

Spatial dynamics of ageing in large urban agglomerations*

Dinâmica espacial do envelhecimento em grandes aglomerações urbanas

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Resumo

O presente artigo discute a relação entre o envelhecimento populacional e os movimentos migratórios, analisando tais fenômenos a partir da dinâmica espacial da população em grandes aglomerações urbanas. Verificou-se que a dinâmica espacial do envelhecimento em grandes aglomerações é heterogênea, tendo com elemento de diferenciação a renda média da população e o processo histórico de desenvolvimento urbano, com tendência a modificação pela aceleração do envelhecimento em curso.

Palavras-chave: Mobilidade residencial; Migração; Espaço Urbano

Abstract

This paper discuss the relationship between population ageing and migratory movements, analyzing from a spatial dynamics of population in large urban agglomerations. We show that the spatial dynamics of ageing in large urban agglomerations is heterogeneous, having as a differentiating element until now the average income of the population and the historical process of urban development, with a tendency to change due to the acceleration of ageing in progress.

Keywords: Residential mobility; Migration; Urban Space

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1. Introduction

Population ageing is accelerating, and this is a relevant subject for several sciences, be they examining it from an individual perspective, as in health studies, or those who address population ageing as a collective social phenomenon with implications resonating beyond the elderly individual. Our analysis follows the second approach, focusing on the spatial dynamics of population ageing and the demands for public policies at local, state, and federal levels.

In a previous study (DOTA et al., 2021), it was exposed relevant inter-municipal inequalities in terms of ageing. These differences would derive from the production and reproduction of urban space, as well as the spatial mobility of the population. The result comes from the fact that we are defining ageing as the relationship between the age groups (elderly, adult and young) or, in other words, based on the age indicator and population structure. Following this understanding, differences in ageing at the inter-municipal level result from urban processes, such as the period of the emergence and occupation of an area. And the circulation of people over time that, through migration and residential mobility, totally or relatively modify the population structure of neighborhoods, is also to be considered.

The decline of demographic growth in recent decades, a situation that can be observed at a global scale and more intensively in Brazil, shed light on the role of spatial mobility of the population in understanding the pace and spatiality of phenomena such as ageing (RODRÍGUEZ-VIGNOLI, 2019; 2022; OLIVEIRA, 2022).

In this article, our goal is to analyze how important the relationship between migration and population ageing is in shaping the spatial dynamics of ageing. Our hypothesis is that migration plays a key and increasingly relevant role in grasping the ageing course in urban space, concluding that migration is conditioned by the production and reproduction of it, which in turn must be analyzed at the regional level in the context of large urban agglomerations. This reveals, therefore, that there are differences in the intensity of ageing in the different parts of large urban agglomerations, which indicates the need to adopt local public policies that contemplate these differences.

The spatial delimitation of the analysis is the seven municipalities that constitute the Metropolitan Region of Vitória, in the state of Espírito Santo: the capital Vitória and the neighboring towns of Vila Velha, Serra, Cariacica, Fundão, Guarapari and Viana. This choice is justified by the intense migration between these cities, which results in socio-spatial changes in the different but interdependent territorial portions of each municipality, depicting socio-spatial complementarities.

We will show that the relationship between the population's spatial mobility and

ageing demands the creation of specific government policies in the metropolitan territory and within the municipalities. In this sense, the analysis and monitoring of these dynamics are a core element for carrying out the planning and execution of effective public policies so that ageing does not become something that is compliant in large agglomerations.

2. Methodological procedures

To analyze ageing from an inter-municipal perspective, we have opted for the microdata extracted from the 2010 Demographic Census of the above-mentioned areas, which are operational units used by IBGE for sample calibration and estimation (IBGE, 2011). This choice derives from the need to observe the spatial dynamics of ageing, and the areas of concern are the smallest units in which data from the demographic census sample are made available.

It should be noted that the lowest scale of information to be collected for migration data is the municipality. It is then at the inter-municipal level that one can observe in which area of concern a migrant resided on the research reference date, and only can be considered a migrant people who moved between different municipalities.

The criterion for analyzing ageing was age (self-) declaration, and the age groups considered in the construction of the ageing index were young people (0 to 14 years), adults (15 to 59 years) and the elderly (60 years or more), with the index calculated as follows:

$$AI = \frac{\text{elderly population (60 years or older)}}{\text{young population (0 a 14 years)}} \times 100$$

We chose to use the Ageing Index (AI) instead of the proportion of elderly in the area of concern, as this proportion is more influenced by the amount of population living in the area, losing analytical capacity.

It is important to note that the 2018 population projection data (IBGE, 2018) were used to reflect on the intensity of ageing of the Brazilian population in the coming decades. Although the 2022 Census preview data already indicate lower population growth, the projection points out a relative certainty regarding trends, which can be accelerated if the lower growth verified is confirmed at the end of the survey.

