

From diversity to division (and back): Unravelling two decades of population change in Belgian cities

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1 Introduction

In recent decades, Europe has witnessed substantial transformations in its urban populations and geospatial configurations owing to the effects of international migration. These shifts have engendered various challenges pertaining to demographic change, ethnic diversification, and the phenomenon of residential segregation, which may manifest either voluntarily or involuntarily along ethnic lines. Despite the observable trends towards desegregation, typified by the reduction of native-dominated neighbourhoods and the rise of multi-ethnic residential areas (Catney et al., 2023), many highly segregated space persist (Andersson et al., 2018; Imeraj, Willaert, & de Valk, 2018).

Empirical investigations, primarily grounded in traditional theories of immigrant spatial assimilation, ethnic enclaves, inter-group conflicts, and place-based social stratification, have adeptly chronicled the aggregate levels and patterns of ethnic residential segregation. These inquiries have also probed the determinants and underlying processes that contribute to these spatial distributions, along with their associated detrimental consequences, particularly concerning ethnic minority populations (Bailey, 2012; Galster & Sharkey, 2017). Nevertheless, the existing body of research falls short in capturing the temporal dimensions of segregation and the evolving nature of residential contexts on the divided-mixed continuum.

As a consequence, a notable gap in the literature remains, specifically regarding the extent to which ethnic diversification generates or exacerbates urban divisions. Additionally, there is an unmet need to explore how spatial processes related to ethnicity contribute to more extensive urban inequalities. This research endeavours to address these lacunae by providing a comprehensive examination of the dynamics of ethnic diversification, residential segregation, and its broader implications within urban societies.

2 Aim, data and methods

This research examines the evolution of ethnic diversity and segregation in Belgium during the decades spanning from 2000, over 2010, to 2020, leveraging comprehensive cross-sectional data at the neighbourhood level, provided by Statistics Belgium. During this period, there was a notable increase in the population share of individuals with foreign backgrounds, leading to heightened ethnic diversity. The population is categorized into six distinct migrant origin groups, taking into account current nationality, nationality at birth, and the current nationality and nationality at birth of both parents for all legal residents in Belgium. The classification covers Belgium, Europe (90% EU-27), Africa (65% Maghreb), Americas, Asia (55% Turkey), and a rest-group, and is applied across 19,781 statistical sectors, which are similar to wards or census tracts.

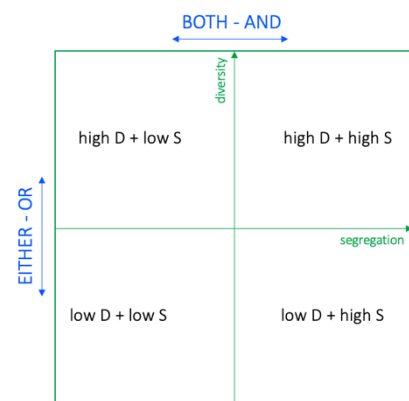


Fig.1 Diversity and segregation

Our analytical strategy for this paper focusses on exploring and visualizing spatial patterns and trends in ethnic diversity and segregation in metropolitan and regional cities in Belgium while investigating their (spatial) interaction and co-variation.

The operationalization of diversity and segregation relies on two specific indices for the time being: Theil's Entropy Index for segregation and the Fractional Index for diversity. These indices enable exploratory GIS mapping (with one dot representing 10 persons), a diversity-segregation typology (figure 1), and ongoing spatial and quantitative analyses that aim to uncover the intricate (co-)variations of diversity and segregation over time. Future analyses will use (local) Moran's I spatial correlation coefficient and GIS to identify hotspots of ethnic homogeneity (division) and mixing (diversity).

2.1 Fractional index (F), a measure of diversity

The fractional index was developed by Christian Kesteloot and calculates how much the distribution of a population over different groups (e.g., age or ethnic groups) differs from an equal distribution. F varies between 0 and 1, and is determined by

$$F = 1 - \sum_{i=1}^n p_i^2 \quad \text{with } p_i \text{ the proportion of group } i \text{ in total population in area}$$

A high index indicates a population composed of different groups of equal size. So, the lower the index, the more a single group is dominant in the neighbourhood. The variation of the fractional index depends on the number of groups that are distinguished: e.g., with two groups, the minimum is 0 if one of the two groups represents 100% of the population in the neighbourhood and the maximum is 0.5 if both groups represent exactly half of the neighbourhood population.

