



## Article

# Ethnic Residential Segregation: Evidence from Two Italian Functional Urban Areas

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**Abstract:** This article aims to update the analysis of the residential segregation of the foreign population in European cities by considering the most recent 2021 census data for two different Italian metropolitan areas, Milan and Bologna. The diachronic analysis (2001–2021) of several indices of residential segregation (i.e., dissimilarity index, two group and multigroup; location quotient; and kernel density estimation) at the metropolitan scale (i.e., functional urban area) will contribute to the debate on the residential settlement patterns of foreign populations, highlighting the specificities of Southern European cities. Despite the significant differences between the two cities considered, the same desegregation trends (i.e., reduction in segregation indices) are identified in both cases. The results show a decrease in residential segregation over time in both core and commuting areas. Furthermore, phenomena of peripheralisation related to overrepresentation in metropolitan municipalities emerge, although core areas remain where the foreign population is most concentrated. The complexity and ambivalence of residential dynamics in the two cases suggest that residential segregation can also take “unusual forms” in Southern European cities that are not always related to the macro-concentration phenomena. In this sense, the “urban diaspora” hypothesis seems to be a suitable concept for capturing the new distributional trend of the foreign population in the Southern European context.



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**Keywords:** ethnic residential segregation; functional urban area; Southern European cities; Italy

## 1. Introduction

Ethnic residential segregation in European cities has gained prominence in public and academic debate in recent decades. Several studies have focused on the analysis of segregation indices, and a broad debate exists on the criteria for measuring the phenomenon quantitatively, as well as on the causes, forms, and trends of ethnic residential segregation, which, in European cities, seem to differ from those in North America due to the specificities of local contexts. However, the debate is limited by dated data and does not consider the metropolitan dimension of segregation processes, except for a few studies (Martori and Apparicio 2011; Arbaci 2019; Benassi et al. 2020a, 2020b; Pratschke and Benassi 2024). The present work contributes to this debate in at least two directions: firstly, by updating the analysis to include the data of the Italian permanent census of 2021; and, secondly, by showing the results of a comparative analysis between two Italian FUAs (Bologna and Milan) to investigate similar trends in the distribution of the foreign population in two very different contexts. This paper is organised as follows. After a review of the debate on the different instruments for measuring segregation, attention is paid to the critical segregation debate developed in Southern European cities. In the second part, the research design, the choice of case studies, the methodology, and the research techniques are presented. Finally, the results of the analysis are illustrated and discussed, together with future research directions.

## 2. Measuring Residential Segregation

Residential segregation, as a social phenomenon, was first investigated in North America in the 1920s. In that context, segregation was mainly conceived as a form of isolation in which social distance is based upon physical separation (Park 1928). The approach and conceptualisation developed by the Chicago School have steered the subsequent debate. Human ecology theorised racial segregation as a temporary phenomenon in the integration process of immigrant groups with the urban fabric. The academic debate, following the trajectory of the assimilationist approach, soon shifted to the criteria for measuring physical and social distance.

Between the 1950s and 1980s, the North American literature focused on identifying the most appropriate methods to measure residential segregation. First, Duncan and Duncan (1955) demonstrated that the index of dissimilarity (ID) is the most useful tool for measuring residential segregation. The index of dissimilarity measures the degree of dissimilarity between the distribution of one group and another, i.e., the reference group. Accordingly, a few years later, Taeuber and Taeuber (1965, 1976) reached the same conclusion with respect to the ID index, although there is still no full agreement on a single tool to measure the phenomenon mathematically. Other scholars argue that the most appropriate indices are the exposure ones, which observe the possibilities of interaction within a neighbourhood. For example, the isolation index measures the probability of people meeting a member of the same social group in a specific territorial unit (Bell 1954; Lieberman and Carter 1982a, 1982b).