3. Migration and ageing

Although there is a range of research related to ageing or migration, the number of such works associating the two categories is still scanty. Given this, we demonstrate the relevance of the integrated analysis for grasping demographic processes in urban space and stressing its importance for advancing studies of the spatial dynamics of ageing.

Concerning the spatial dynamics of ageing, we are referring to the ageing process that is, at the individual level, linear and uniform, but uneven when considering territorial delimitations. It is these very differences that will lead to different demands of public policies.

The first step is to define which approach will be given to analysis and reflection. In this sense, we will address the spatial distribution of the population by age, according to Bailey (2005). Migration gains prominence in the ageing process at the inter-municipal level because the entry or exit of people in a given geographical space changes the age structure, both at the destination and the place of origin (CARVALHO; RIGOTTI, 2015; RODRÍGUEZ-VIGNOLI, 2019). It is due to the age pattern of migration processes (ROGERS, 1988; CAMPOS; BARBIERI, 2013) that, despite the differences between countries, is more common for adult layers (BERNARD; BELL; CHARLES-EDWARDS, 2014).

In these trends of change in the pattern of ageing related to migration, Camarano and Abramovary (1999) demonstrated, from their work reflecting on the Brazilian rural exodus of the second half of the 20th century, that the migration of the young population to large urban centers contributed to ageing and greater masculinization of the population in rural areas.

This last aspect has occurred because there was greater female migration within the process of rural depopulation and the growth of cities. This phenomenon, and because females enjoy greater longevity, brought consequently a feminization of ageing in the urban environment.

Oliveira (2006) warns that ageing is heterogeneous, as well as other demographic issues, because it results from economic, cultural, and social dynamics. Regarding the territory, especially in large urban agglomerations, the specific dynamics of urban expansion conditions the spatial redistribution of the population from residential mobility and intrametropolitan migration, with well-marked characteristics of the population, even in terms of age (DOTA, 2015; CUNHA, 2018).

On the urban scale, therefore, it is possible to reflect the diversity of ageing patterns in dialogue with the very logic of the production of space. Oliveira (2006) and Guidugli (2002), analyzing the case of São Carlos, a municipality in São Paulo, uncovered a trend depicting a geographic concentration of the elderly population in central areas. According to the authors, it is related to income issues, as the younger population tends to present lower average wages and is more likely to be pushed to peripheral areas, in a process of relative ageing, that is, not only by the movement of the elderly people but by the whole of society.

Another equally important factor is the socio-spatial inequality among various neighborhoods, which is reflected in different living conditions even between neighboring

areas. In the case of São Paulo, according to the Inequality Map (REDE NOSSA SÃO PAULO, 2020), life expectancy in the most central areas can reach 81, as for prime neighborhoods like Jardim Paulista and Altos de Pinheiros, while in peripheral areas, Jardim Ângela or Cidade Tiradentes for instance, it does not exceed 58 years.

Based on these heterogeneous groups, which have a clear territorial dimension, ageing differences reverberate at the inter-municipal level. It is necessary, then, to think about the diverse scope of challenges public management must face, especially considering the social dynamics of each municipality. It is important to note that individual ageing is one of the variables affecting the spatial dynamics of ageing in large agglomerations, a fact that will be better developed in the next sections.

4. Ageing and public policies

In recent decades the impact of ageing on society has been undeniable, especially regarding health conditions. Longer life expectancy has raised the challenge of ageing with autonomy and physical, mental, and social wellbeing (MARI et al., 2016), making ageing one of the great themes of reflection for health studies and promoting public policies.

The rapid growth in the number of elderly people has been followed by major changes in the epidemiological and demographic profile of the population. According to Santos and Silva (2013), these changes have important repercussions on the life of elderly people, their families and community, particularly when ageing is hindered by dependence.

In this context, the need to think about public policies aimed at improving the living conditions of the elderly occurs goes beyond a handful of medical and hospital problems. It is also related to psychological interactions, financial independence, autonomy, and due care to ensure social well-being (BRASIL, 1994).