2.2 Theil's Entropy index (H), a measure of segregation

Theil described the entropy index as a measure of the average difference between a unit's group proportions and that of the system as a whole (Theil, 1972).

$$H = \frac{M}{E(p)} \quad \text{with } M \text{ being the Mutual Information Index and } E(p) \text{ being the Entropy}$$

$$H = \sum_{i=1}^n \left[\frac{t_i(E-E_i)}{ET} \right] \quad \text{with } E_i = \sum_{r=1}^r (\Pi_{ri}) \ln[1/\Pi_{ri}]$$

t_i : total population of tract i
 T : metropolitan area population
 n : number of tracts/wards/sectors
 E_i : tract i 's diversity (entropy)
 E : metropolitan area diversity
 Π_{ri} : particular racial/ethnic group's proportion of the population in tract i

Since interpreting the Mutual information index is not easy because it is not normalized, this paper focusses on Theil's information index (H). H can range from 0, when all areas have the same composition as the entire metropolitan area (maximum integration), and 1, when all areas contain one group only (maximum segregation). So a value of 0.419 would indicate moderate segregation. The entropy index is not influenced by the relative size of the various groups in a metropolitan area. Rather, it measures how evenly groups are distributed across metropolitan area neighbourhoods, regardless of the size of each of the groups.

3 Preliminary results

3.1 Increasing ethnic diversity

On a national scale, all ethnic minority populations have notably grown over the two-decade observation period. Expressed as share of the 2000 co-ethnic population, European minorities have grown with nearly 75% whereas minorities with roots in Africa, Americas and Asia have grown between 157-185%. The native Belgian population has shrunk with 7%. This ethnic diversification is supported by an increase in F between 2000 (F=0.3005) over 2010 (F=0.4016) to 2020 (F=0.4919). The national-level trend

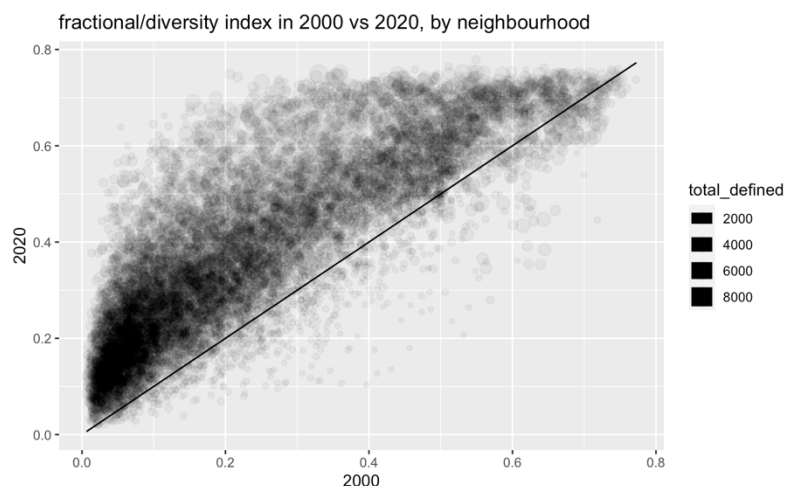


Fig.2 Increasing diversity: Fractional Index by neighbourhood, 2000-2020

of ethnic diversification is visibly projected at lower geographic levels but different yet distinct patterns of change and different ethnic composition across all cities in Belgium arise. At neighbourhood level, 77% of all neighbourhoods became more diverse between 2000 and 2020 (figure 2).

3.2 Decreasing ethnic residential segregation

With a negative growth rate nationwide ($H=-28.80$), desegregation is the trend. Scaling down to municipalities and cities however, marked differences are observed (figure 3). This is largely due to the fact that of the total segregation (in 2020), 73% concerns segregation between municipalities ($H=0.1373$) and 27% is segregation within municipalities ($H=0.0505$).

3.3 Ethnic diversification, a divisive process?

The diversity-segregation covariation takes many different forms. Roughly speaking, the nature of the covariation and the geographical variation hereof, falls into three main groups of cities.

The leading group

In cities like Brussels, Antwerp, and Genk, native Belgians have transitioned into the minority, leading to the emergence of superdiverse cities, as described by Vertovec (2007), or what can be termed as majority-minority cities. For instance, in the Brussels region, the Conscience neighborhood in Evere stands out as one of the most diverse yet least segregated areas. Various origin groups coexist in this neighborhood, and their populations are almost equal in size. Similar neighborhoods with a comparable profile include Turkeyen in Antwerp (as depicted in figure 4) and Zwartberg in Genk.

