 2016). Since 2014, however, Brazil has suffered from increasing economic and political instability, which has strongly affected the social conditions of the country. The Gini Index increased from 0.517 in 2014 to 0.533 in 2017, while poverty rates increased from 7% in 2014 to 10% in 2017 (IBGE 2019) and unemployment jumped from 5.5 in 2014 to 13% in 2017 (Góes and Karpowicz 2017). Although the impacts of the country's deteriorating social situation are visible in our cities, they have not yet been systematically analysed.

Despite these improvements, general patterns of urban segregation in Brazilian cities showed remarkable stability, as will be demonstrated throughout this chapter, albeit with important changes in the details of segregation patterns. Compared with other socio-economic changes, however, urban inequalities associated with spatial segregation have changed little, highlighting the need for better financed and bolder urban policies, especially concerning urban planning and land-use control.

The subject of this chapter—São Paulo—is the most important Metropolitan Region of South America, with around 20 million inhabitants in an area of 7,946km^2. It encompasses 39 municipalities across a continuous urban area, approximately

MRSP Municipalities

1 - São Paulo	9 - Diadema	17 - Itapecerica da Serra	25 - Osasco	33 - Santo André
2 - Arujá	10 - Embu das Artes	18 - Itapevi	26 - Pirapora do Bom Jesus	34 - São Bernardo do Campo
3 - Barueri	11 - Embu-Guaçu	19 - Itaquaquecetuba	27 - Poá	35 - São Caetano do Sul
4 - Biritiba Mirim	12 - Ferraz de Vasconcelos	20 - Jandira	28 - Ribeirão Pires	36 - São Lourenço da Serra
5 - Caieiras	13 - Francisco Morato	21 - Juquitiba	29 - Rio Grande da Serra	37 - Suzano
6 - Cajamar	14 - Franco da Rocha	22 - Mairiporã	30 - Salesópolis	38 - Taboão da Serra
7 - Carapicuíba	15 - Guararema	23 - Mauá	31 - Santa Isabel	39 - Vargem Grande Paulista
8 - Cotia	16 - Guarulhos	24 - Mogi das Cruzes	32 - Santana de Parnaíba	

Fig. 26.1 Map of the metropolitan region of São Paulo

2,200 km^2, as shown in the map in Fig. 26.1. São Paulo Municipality, with about 12 million inhabitants, is the most populous Brazilian city and covers most of the occupied area of the Metropolitan Region of São Paulo (MRSP). Its central area concentrates most of the jobs and amenities in the region. The municipality of Guarulhos, located northeast of São Paulo (number 16 in Fig. 26.1), is the second most populous city in the MRSP, with about 1.3 million inhabitants. It is notable because this is where the busiest airport in Brazil can be found. Santo André, São Bernardo do Campo and São Caetano do Sul (numbers 33 to 35 in Fig. 26.1) are the most developed municipalities of a region known as the 'ABC'[1], which is traditionally known for its industrial economic base and represents an important sub-centre of the region.

While São Paulo concentrates a significant portion of the wealth of the country, with 17.7% of the Brazilian GDP in 2013, it also has a large working-class population and high levels of poverty, precarious housing conditions and inequality. The low-income population, mostly residents on the fringes of the metropolitan area, tend to suffer from low-quality services, long-journeys to work, and low accessibility to amenities and opportunities, all exacerbated by segregation.

Due to its importance in the country, there is a long tradition of segregation studies on São Paulo (Kowarick 1979; Bonduki and Rolnik 1982; Caldeira 2000; Marques 2016). The present chapter builds on a series of studies developed by Marques and colleagues which measured segregation using socio-occupational groups in the

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[1] ABC stands for the initials of the three main municipalities of the region: Santo **A**ndré, São **B**ernardo do Campo and São **C**aetano do Sul. The region is composed by 7 municipalities: in addition to the above-mentioned three, it includes Diadema (number 9 on the map in Fig. 26.1), Maua (number 23), Ribeirão Pires (number 28) and Rio Grande da Serra (number 29).

Metropolitan Region of São Paulo (MRSP) for the period of 1991–2000 (Marques et al. 2012) and 2000–2010, each regarding class (Marques 2016) and race (França 2016). Their findings confirm that the greater the social distance between classes, the greater the segregation. They also highlight that São Paulo is extremely hierarchical in its socio-spatial structure. The results of previous studies make clear that the top occupational groups are the most segregated, but also indicate changes in the structure of the middle and lower classes which have become more integrated between 2000 and 2010.