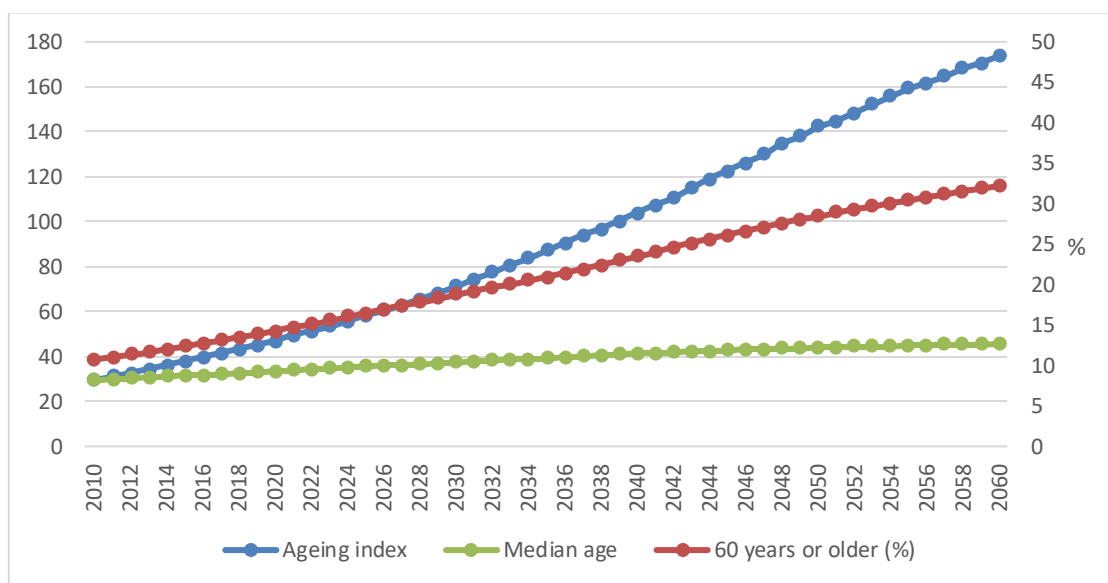
In Brazil, until the mid-1980s, state actions aimed at the public health and well-being of the elderly were characterized by a series of gaps and serious structural problems (FERNANDES; SOARES, 2012). It was only in 1988, with the new Federal Constitution, that this scenario began to undergo changes. However, it was after Law No. 8,080 of 1990, originating the Unified Health System (SUS, in Portuguese) that actions aimed at protecting the interests of the elderly population in Brazil started (TORRES et al., 2020).

To legitimize and constitutionally guarantee this attention, the National Policy for the Elderly (PNI, in Portuguese) was created by law in 1994, although it was revoked in 2019 (BRASIL, 2019). The PNI brought a series of changes that sought to ensure rights, such as health care at the most diverse levels of medical assistance, and the creation of alternative health services for the elderly, in addition to the actions of prevention, promotion and protection of elderly health conditions (BRASIL, 1994).

Subsequently, aiming to strengthen the National Policy of the Elderly and continue advancing in the debates and specific demands of the elderly, a Statute of the Elderly was launched in 2003 (BRASIL, 2003). The Statute reiterates the terms of federal legislation, defining a series of crimes against the elderly. It is responsible of guarantee the right to life, freedom, health, sport and leisure, housing, social security, and assistance, among other issues of key importance to secure healthy subsistence and the exercise of citizenship of the elderly.

A constitutional contribution is an important tool for the building of public policies, especially for the elderly population, a group that has been growing at a fast pace (Figure 1). According to data from the 2018 Population Projection (IBGE, 2018), the ageing rate will tend to grow approximately 5.8 times between 2010 and 2060, going from 29.5 to 173.4, because of the increase in the proportion of elderly in the total population (from 10.7% to 32.1%) alongside with the decrease of young people up to 14 years old (from 24.7% to 14.7%).

Figure 1: Ageing index, the proportion of people 60 years or older and population by median age. Brazil, 2010-2060.



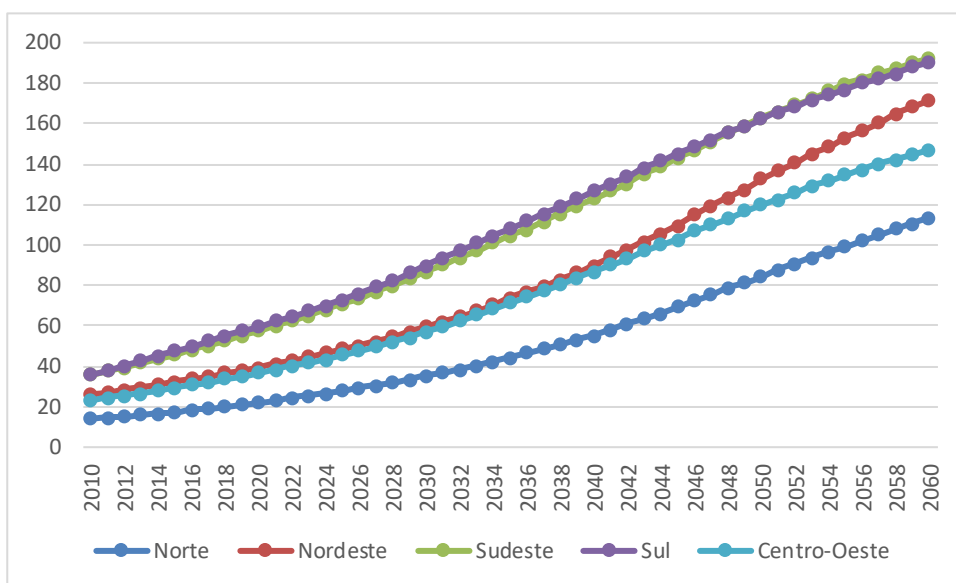
Source: IBGE. 2010 Demographic Census and 2018 Population Projection.