A further contribution to the debate on the criteria for measuring segregation is provided by James and Taeuber (1985), who identify four different dimensions to assess the distribution of social groups across urban areas. Building on James and Taeuber's analysis, Massey and Denton (1988) include a higher number of indices, namely 20. The authors argue that it is necessary to take five different dimensions of segregation into account simultaneously, and, through an analytical comparison, they identify for each of these dimensions—*isolation, concentration, exposure, centralisation, and spatial clustering*—the most accurate index. Despite the thoroughness of the analysis, the method identified by Massey and Denton failed to establish itself as the only way of measuring the phenomenon, even though it is still recognised as one of the most rigorous. Following a similar criterion, Reardon and O'Sullivan (2004) put forward an alternative proposal, condensing the five dimensions previously identified by Massey and Denton into two: *spatial exposure (or spatial isolation) and spatial evenness (or spatial clustering)*. Some analyses have identified measurement criteria in relation to the analysis of the generative causes of the phenomenon (Clark 1986; Dawkins 2004), while others have attempted to identify how levels of segregation vary internationally in English-speaking countries and beyond (Poulsen et al. 2002; Johnston et al. 2007).

## 3. Ethnic Residential Segregation in European Cities

The academic debate has emphasised that levels of residential segregation in Europe are relatively low compared to those of US cities. Some analyses have shown how the different ethnic-national compositions and the role of the state have generated distinct forms of segregation: in the US context, the racial dimension is more pronounced, while in the European context, it is the socioeconomic and class dimensions that have a greater impact (Wacquant 2007). Moreover, the presence of the welfare state in Europe has been a "moderating factor", both at the national and local levels, limiting the development of ethnically and socially homogeneous residential areas, although not without contradictions (Andreotti et al. 2012). In this regard, it is interesting to mention the "state-market-family nexus", which represents an adaptation of the Esping-Anderson model to explain welfare regimes (state, market, and family are understood as welfare providers) (Arbaci 2019). Moreover, several empirical studies have shown that immigrants in Europe seem to follow socioeconomic rather than ethnic logic in the processes of settlement in a new urban context (Musterd 2005; Bergamaschi 2012; Consolazio et al. 2023).

The dissonance in the conceptualisation of segregation between the North American and European schools of thought also has ideological and historical roots. According to [Maloutas \(2012\)](#) and [Ruiz-Tagle \(2013\)](#), there are two key differences. The first concerns the history of urban space in the two contexts. Suburbanisation processes in Southern European cities have not been as strong and intense as in American cities. The European elites have not radically abandoned the historic city centres, and residential mobility is significantly lower. In addition, welfare policies have partially mitigated the effects of social and spatial inequalities, while this has not happened in North American metropolises, where segregation processes have been much more intense. The second argument is related to the different understandings of segregation as a political and social problem. As shown by the spatial assimilation theory and Schelling's preference theory ([Schelling 1971](#)), in the American context, segregation is still substantially perceived as the limitation of individual opportunities and as the aggregate result of individual choices. Conversely, in Europe, segregation is conceived as a social and structural problem to the extent that governments have partially attempted to address the problem by mitigating inequalities in the housing and labour markets.

Nevertheless, the approach developed by US scholars has largely influenced the subsequent debate worldwide ([Montesano 2023](#)). Segregation has been investigated as an ecological category, strictly related to US-based theories ([Maloutas 2004](#); [Arbaci 2019](#)). Segregation has been mainly conceived in terms of concentration, directly associated with the image of the Black American ghettos and urban underclass ([Wilson 1987](#)). Concentration, which is just one of the dimensions related to segregation dynamics ([Massey and Denton 1988](#)), is still perceived as crucial in segregation studies and is viewed as generating negative social effects. For these reasons, it represents a major issue in policies and public debate ([Oberti and Préteceille 2017](#)). However, other approaches have been developed to analyse residential segregation mechanisms, with a specific focus on the Southern European context.