This chapter revisits the results from previous studies and expands on their analysis by further exploring the spatial relationships between socio-occupational groups during the period between 2000 and 2010. In addition to analysing group relationships using the evenness/clustering dimension of segregation (Dissimilarity Index), this chapter explores the exposure/isolation spatial dimension complementing previous analyses. Using global exposure and isolation indices, changes in relationships between socio-occupational groups during this period are revealed, contributing to an in-depth understanding of the known changes in segregation patterns in the MRSP. The spatial patterns of such changes are presented by maps of local exposure and isolation indices, which allow for a detailed understanding of the effect of changes in those relationships in the spatial dynamics of the metropolis.

The next section discusses the MRSP's socio-occupational composition in 2000 and 2010 and introduces the occupational classification used in the following analysis. It also discusses the residential distribution of socio-occupational groups with maps describing neighbourhood types by socio-occupation composition and the location quotient of top and bottom socio-occupational groups. The following section discusses the methodology employed and introduces the isolation and exposure indices used to complement the analysis using the Dissimilarity Index. Results are then presented and discussed, followed by the overall discussion and conclusions.

26.2   Socio-occupational Classes in the Metropolitan Region of São Paulo

In the present study, occupational groups are used as a proxy to socio-economic groups. This allows for consistency in the approach of analysis across different census periods which would not be possible using income groups. As data for occupational groups is not available in the Brazilian Census, the classification adopted here was produced by the Centre for Metropolitan Studies (CEM) and was used in previous studies (Marques 2016; França 2016). The classification is based on a social stratification methodology called EGP classification, following the initials of its proponents (Erikson et al. 1979), and adapted to the Brazilian social structure by researchers since the 1980s (Silva 1999). This classification differentiates employment types as rural or urban; manual or non-manual; and routine or non-routine—where the second term in

Table 26.1 EGP classes, abbreviations and social groups

| EGP classes	Abbreviation	Social group
Owners and employers	OE	Top
High-level professionals	HLP	
Low-level professionals	LLP	Middle
High-level routine non-manual	HL-RNM	
Technicians and supervisors	TS	
Low-level routine non-manual	LL-RNM	
Skilled manual workers	SMW	Bottom
Unskilled manual workers	UMW	

each pair represents a higher socio-economic and occupational status. The classification also includes information on occupational position and hierarchy, distinguishing between employed workers, supervisors, the self-employed and employers. For the present analysis, rural classes (employers, subsistence farmers and farmworkers) will not be included due to their low representation within the MRSP. Table 26.1 lists 8 EGP classes used in this study, their abbreviations and the categorisation into the top, middle and bottom.

The dataset provided by the Centre for Metropolitan Studies was built using data from the sample questionnaire of the Brazilian National Census, distributed by 'weighting areas' (*áreas de ponderação* in Portuguese). Although there have been changes in the boundaries of the MRSP's weighting areas between 2000 and 2010, the dataset used here is a consolidated dataset comprising 633 spatial units. Weighting areas in the MRSP have an average population of 32,000 inhabitants, although there is significant variation between them.

Figure 26.2 shows the distribution of EGP classes in the MRSP in 2000 and 2010, respectively. It can be said that changes in the composition of EGP groups
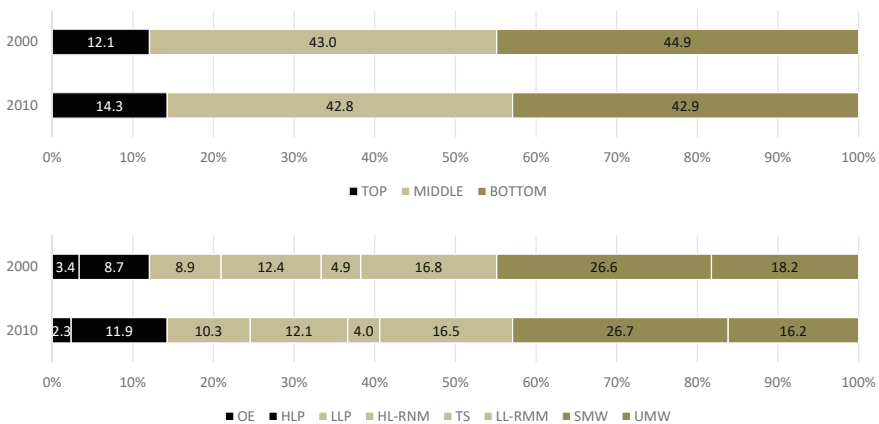
**Fig. 26.2** Distribution of occupational (EGP) classes and change over time
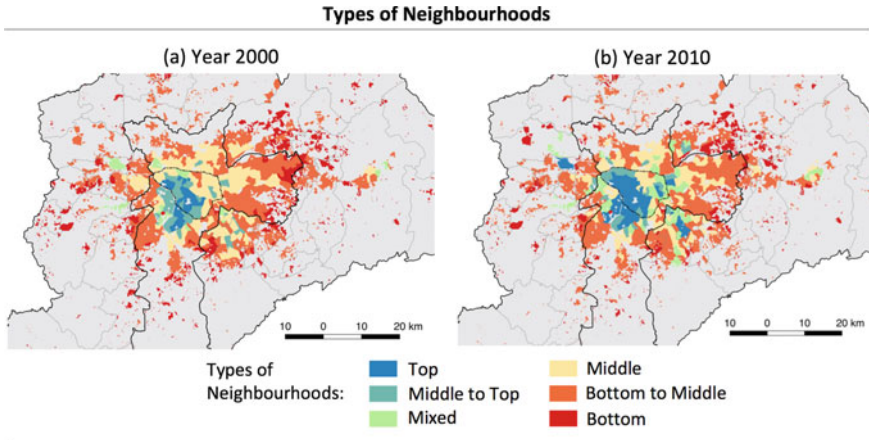
Fig. 26.3 Neighbourhood types distribution in the MRSP (years 2000 and 2010) according to socio-occupational composition