The peloton

There is also an intermediate group that includes cities such as Ghent, Leuven, Mechelen, Turnhout and Sint-Niklaas. In these cities, the proportion of residents with foreign roots has experienced a significant increase, but the percentage of Belgians without a migration background still comprises 60 to 75 percent of the population. Notable examples are the Drie Zwaantjes neighborhood in Ghent and the Onze-Lieve-Vrouwekerk area in Mechelen. In Drie Zwaantjes, six out of ten residents still have native Belgian origins, a notable shift from the 94 percent figure recorded in 2000. The newly arrived population is a blend of individuals with roots in the EU-27 (comprising 22 percent), Asia (constituting 14 percent), and Africa (accounting for 7 percent). Although these demographics may not fit the strict criteria of superdiversity, these areas exhibit a notable level of ethnic diversity.

The tail group

Conversely, there are cities where ethnic diversity remains relatively limited, with fewer than 25 percent of residents having migration backgrounds. This category includes Ostend and Roeselare. In Ostend, three-quarters of the population still consists of individuals with native Belgian origins, while in Roeselare, this proportion is notably higher, standing at 82 percent. Interestingly, an increase in segregation has been observed in several cities within this group, such as in the *Spanish* neighbourhood in Roeselare or the vicinity of Prinsenlaan in Ostend. This suggests that relatively little change is occurring in Roeselare and Ostend, compared to other cities where the progression towards ethnic and cultural diversity is more rapid.

Huge variations in between groups

Nationally, there is a discernible trend: urban environments have experienced increased diversity and a greater mixture of ethnic backgrounds, although this pattern varies significantly from one city to another. Furthermore, within cities, substantial disparities exist among neighbourhoods. In the city of Brussels, the capital of Belgium and Europe, home to over x nationalities, the prevalence of multi-ethnic neighbourhoods is on the rise. Simultaneously, firmly segregated neighbourhoods persist. A notable example is the Molenbeek Marie-José

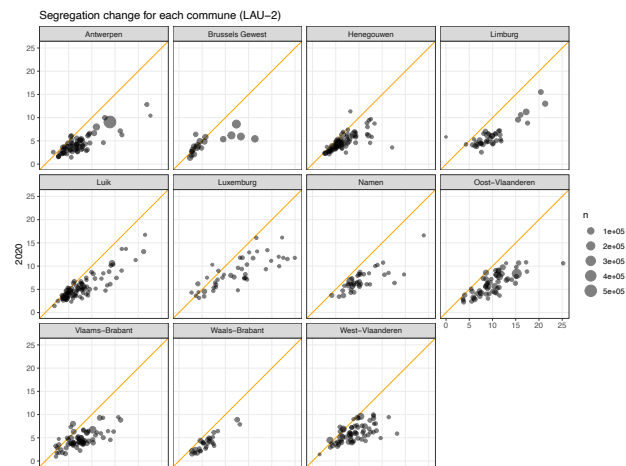


Fig.3 Decreasing segregation, 2000-2020



Fig.4 Turkeyen neighbourhood, Antwerp, 2020

blocks, where the proportion of residents of exclusively Belgian origin dropped from 60 percent in 2000 to just 9 percent in 2020, with 80 percent of inhabitants now having roots in African regions, particularly the Maghreb countries.

Smaller cities also exhibit the emergence of super-diverse neighbourhoods, where the recent increase in the percentage of residents with foreign backgrounds is a noteworthy development (observed in Leuven, Sint-Niklaas, and Mechelen). Moreover, there are traditional arrival neighbourhoods where the dominance of a single ethnic origin has been broken, as exemplified in Ghent. Additionally, neighbourhoods on the outskirts of the city experience an inflow of residents from the city centre, as observed in Evere and Wondelgem.

4 Diversity and segregation, conceptually and empirically related? Some preliminary conclusive reflections

This study delves into the intricate relationship between diversity and segregation, contending that both have become increasingly prominent, interrelated, and intertwined aspects of urban centres and metropolitan areas. The diversity-segregation conundrum (Florida, 2017) now stands as a central feature of our contemporary social and economic landscape, with different scholars taking different perspectives on the issue. Some view diversity as a positive force, promoting greater understanding and tolerance between different population groups, while others see it as a potential source of conflict, leading to greater segregation and exclusion of certain groups. The new Statbel data provide a wealth of valuable insights into neighbourhoods across the country. This study illustrates the coexistence of emerging multi-ethnic neighbourhoods alongside longstanding neighbourhoods of ethnic concentration. Overall, the output of the analyses produce all types of neighbourhoods: some have high diversity and high segregation, others are low on both. Further spatial analyses seek to uncover (multi-)ethnic hotspots within local contexts and shed light on the capacity of communities to cultivate bonding and bridging social capital (Neal, 2015).

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