#### 4. Segregation between Concentration and "Urban Diaspora"

In the 1990s, starting with the thesis of social polarisation and global cities, the idea that social inequality growth corresponds to segregation growth at the urban level has spread in the academic debate ([Sassen 1997](#); [Borja and Castells 2002](#)). Moreover, although, in some contexts, the two phenomena—i.e., social polarisation and spatial segregation—have grown simultaneously, the same evidence cannot be found in all cities; the relationship between social and spatial inequalities has materialised at the territorial level in different forms and intensities ([Maloutas and Fujita 2012](#); [Arbaci 2019](#)). More generally, it has emerged that levels of ethnic segregation are lower in European countries than in US cities, and neighbourhoods with more significant levels of ethnic concentration in Europe remain de facto heterogeneous, presenting a certain socio-ethnic mix ([Hamnett 1994](#); [van Kempen 1994](#)). Moreover, in Southern European countries, and particularly within the Italian context, the affluent, high-income classes have historically segregated themselves from the broader urban population ([Barbagli and Pisati 2012](#)). In Italy, analyses highlight significant processes of both peri-urbanisation ([Martinotti 1993](#)) and gentrification ([Semi 2015](#)) causing the outflow of low-income groups to suburban or peri-urban areas. The effect in the short and medium terms, however, has been to decrease overall segregation, particularly due to the lower residential isolation of the middle class and the greater social mix in peripheral areas ([Barbagli and Pisati 2012](#)).

According to [Fujita \(2012\)](#), the dual-city thesis is appropriate for reading the spatialisation dynamics of social inequalities affecting some Anglo-Saxon cities, while applying the same scheme to European cities is complex. In many Southern European countries, a high level of social inequalities and a low level of segregation coexist because social polarisation is not empirically reflected in the phenomena of spatial segregation and ghettoisation. In fact, by adopting a wider definition, residential segregation can also take "unusual forms" that diverge from an ethnically and socially homogeneous neighbourhood. Different con-

cepts and images have been introduced to investigate segregation dynamics, such as the categories of micro-segregation (e.g., interstices or vertical segregation), marginalisation (e.g., discrimination in the access to the housing market), and peripheralisation (e.g., the process of expulsion from the central to the peripheral areas of the city).

In particular, the literature on interstices (i.e., micro-areas with an overrepresentation of the foreign population in which different nationalities overlap) sheds light on the importance of the scale of analysis: the mechanisms of segregation and marginalisation are visible only by focusing on small territorial units (Bergamaschi 2012). Another example of micro-segregation concerns vertical segregation (i.e., people unevenly distributed according to their social group across the floors of a building), which has been used to describe residential dynamics in the Athenian case (Maloutas and Spyrellis 2016). More generally, these approaches emphasise that forms of spatial segregation can also exist in contexts marked by social heterogeneity, where different social and ethnic groups live in spatial proximity (Maloutas and Karadimitriou 2022).

Beginning in the 2000s, some European scholars questioned the idea that a linear and direct relationship between social and urban inequalities exists (Maloutas 2007; Maloutas and Fujita 2012; Pfirsch and Semi 2016). When considering the local and social context, this relationship can be more complex: an inverse relationship between social polarisation and residential segregation can indeed be found. The mechanisms of dispersal and desegregation (i.e., a reduction in segregation indices) can also be associated with increasing marginalisation dynamics and expulsion rather than upward social or residential mobility. In this regard, Arbaci (2019) elaborated the concept of “urban diaspora” to read those processes of expulsion of immigrant groups from the central areas to the outer boundaries of the metropolitan area. In this sense, the concept of urban diaspora allows us to understand how the increase in inequalities and decrease in spatial segregation are not paradoxical. Notably, recent studies have detected peripheralisation processes in several cities in Italy (Costarelli and Mugnano 2017; Bergamaschi et al. 2021).

Furthermore, several studies in Europe have highlighted the key role played by the metropolitan scale, noting that the spatial patterns of foreign populations in urban areas go beyond administrative limits and include peri-urban and suburban area scales (Martori and Apparicio 2011; Arbaci 2019; Benassi et al. 2020a). This process of expulsion of marginal social groups from the core municipality is also accelerated by the growing importance of gentrification in shaping the suburbanisation of poverty (Hochstenbach and Musterd 2017). Despite this evidence, only a few analyses have assessed residential segregation at the metropolitan scale, even more so in Italy (Guerzoni 2018; Daconto and Montesano 2022), and, to a large extent, studies have been carried out considering urban poles and core municipalities. Moreover, it has been demonstrated that no single European model can be identified, not even for Southern European cities (Arbaci 2019; Benassi et al. 2020b). With rare exceptions (Pratschke and Benassi 2024), another feature of residential segregation studies in Italy is the use of relatively old data, such as those from the 2011 censuses (so far, the latest available), which do not allow for an analysis of the impact on segregation of the significant urban transformation processes that have taken place since 2011.