are consistent with the social, political and economic changes in Brazil over this period. The graph clearly shows that manual workers (skilled and unskilled) are the largest EGP class, followed by low and high-level routine non-manual workers. The third-largest class is the high- and low-level professionals. In terms of change over the period, the graph shows that the proportion of professionals increased while the proportion of unskilled manual workers decreased. Owners and employers seem to have declined, but this might be due to sample variation since this is a small class. It is interesting to note that while there has been an increase in the proportion of the top group (12–14%) and a decrease in the bottom group (45–43%), the middle group has remained stable during the period.

The maps in Fig. 26.3 show the distribution of neighbourhood types for both 2000 and 2010, using the following classes of neighbourhoods: *top* (proportion of top group—*ptop* > 0.4), *middle* (proportion of middle group—*pmiddle* > 0.5), *bottom* (proportion of bottom group—*pbottom* > 0.5), *middle to top* (0.2 < *ptop* < 0.4 and 0.2 < *pmiddle* < 0.5 and *pbottom* < 0.2), *mixed* (0.2 < *ptop* < 0.4 and 0.2 < *pmiddle* < 0.5 and 0.2 < *pbottom* < 0.5) and *bottom to middle* (*ptop* < 0.2 and 0.3 < *pmiddle* < 0.5 and 0.3 < *pbottom* < 0.5). Maps from both 2000 and 2010 clearly show the concentric pattern of segregation, which is typical of Brazilian cities, with high-status neighbourhoods in the centre surrounded by rings of middle-status/mixed areas, and the lowest status neighbourhoods in the peripheral ring. Confirming the known changes during this period, the map for 2010 shows a more fragmented and heterogeneous spatial pattern in the peripheral areas, but a clearer predominance of top groups at the centre. Despite the small increase in the overall proportion of the top occupational groups in the MRSP, a significant expansion of high-status neighbourhoods can be seen in the central area of the MRSP—known as the expanded centre of São Paulo. Figure 26.3 also illustrates the emergence of top neighbourhood types in more peripheral areas, which can be attributed to the gated communities
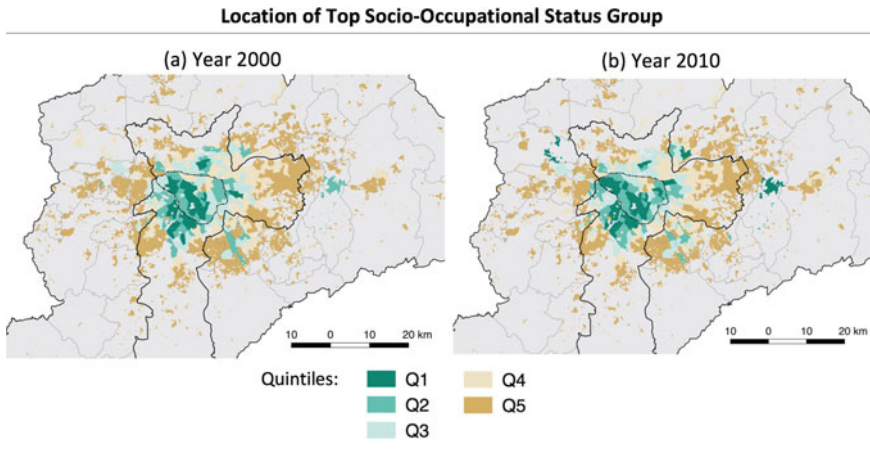
Fig. 26.4 Location of top socio-occupational status group in the MRSP (years 2000 and 2010)