This result is related to structural demographic changes, such as reduced fertility rate and increased longevity observed and projected for the coming decades. In the 2018 IBGE projection, for instance, the projected fertility rate for 2060 would be 1.66 children per woman, compared to 1.75 observed in 2010, just below replacement levels (2.1). Regarding longevity, the projection showed that in 2060 Brazilian life expectancy will reach 81.0 years (77.9 for men and 84.2 for women) compared to 73.8 observed in 2010 (70.2 for men and 77.6 for women).

Projections indicate, therefore, that population ageing is progressing, which will make states face increasing demands in the coming decades. The ageing trend of the Brazilian population, however, is spatially differentiated when considering different territorial portions and as a result of the general demographic dynamics, including migratory exchanges.

Between major regions and Federation Units, this difference can already be observed. As observed in Figure 2, variations in the level of the ageing index in 2010 will tend to remain in the coming decades for large regions, although some variations are expected.

Figure 2: Ageing index. Large regions of Brazil, 2010-2060.



Source: IBGE. 2010 Demographic Census and 2018 Population Projection.

Sul and Sudeste regions have the highest index, while the Norte would have the lowest. It should be noted that migration plays a central role in the variation of the index over time, but due to its uncertainty in relation to future dynamics, these limits should be considered for the analysis. By way of example, in the 2018 population projection, IBGE projected internal migration until 2030, repeating the 2030 value for the following years. International migration has not been included (IBGE, 2018). This strategy is used precisely because of the difficulties of projecting migration, allowing it to be kept in the calculation considering its recent history.

These differences in relation to the spatial dynamics of ageing also appear at the level of municipalities, and the way each territorial portion is inserted in economic, social, and political networks makes a difference to understand the level and pace of ageing in each municipality. In the next section, we enter a more local analysis, presenting the specificities of ageing at the intramunicipal level.

5. The role of migration in ageing

Migration contributes to ageing as the result of migratory exchanges that, being constant over time, promote the ageing of some areas (regions, federal units, and municipalities) and the rejuvenation of others. This process comes on the one hand, from the age pattern of internal migration itself, as shown by Rogers (1988), which in turn is repeated with few differences when compared internationally, whilst also being influenced by the time of occurrence of other associated phenomena (BERNARD; BELL; CHARLES-EDWARDS, 2014). It is important to highlight that the ageing process results not only from the displacement of older people but is also promoted, in one area, by the departure (emigration) of younger people.

The tendency to ageing, observed through indicators such as the ageing index or the proportion of elderly people in the total population (Cf. Figures 1 and 2), tend not to show these spatial dynamics, which is closely linked to territorial inequalities and to the number of ways in which municipalities or given territorial portions are inserted in economic, political and social dynamics.