## 5. Materials and Methods

### 5.1. Data and Units of Analysis

Two main types of data were used for the present analysis. First of all, data on the citizenship (Italians, EU foreigners, and non-EU foreigners) of the resident population were used. In particular, data from the 2001 and 2011 population and housing censuses and the 2021 permanent population census refer to census sections, the minimum territorial unit in Italy.

The use of this type of unit has its limitations, given the variability of the population and geometries of the census sections, as well as the presence of empty areas. A recent trend to overcome this limitation is carrying out rezoning and interpolation operations capable of generating homogeneous grids or zones (Pratschke and Benassi 2024; De Falco and

Irpino 2024). In this article, a microscale, that of census sections, was adopted to match the geography of the social process under scrutiny, as the phenomenon of segregation in Italy manifests itself at the microscale. Furthermore, we wanted to observe the phenomenon from a different perspective from other studies, which have used other types of units, to contribute new evidence to the debate on the issue.

To limit the impact of the eccentricity of the census sections on the results, the 2011 and 2021 data were applied to the same spatial unit, and only inhabited sections with a residential density greater than or equal to 100 were selected (18,481 sections selected out of 22,146 total in the Milan FUA and 3587 sections selected out of 4790 total in the Bologna FUA). Secondly, geodata relating to the boundaries of the spatial units necessary for the selection of the ecological units and spatial analysis were used:

- Shapefiles of the 2001 and 2011 census sections to which data from the respective population censuses were joined;
- Shapefile borders of administrative units were used for statistical purposes to obtain the boundaries of the municipalities;
- Shapefile functional urban areas by country, created by the OECD and European Commission, were used to determine the boundaries of the cores and commuting zones of the selected metropolitan areas.

## 5.2. Selection of Cases

For the analysis, we used the OECD and the European Commission's harmonised definition of urban and metropolitan areas (Dijkstra et al. 2019). The choice was justified by the fact that this definition has already been applied in numerous studies focusing on residential segregation analyses (Benassi et al. 2020a, 2020b). Moreover, unlike the administrative definition, it allowed us to accurately capture the functional and economic connections among cities. The OECD and the European Commission have jointly developed a methodology to define functional urban areas (FUAs) consistently across countries using population density and travel-to-work flows as key information: an FUA consists of a densely inhabited city and a surrounding area whose labour market is highly integrated with the city (Dijkstra et al. 2019). In particular, the method allows us to identify the urban core, with a density of more than 1500 residents per square kilometre and a population of more than 50,000 inhabitants, and the commuting zone, which are the contiguous municipalities where at least 15% of employed residents work in the urban core. Each FUA is then classified according to its population size into four categories: small urban areas, with a population below 200,000 inhabitants; medium-sized urban areas, with a population between 200,000 and 500,000 inhabitants; metropolitan areas, with a population between 500,000 and 1.5 million inhabitants; and large metropolitan areas, with a population of 1.5 million or more inhabitants.

The functional urban areas of Bologna and Milan were the case studies for the analysis. Although they share some common characteristics—being metropolitan areas in Northern Italy with relatively generous and structured welfare systems and important migration hubs belonging to the same “metropolitan” model of socioeconomic integration (Ambrosini 2013)—their diversity, in terms of size, morphology, urban history, and position in national and international urban hierarchies, makes them heterogeneous cases. In this sense, this comparison aims to explore whether there is similarity or diversity in ethnic residential segregation trends in two different Italian metropolitan areas.