in those areas. In addition, the maps show a reduction of bottom neighbourhoods, which are replaced by bottom to middle in 2010, and an apparent reduction of middle neighbourhoods in 2010, mainly replaced by mixed or higher status neighbourhoods.
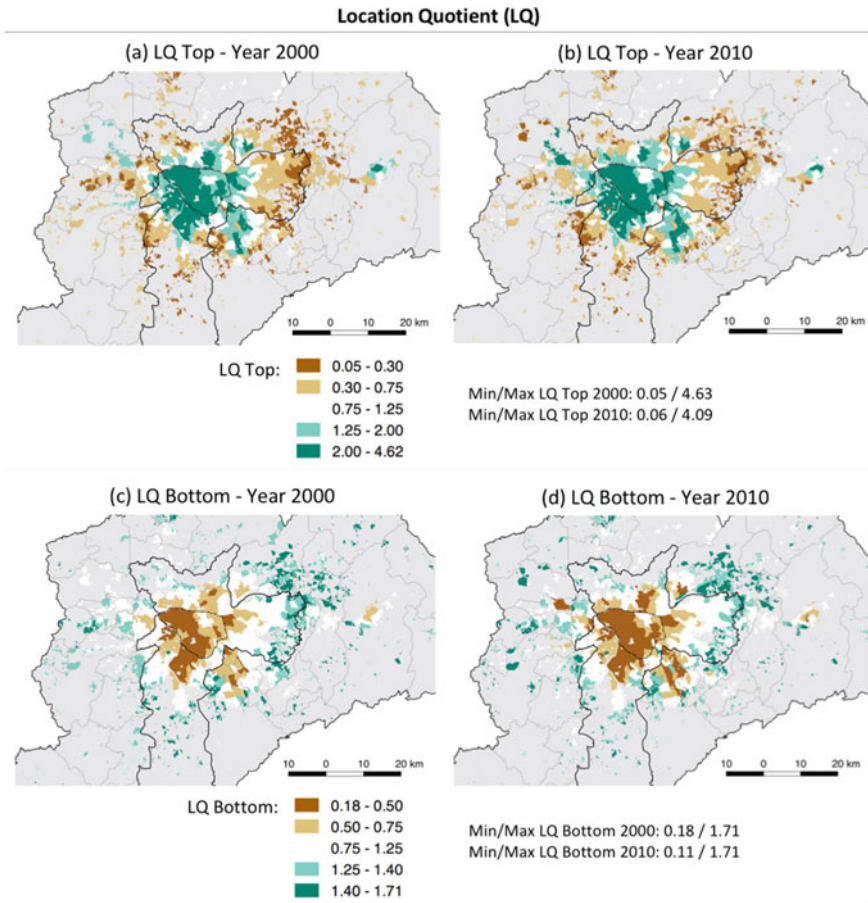
Figure 26.4 shows the location of the top socio-economic status groups, which remained stable between 2000 and 2010. In 2000, 27 areal units (or 4%) housed 20% of the top group (Q1), while in 2010 there was only a small increase in this number (29 areal units). Amongst the new areas classified as Q1, there are a few located outside the central region, corroborating the pattern of neighbourhood types distribution in Fig. 26.3.

Figure 26.5 presents location quotient (LQ) maps for top and bottom occupational groups, which also shows relatively stable patterns during the period 2000–2010. Yet, the LQ of top group shows interesting aspects, such as the fact that the share of top groups in the dark green areas is more than four times higher than in the rest of the MRSP. Figure 26.5b also shows an increase in the dark green areas (highest LQ-top) outside of the expanded centre of São Paulo. Figure 26.5c, d show an increase in the dark brown areas (lowest LQ-bottom) in the centre, which indicates that the concentration of the low-status population has decreased in the central areas from 2000 to 2010.

26.3 Measuring Spatial Segregation in the Metropolitan Region of São Paulo

The analysis presented here builds on previous studies measuring segregation in the MRSP (Marques et al. 2012; Marques 2016; França 2016), which used Moran I and the Dissimilarity Index (D). It partially replicates Marques and França's analyses of

Location Quotient (LQ)

(a) LQ Top - Year 2000

(b) LQ Top - Year 2010

LQ Top:
- 0.05 - 0.30
- 0.30 - 0.75
- 0.75 - 1.25
- 1.25 - 2.00
- 2.00 - 4.62

Min/Max LQ Top 2000: 0.05 / 4.63
Min/Max LQ Top 2010: 0.06 / 4.09

(c) LQ Bottom - Year 2000

(d) LQ Bottom - Year 2010

LQ Bottom:
- 0.18 - 0.50
- 0.50 - 0.75
- 0.75 - 1.25
- 1.25 - 1.40
- 1.40 - 1.71

Min/Max LQ Bottom 2000: 0.18 / 1.71
Min/Max LQ Bottom 2010: 0.11 / 1.71

Fig. 26.5 Location quotient maps for the years 2000 and 2010: top groups (**a**, **b**) and bottom (**c**, **d**)