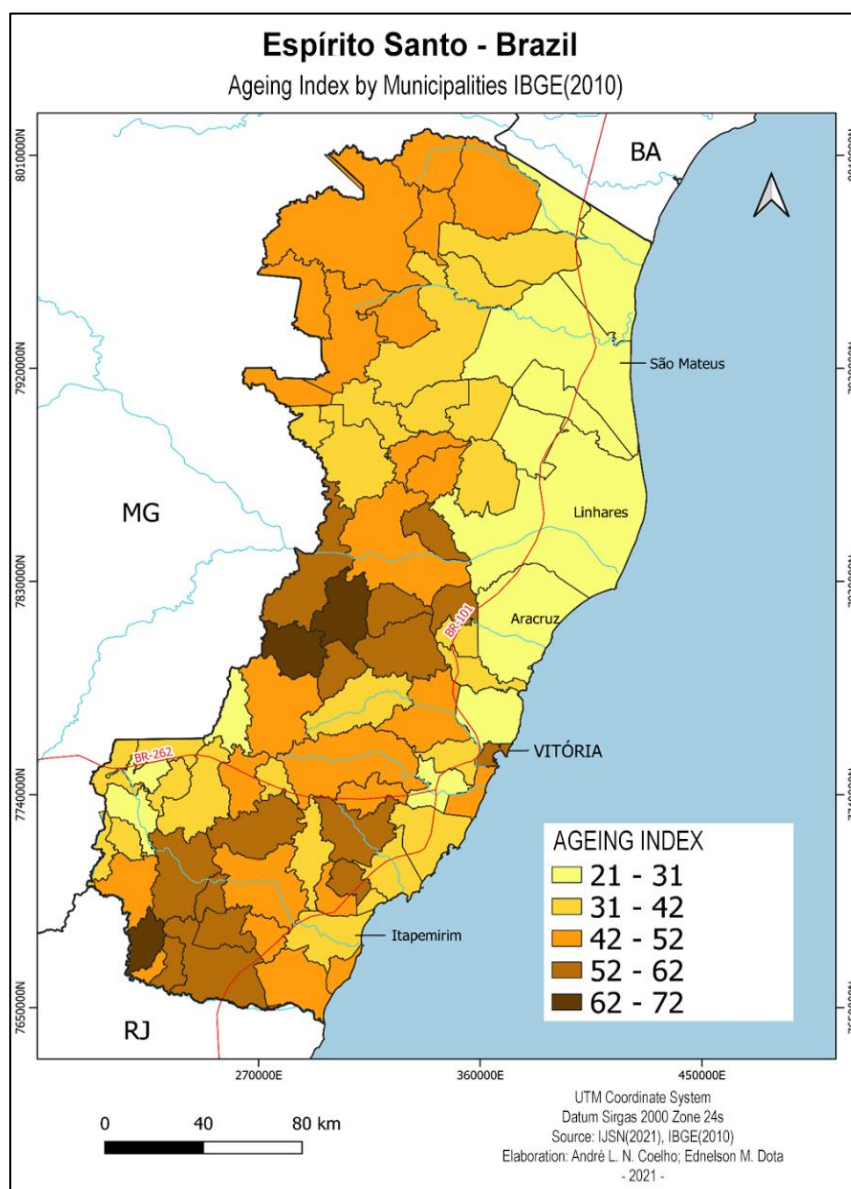
Figure 3 shows these differences for the state of Espírito Santo: we can highlight the first level, somewhat between coastal and inland municipalities, with coastal populations with an overall lower ageing rate. Another possible division for the analysis is between the center-south portion of the interior and the north: the center-south, a mountainous region with a predominantly agrarian economy, with small properties, with higher rates than the northern portion, precisely because they give more migrants to other portions than they receive (DOTA; COELHO; CAMARGO, 2017).

In the coastal portion, the north with lower indices than the south, and in the metropolitan region much difference between the municipalities: Vitória with a higher index, Cariacica and Vila Velha with intermediate indices, and Serra and Viana with lower indices.

In the case of the northern coastal region, which has been the scene of important investments, such as the oil and gas sector (ZANOTELLI et al., 2019), migration has shown growth and greater economic integration has been observed, including traces of expansion of the metropolization process from the RM of Greater Vitória (DOTA; FERREIRA, 2020).

Such differences in indices, therefore, relate to the way productive activity and derived social phenomena are held in different portions of the state. In the latter, migration stands out in its different modalities, contributing decisively and specifically to the areas in which it is observed.

Figura 3: Ageing index. Municipalities of Espírito Santo, 2010.



In the Metropolitan Region of Vitória (MRV), one can observe a local dynamic derived from this general process, with the emphasis being placed on the different degrees of integration and complementarity among the seven municipalities that shape the processes of population spatial redistribution.

As shown in Table 1, 88.9% of the population of the region, in 2010 it was concentrated in the municipalities of Vitória, Serra, Vila Velha and Cariacica. The integration and complementarity between them are intense, something reflected both in the data of migratory exchanges and commuting to work.

87.1% of these migratory exchanges were concentrated among the four municipalities, and 91.7% of pendular mobility for work was directed to one of them. The

regional urban space, therefore, is strongly polarized by these four cities, which represent a major share of labor and housing opportunities.

Table 1: Resident population, metropolitan migration and the pendulum migration to work. Municipalities of MRV, 2010.