Milan and Bologna are both important destinations of the international migration flows in Italy that began in the 1990s and are now stable throughout the country, as demonstrated by the data on naturalisations and immigrant presence in the labour market. The incidence of foreign residents in the total population is 12.6% in the FUA of Milan and 12.4% in the FUA of Bologna, while the national average is 8.7%. Among the foreign resident population, in Bologna, the most numerous nationalities come from Romania (20,239), Morocco (7468), Pakistan (6982), Ukraine (6007), Albania (5966), Bangladesh (5822), Philippines (5685), China (5586), Moldova (5035), and Tunisia (2382), while in Milan, the



most represented nationalities are from Romania (81,949), Egypt (76,570), China (49,036), Philippines (48,054), Peru (36,680), Albania (35,763), Morocco (32,818), Ukraine (30,365), Ecuador (25,174), and Sri Lanka (25,055). In both metropolitan areas, there are more than 155 nationalities, indicating a great heterogeneity of migratory profiles and flows.

In both cases, no direct de/segregation urban policies can be identified, and settlement patterns are mainly influenced by three factors: the integration into the local metropolitan economy, public housing policies characterised by tenure conversion for the middle class, and the concentration of migrants in some public-housing sectors. These dynamics, combined with the broader processes of gentrification, touristification, and studentification, have produced a greater social mix in peripheral areas and peri- and suburbanisation phenomena, particularly for households wishing to access property, with marked ethnic differentiation due to divergent purchasing behaviours (Costarelli 2023).

In terms of the spatial distribution of the foreign population, the two cities exhibit some common and some dissimilar patterns. Several studies have revealed the phenomena of micro-segregation and interstices in both cities, i.e., forms of territorial concentration of foreigners visible on a very fine scale (Bergamaschi 2012; Costarelli and Mugnano 2017). In addition, the relevance of public housing in shaping the spatial distribution of the migrant population on the city territory has been highlighted in both cases (Bergamaschi and Maggio 2020; Costarelli 2023). Nevertheless, peripheralisation processes at the municipal scale were identified in both cities, affecting the migrant population as a whole, albeit with some differences between the two cities (Bergamaschi et al. 2021; Costarelli and Mugnano 2017). Consistent with the urban-planning history and social morphology of the urban fabric, Bologna shows a clear north–south demarcation where, traditionally, more popular neighbourhoods are concentrated in the north, while Milan shows a more evident centre–periphery pattern. In this context, recent studies have also analysed the growing importance of the metropolitan dimension in the residential distribution patterns of the foreign population in both cities (Guerzoni 2018; Daconto and Montesano 2022). For this reason, our contribution aims to go further by adopting a comparative perspective on the dynamics of ethnic residential segregation in the FUAs of Bologna and Milan.

### 5.3. Methods

To analyse the evolution of residential segregation, several indices have been devised to detect different dimensions of segregation (Massey and Denton 1988).

Firstly, the dissimilarity index can detect the evenness or uniformity of group distribution within the units of analysis. In particular, both the two-group, which considers the segregation of one population with respect to another, and the multigroup, which simultaneously analyses the segregation of several groups, dissimilarity indexes were calculated. As anticipated, the indices were created using, as units of analysis, the census sections of the FUAs of Milan and Bologna for the 3 census rounds (2001, 2011, and 2021), taking into consideration 3 populations (residents with Italian citizenship, with EU citizenship, or with non-EU citizenship).

Secondly, the location quotient (Benassi et al. 2022) was considered, i.e., a local segregation index that measures the group concentration in a given territorial unit with respect to the average incidence of the same group as a whole and that allowed us to identify and represent the units where there is an over- or underrepresentation of the group. The location quotient was calculated for the resident population with foreign citizenship only and referred to the core and commuting areas in the years 2001, 2011, and 2021 to test the peripheralisation hypothesis.