occupational groups using D and complements it by exploring another spatial dimension of segregation using global and local Exposure and Isolation Indices (Feitosa et al. 2007; Lieberson 1980). The use of complementary segregation indices depicting different spatial dimensions of segregation is based on the understanding that distinct segregation indices portray different aspects of segregation. Those dimensions are directly linked with the conceptual definition of spatial segregation and the appropriateness of each concept for the case study in hand. The Dissimilarity Index (D), which is the most popular segregation index, and its generalised (multi-group) version captures the degree that social groups are evenly distributed within a region (Duncan and Duncan 1955; Sakoda 1981). It assumes that a region is not segregated when all socio-economic groups are evenly distributed across space. The index measures the extent to which the distribution of social groups in the different spatial units of the region replicates the overall population composition of the region, which can

range from 1 (complete segregation) to 0 (complete integration). The index can be computed for each pair of groups (D Index proposed by Duncan and Duncan in 1951), which can include the evenness of each group in relation to all other groups, or for all groups taken together (Generalised D Index proposed by Sakoda in 1981). The global dissimilarity figure indicates the proportion of the population (of the relevant group) that would have to relocate to a different neighbourhood in order to match the distribution of reference groups (all others or paired group).

Following Reardon and O'Sullivan's (2004) proposal for the two axes of spatial segregation (the first axis measuring evenness to clustering dimension and the second exposure to isolation dimension), this chapter employs Exposure and Isolation indices (Lieberson 1980) to complement the analysis using D. Unlike D, which focus on the distribution of different groups across space, the Exposure Index measures the potential interaction between groups or, in other words, the extent of which one group is exposed to another based on spatial proximity. The Isolation Index is a special case of the Exposure Index, which measures the exposure of a social group to itself. Those indices range from 0 to 1 and are highly dependent on the city-wide proportion of groups: the more people of class m, the more likely the exposure/isolation. This dependency causes problems for comparative studies both across different geographical areas and same areas across different time periods. Thus, to aid interpretation of the results across different time periods, this study uses *normalised* isolation and exposure indices, where the original figures were divided by the city-wide percentage of class m in MRSP. In this case, values closer to 1 indicate less segregation and values higher and lower than 1 indicate an exposure superior and inferior, respectively, than the one expected in an integrated region. The latter is understood as a region where all exposure/isolation indices regarding one class are equal to its proportion in the whole region. It should also be noted that while the traditional Exposure Index of group m to n differs from the exposure of n to m, their normalised versions do not.

The spatial pattern of the exposure/isolation dimension is explored in this chapter by maps of the local version of Exposure and Isolation indices, which indicate the contribution of each area to the composition of the global index (Feitosa et al. 2007). These local indices indicate the areas where exposure between groups (or from a group to itself) is higher, allowing for areas of high and low segregation between specific groups to be spatially identified. The advantage of the Exposure Index over the Dissimilarity Index is that it directly measures the spatial relationship between groups. While D compares levels of spatial distribution between two groups, the Exposure Index allows for a detailed account of how those two groups potentially interact based on their spatial locations. In the case of the MRSP, where residential segregation has been extensively studied and measured over the years and its overall pattern is well-known, the Exposure Index provides the opportunity to unfold the spatial relationships between groups and investigate the increasing heterogeneity in peripheral areas highlighted by previous studies.

26.4 Dissimilarity and Exposure/Isolation Results in the Metropolitan Region of São Paulo

Table 26.2 presents the results for Dissimilarity (D) for MRSP in 2000 and 2010. Results show an increase in segregation over the period, indicating that the distribution of EGP classes became less even in the region, with an increase of Generalised D from 0.19 to 0.21. By calculating D not only in its generalised form (considering all groups together) but also for each class (in relation to each other and to all other EGP classes together), the analysis reveals the changes in segregation levels per class. Results confirm findings of previous studies (Marques 2016; França 2016) that segregation between EGP classes increases along with the social status distance between groups—a trend that is more accentuated in 2010 than in 2000. Also consistent with other studies that demonstrate that elites tend to be the most segregated (Maloutas and Fujita 2012), the classes with highest segregation (and highest increase in D levels from 2000 to 2010) belong to the top social group—owners and employers (OE) and high-level professionals (HLP). D levels between top and bottom groups increased from 0.48 in 2000 to 0.50 in 2010, mainly due to the increasing segregation of OE. The classes with lowest segregation levels are those belonging to the middle group—routine non-manual (RNM) and technicians and supervisors (TS). These classes presented relative stability in the period 2000–2010, with the exception of the low-level routine non-manual (LL-RNM) class which presented increasing levels of dissimilarity towards OE and professionals (HLP and LLP).