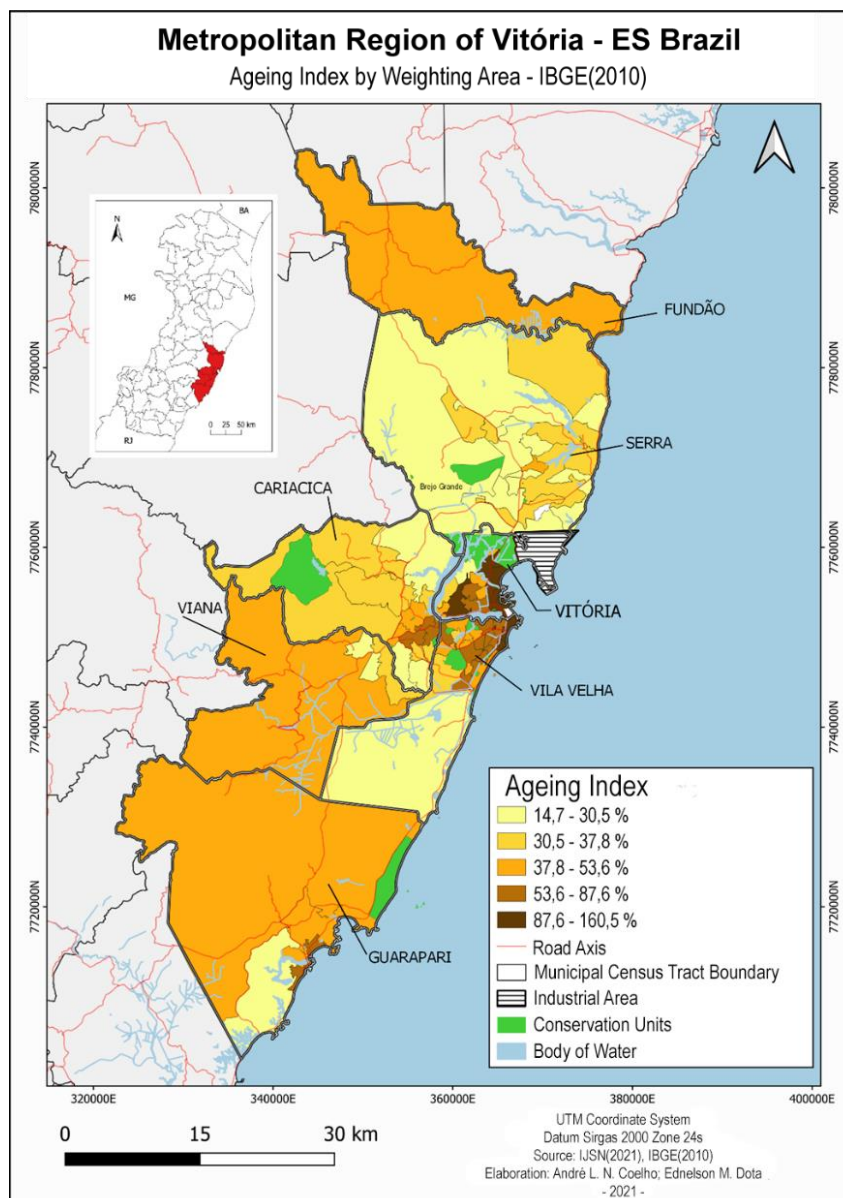
	Population	%	Intrametropolitan migration			Balance on commuting to work
			Immigration	Emigration	Balance	
Cariacica	348,738	20.7	8,979	10,777	-1,798	-50,158
Fundão	17,025	1.0	1,172	480	692	961
Guarapari	105,286	6.2	2,568	1,749	819	-1,351
Serra	409,267	24.2	13,277	7,532	5,745	-16,175
Viana	65,001	3.9	4,269	2,292	1,977	-7,079
Vila Velha	414,586	24.6	10,998	9,534	1,464	-18,598
Vitória	327,801	19.4	7,543	16,442	-8,899	94,322
MRV	1,687,704	100,0	48,806	48,806	0	0

Source: IBGE. 2010 Census. Special tabulations by Lagedep/UFES.

Migratory exchanges and commuting to work movements are not random. They result from the role of each municipality regarding the spatial distribution of productive activities, housing opportunities and the relationship established between them over time in an urban space that, in a certain way, functions as one large city formed by several municipalities (MATOS, 2005).

Figure 4 shows the inequalities of ageing in the municipalities of MRV. Higher rates are noticeable in wealthier portions (see Figure 5), such as the northern coastal stretch of Vila Velha (Praia da Costa) and Vitória (from Enseada do Suá to Mata da Praia).

Figure 4: Ageing index according to the areas of concern. Municipalities of MRV, 2010.



Alongside this portion that concentrates the wealthy people, there are also central areas together with the oldest occupied portions of Vitória, Vila Velha, Cariacica and Guarapari.

In Figure 5, in which the nominal household income is observed, there is a pattern of distribution that resembles the previous one, indicating work income as an important dimension in the understanding of the ageing process in its spatial dimension.

In line with the results of Guidugli (2002) and Oliveira (2006), we stress that both central areas, the first districts to be occupied, and those highly valued areas of the MRV, are deeply related to the areas of concentration of the elderly population. Although both

have, as part of the explanation, the spatial (re)distribution of the population in prime areas, some of them newly formed, the impact of migration is even more evident.

Figure 5: Nominal household income according to the areas of concern. Municipalities of MRV, 2010.

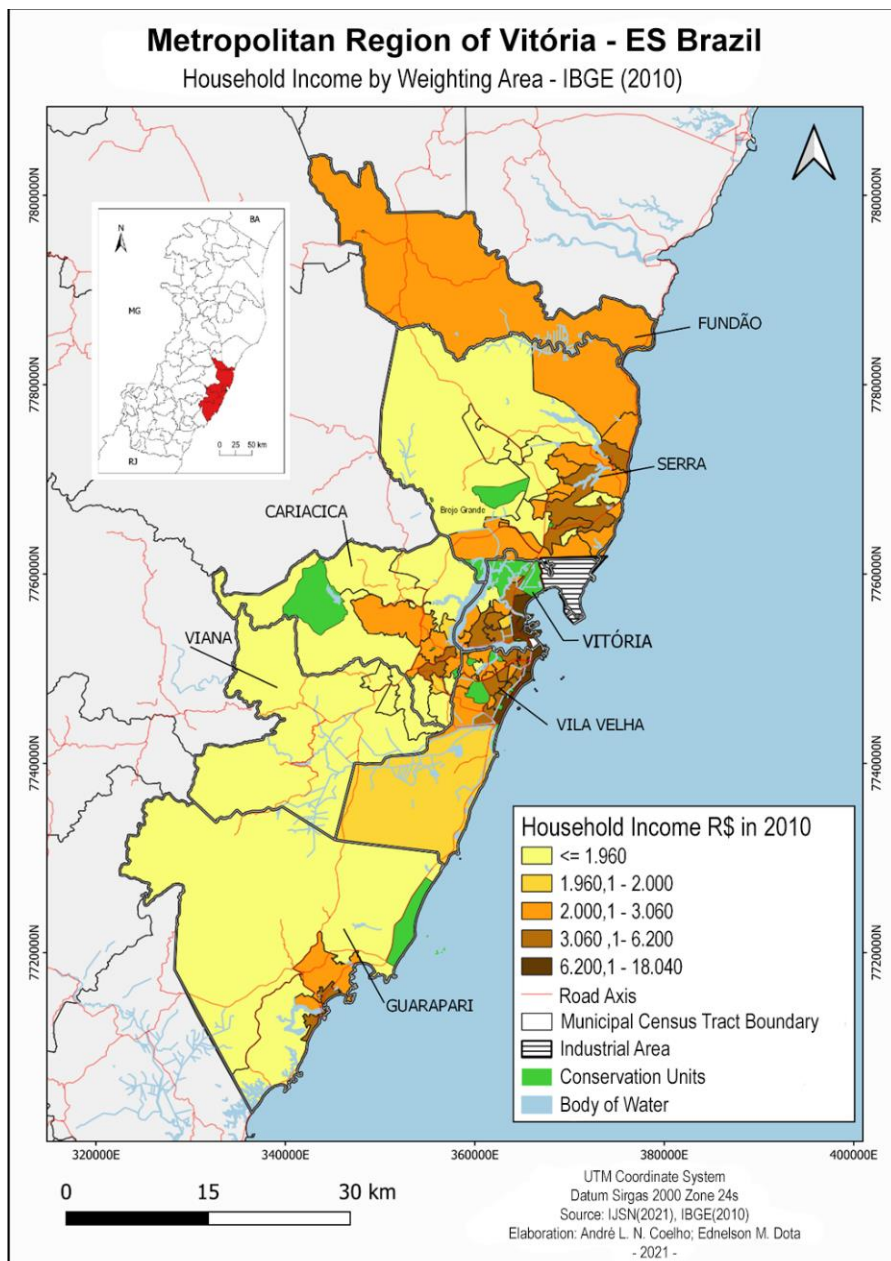
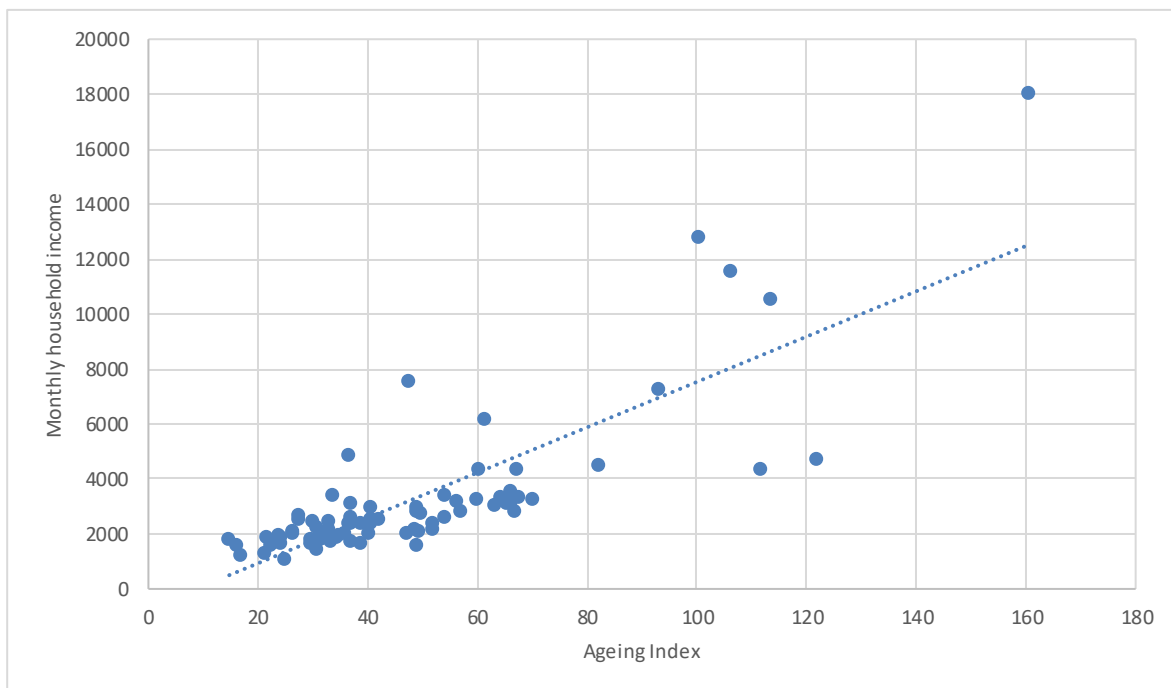