While the OE and LL-RNM classes have shown the highest increase in D levels in relation to all other classes (differences of 0.06 and 0.04, respectively, from 2000 to 2010), all other classes have presented stability or a slight increase in the index. Such figures tend to change, however, when indices are computed for each pair of classes. To further explore such changes, the spatial relationship between groups is analysed using exposure and isolation indices.

Table 26.2 Dissimilarity indices (multiplied by 100), MRSP. Years 2000 (bottom-left) and 2010 (top-right)

	OE	HLP	LLP	HL-RNM	TS	LL-RNM	SMW	UMW	ALL	TOP	MID	BOT
OE		18	27	41	48	51	56	57	44			
HLP	13		16	32	39	43	49	50	39			
LLP	21	17		19	28	30	38	39	25			
HL-RNM	33	31	16		15	16	22	25	12			
TS	40	38	23	12		16	17	21	14			
LL-RNM	41	39	24	12	13		13	15	13			
SMW	50	50	36	24	17	15		10	20			
UMW	48	46	34	23	19	14	9		21			
ALL	38	38	23	12	13	9	21	19				
TOP											32	50
MID										32		21
BOT										48	20	
Generalized D (multi-group) 2010: 21												
Generalized D (multi-group) 2000: 19												

Table 26.3 Normalised exposure/isolation indices, MRSP. Years 2000 (bottom-left) and 2010 (top-right)

	OE	HLP	LLP	HL-RNM	TS	LL-RNM	SMW	UMW	TOP	MID	BOT
OE	2.39 1.93	1.91	1.47	1.01	0.87	0.79	0.63	0.67			
HLP	1.81	1.79 1.85	1.43	1.04	0.9	0.84	0.69	0.7			
LLP	1.41	1.43	1.29 1.26	1.06	0.96	0.92	0.81	0.8			
HL-RNM	1.06	1.07	1.07	1.06 1.07	1.01	1	0.97	0.94			
TS	0.93	0.93	0.98	1.03	1.12 1.08	1.01	1.03	1.01			
LL-RNM	0.88	0.92	0.9	1.01	1	1.07 1.04	1.05	1.04			
SMW	0.69	0.68	0.82	0.95	1.02	1.03	1.14 1.14	1.13			
UMW	0.78	0.78	0.86	0.94	0.98	1.02	1.1	1.18 1.11			
TOP									1.84 1.84	1.04	0.68
MID									1.05	1.03 1.03	0.96
BOT									0.72	0.96	1.14 1.11

Table 26.3 shows the results for the normalised Exposure and Isolation indices. Exposure was calculated for each pair of classes, with exposure of one class to itself presented as the Isolation Index. As previously mentioned, in the case of *normalised* Isolation and Exposure, values closer to 1 indicate less segregation and values higher and lower than 1 indicate an exposure superior and inferior, respectively, than the one expected in an integrated region. As expected, the normalised Exposure Index values are lower than 1 for groups with greater social distance, and higher than 1 for those with lower social distance. For instance, the normalised Exposure of HLP to OE in 2010 is 1.91, which means that it is almost 2 times higher than the expected in an integrated arrangement. Also, the highest normalised Isolation Index values (exposure of a group to itself) were observed for top classes (OE and HLP, with values from 1.79 to 2.39), while the lowest were observed for middle classes (RNM, with values that are closer to 1, from 1.04 to 1.07), confirming that if the city is highly segregated, it is the elite social groups who are really isolated. Furthermore, we must add that previous studies such as the one by França (2016) showed that data of self-classified skin colour (the Brazilian census category for race) demonstrates that it is the white elite who are the most segregated.

By looking into how normalised Exposure and Isolation indices changed from 2000 and 2010, it is possible to establish how the spatial relationship between classes has changed. Regarding broader groups—top, middle and bottom, results show stability in most global indices. Nevertheless, a detailed analysis of the exposure between EGP classes confirms that the avoidance between classes with greater

social distance, which was already high, increased during the analysed period. The analysis also shows a tendency of increase in integration between classes with lower social distance. Such results lead to the conclusion that, although it is possible to observe an increase in heterogeneity in certain areas of the MRSP, this is mainly promoted by a higher exposure of classes with similar levels of status. To illustrate such trends, some classes deserve special attention. The first is the OE, confirming results from previous studies as well as analysis with D. The second is the lowest status class (unskilled manual workers—UMW), which has also shown interesting changes in this period.