Figure 6 shows that the relationships shaping the ageing pattern in the areas of concern are complex and they are not a direct result of the time elapsed since their occupation and valorization of the areas. Despite the strong positive correlation between the ageing index and monthly household income ($r= 0.713$, $p <0.001$), the related demographic dynamics should be considered.

In large urban agglomerations, predominant migratory groups, especially intrametropolitan and residential types of mobility, are deeply affected by processes linked to housing dynamics. As Dota (2015) showed for the Metropolitan Region (MR) of Campinas, Farias (2018) for the MR of Baixada Santista and Cunha (2018) for the main MRs in Brazil, residential mobility is a key element for urban expansion. The displacement of the population between neighboring municipalities or nearby neighborhoods feeds the occupation of new households being launched on the market or created with their own financial means.

These displacements also play a central role in areas consolidated for a longer time. With the development of the family life cycle, children grow up and leave home to form a new family or occupy a home alone. In general, this movement is aimed at new areas of occupation, with lower living costs, precisely because this new family is at the beginning of its life cycle, with lower incomes, short experience in the labor market, education still in process, etc.

Figure 6: Relationship between the ageing index and the monthly household income. MRV areas of concern, 2010.



Source: IBGE. 2010 Census. Special tabulations by Lagedep/UFES.

As a result, the migration of younger people contributes to the ageing of the place where they had left, whilst causing the areas of destination to rejuvenate, in a constant motion set out specifically by the dynamic movements within these areas. The unequivocal relationship between average income and central areas, therefore, stems from the demographic dynamics in its broader sense. It is related to the processes of family

formation, the number of children, and the development of the family life cycle, besides the processes of urban expansion and production of urban space.

6. Concluding Remarks

The demographic dynamics coming from the interaction among fertility, mortality, and migration, give rise to a population geography that owes its dynamic to the constant process of transformation. In large agglomerations, this is even more evident, and the results of these interactions are core elements to understanding latter-day and emerging demands.

What is observed in MRV in the 2010 data in relation to the spatial dynamics of ageing has the same conditions as those presented for São Carlos by Guidugli (2002) and Oliveira (2006). The speeding up of ageing in Brazil poses new challenges, though, a perspective backed by previous data from the 2022 Census. Since this dynamic results from the interaction of many variables, as demonstrated in this paper, how to consider that this pattern will be followed, if we have a lower fertility rate, a change in the composition of households, a change in the dynamics of demographic growth, besides adverse structural and circumstantial conditions resulting from the combination of political, fiscal, economic and health crises in Brazil?

While the acceleration of population ageing is expected, these ongoing transformations do not purport to alter the ageing process, but rather its spatial dynamics, highlighting that these central variables for its analysis must be put in perspective or, at least, need to be revised to point towards new ways of influencing these dynamics over time.

These results emphasize the relevance of thinking about the spatial dynamics of large agglomerations from the perspective of population geography, since changes in demographic variables, also linked to individual behaviors and choices, modify the structure of the population, and require, over time, the adaptation of policies and more reflection on new demands coming from these changes.

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