OE have confirmed their position as the most segregated EGP class. It is also the one with the highest increase in segregation levels from 2000 to 2010 (in both Dissimilarity and Exposure/Isolation Indices), showing an increase in normalised isolation from 1.93 to 2.39. OE's levels of isolation are followed closely by HLP. Results for 2000 and 2010 show an increase in exposure between occupational classes with higher status (OE, HLP and LLP) and a decrease in their exposure to middle and bottom groups, in particular to UMW. UMW presented a slight increase in isolation levels from 2000 to 2010. Meanwhile, results show a decrease in its exposure levels to the three highest status occupational classes (OE, HLP and LLP), denoting an increase in segregation between UMW and those classes. Nevertheless, UMW's exposure to bottom- and middle-status classes (except LLP) showed an increase, indicating further integration between groups with lower social distance and, therefore, a higher heterogeneity of peripheral areas.

The least segregated classes, with normalised isolation and exposure figures closer to 1, are the middle ones, with the exception of low-level professionals (LLP), which presented high levels of isolation. The LLP also became more exposed to OE and less exposed to bottom classes (especially UMW).

Despite the relative stability of global indices computed for the broader groups (top, middle and bottom), maps of the local exposure of the bottom group to others (top, middle and bottom—the latter is an isolation map) for 2000 and 2010 (Fig. 26.6) indicates some changes in residential patterns. The maps show evidence of a decrease in exposure of top and middle groups to the bottom group in the central areas of the MRSP, reinforcing the conclusion that bottom classes have decreased their presence in central areas. Figure 26.6a, b show the local exposure of bottom to top group. While the overall spatial pattern remains essentially the same, these maps show an increase in exposure of bottom to top group in some peripheral areas of the map (circled). In addition, the normalised global exposure value has decreased by 0.04 (Exposure 2000 = 0.72/2010 = 0.68) and the maps show a decrease in exposure in the expanded centre of São Paulo. This suggests that although the top group has clearly expanded residentially, this process did not promote further exposure with the bottom group. This is mainly because the top group's areas of expansion are not characterised by the presence of the bottom group.

Figure 26.6c, d show the local exposure of bottom to middle group. Similarly to Fig. 26.6a, b, the overall structure remains the same but it is possible to observe a decrease in exposure in the central area (expanded centre) and new peripheral areas of high exposure in the outskirts. It is important to note that the normalised

Local Exposure/Isolation Indices
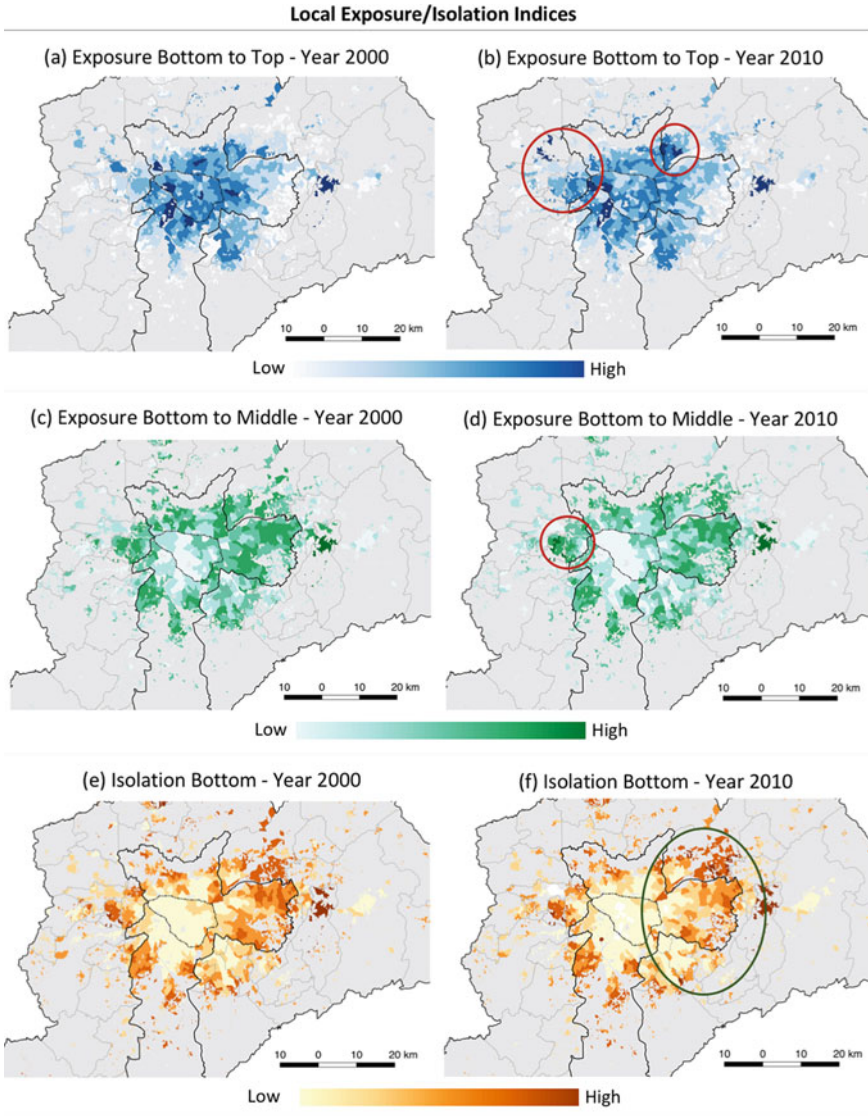
Fig. 26.6 Local exposure maps of bottom to top (**a**, **b**), bottom to middle (**c**, **d**), and bottom to bottom (Isolation—**e**, **f**)

exposure levels of bottom to middle group have remained stable (at 0.96) in the period. Figure 26.6e, f show the isolation of bottom group (exposure to itself). While global values increased by 0.03 in the period (from 1.11 to 1.14), changes in the residential pattern can be observed in the eastern and south-eastern regions (circled),

where the most peripheral areas presented an increase in the levels of isolation, while the opposite was observed in the areas located closer to the centre.

26.5 Discussion and Conclusions

This chapter is built on findings from previous studies regarding segregation in the Metropolitan Region of São Paulo. It explores the spatial relationship between socio-occupational groups using isolation and exposure indices. The analysis confirmed a highly segregated distribution of social groups in the Metropolitan Region and revealed increased levels of segregation, with global indices figures for 2010 higher than for 2000. Following previous studies, higher status classes presented the highest levels of segregation amongst all EGP classes. Spatially, there is evidence that the expanded centre of São Paulo has become further appropriated by the elite, with a reduced presence of bottom classes. The study also demonstrated that the highest status classes are the most segregated in both 2000 and 2010 (OE, HLP and LLP, with OE in the leading position) and revealed the following most segregated group is the lowest status class (UMW).

It is clear from the results that the MRSP peripheral areas have become more fragmented and heterogeneous in this period, confirming findings of previous studies. The analysis revealed that the increased heterogeneity of MRSP's peripheral areas is mainly composed by classes with close social proximity, rather than polarised ones. While there is evidence of an increase in exposure areas of bottom to top classes in specific locations, those are not significant. This points to another important finding that high-income gated communities located side by side of low-income informal settlements are the exception, rather than the rule, in the peripheral areas of the MRSP. In fact, results showed that while middle classes got more integrated amongst themselves and with bottom classes, the separation between bottom and top classes was not only maintained but also increased during the period. All these findings suggest a reconfiguration of the concentric pattern of segregation that maintained a spatial structure of strong social isolation during the period, although with greater complexity.

It is important to reflect on the meaning of those findings and the fact that top classes are more segregated than bottom classes, which is coincident with findings in other cities. Results showed that the top groups have, indeed, a clear dynamic of avoidance to the bottom group, although they are more segregated from other social groups, but not from amenities and opportunities (an aspect not addressed by the analysis). The bottom groups, in addition to being significantly segregated to other groups, are also located in areas with poor services and at great distances of amenities, services and opportunities. This fact is at the heart of the segregation problem in the MRSP, as well as Brazil and Latin America. While the lack of integration between social groups is concerning, in more pragmatic terms the issue is how residential segregation matches the spatial pattern of urban opportunities; the locking-in processes of the bottom groups into certain areas and their poor access to services

reproduce urban inequality. As such, for the increasingly segregated elite, segregation means monopolizing opportunities, with important consequences to inequality reproduction.

It is important to highlight that the period studied coincided with a phase of economic growth and decreasing inequalities in Brazil, which since 2014 has been substantially reverted. The heterogeneity of the peripheral areas is likely a product of such economic growth with possible links to social mobility, but the structure of segregation tends to remain the same. There have been no studies on segregation measurements looking beyond 2010, mainly due to lack of data availability. Nevertheless, considering that residential location choices are deeply influenced by economic power, it is expected that segregation will increase in the future.

This chapter has demonstrated that economic growth and decreasing inequalities did not translate into the alleviation of segregation problems in the MRSP. As such, further action is required to tackle residential segregation in Brazil. Segregation is often understood as a mere spatial expression of social inequalities, but it is actually produced by several processes related to space production, in which public policies play an important role. There is a strong need for better financed and bolder urban policies, particularly concerning housing policies and land-use regulation. As demonstrated by this study, those are also required in periods of growth and increasing equality. The effects of the current and future instability of the country on segregation remain to be measured. It is clear that without active and continuous policies, segregation will not only remain as one of the larger trends in Brazilian cities, but might be further aggravated.

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