Finally, to understand the evolution of foreigners' residential patterns between 2011 and 2021, we also calculated the variation in the density distribution of foreign residents using the Kernel Density Estimation (KDE) and Map Algebra GIS tools. The KDE is considered a local index of segregation, which makes it possible to identify areas of concentration of population groups and to overcome certain analytic limitations based on polygonal census sections. The analysis is based on the points (centroids) of the sections

and is therefore not influenced by the shapes of the spatial units. The KDE also allows the influence of proximity between spatial units to be considered, since high/low values in spatial units within the threshold produce corresponding high/low KDE values. Finally, the KDE allows for an easier analysis of changes over time, as density values are associated with a continuous grid of cells of the same size and position over the different periods. In particular, the weighted KDE was calculated by counting the number of residents with foreign nationality for the years 2011 and 2021. Then, using the Map Algebra tool, the KDE raster of 2021 was subtracted from that of 2011 to obtain the change in density.

## 6. Results

In Table 1, it is possible to observe the variation in the segregation indices at the FUA-, core-, and commuting-area levels.

**Table 1.** The evolution of dissimilarity indices in the core and commuting areas in Bologna and Milan FUAs. Source: authors' elaboration on ISTAT data (2001–2021).

Spatial Units	2001	2011	2021	Var. 01-21	Var. 11-21
FUA (Milan)					
Multigroup D index	0.45	0.38	0.38	−0.07	−0.01
Two-group D index					
UE–Extra UE	0.49	0.42	0.40	−0.09	−0.02
UE–Italian	0.43	0.34	0.36	−0.08	0.02
Extra UE–Italian	0.49	0.45	0.40	−0.09	−0.04
Core areas (Milan)					
Multigroup D index	0.4	0.38	0.38	−0.02	0.00
Two-group D index					
UE–Extra UE	0.46	0.39	0.39	−0.07	0.00
UE–Italian	0.41	0.33	0.34	−0.07	0.01
Extra UE–Italian	0.43	0.41	0.40	−0.03	−0.01
Commuting areas (Milan)					
Multigroup D index	0.41	0.36	0.35	−0.06	−0.01
Two-group D index					
UE–Extra UE	0.48	0.36	0.34	−0.14	−0.02
UE–Italian	0.43	0.34	0.37	−0.06	0.03
Extra UE–Italian	0.45	0.41	0.37	−0.08	−0.04
FUA (Bologna)					
Multigroup D index	0.41	0.33	0.32	−0.09	−0.01
Two-group D index					
UE–Extra UE	0.50	0.35	0.32	−0.19	−0.04
UE–Italian	0.44	0.29	0.32	−0.12	0.02
Extra UE–Italian	0.44	0.40	0.34	−0.10	−0.06
Core areas (Bologna)					
Multigroup D index	0.39	0.3	0.3	−0.09	0.00
Two-group D index					
UE–Extra UE	0.48	0.33	0.3	−0.18	−0.03
UE–Italian	0.42	0.28	0.32	−0.10	0.04
Extra UE–Italian	0.41	0.36	0.31	−0.10	−0.05
Commuting areas (Bologna)					
Multigroup D index	0.45	0.35	0.32	−0.13	−0.03
Two-group D index					
UE–Extra UE	0.57	0.39	0.33	−0.24	−0.06
UE–Italian	0.49	0.32	0.33	−0.16	0.01
Extra UE–Italian	0.49	0.43	0.35	−0.14	−0.08

At the FUA level, the multigroup dissimilarity index shows low values in both metropolitan areas, with a slight downward trend, especially between 2001 and 2021. Indeed, between 2011 and 2021, the situation remains almost unchanged. At the core area level in the case of Milan, the decrease is even smaller, while in Bologna, the decrease is the same as in the FUA, with a (slight) decrease, especially between 2001 and 2021. In Milan,

no deviation emerges even if the commuting areas are taken into consideration, but in Bologna, it is in these areas that a greater, albeit slight, decrease is found.

The analysis of the two-group dissimilarity index allows additional elements to be highlighted. First of all, residential segregation is greater among the foreign population of non-European nationality at the metropolitan-area level, especially in Milan. Also, in this case, there is a decrease in the DI two-group values over time. Moreover, segregation is relatively higher in the core areas of Milan, even though the commuting areas were the most segregated at the beginning of the period. In Bologna, on the other hand, there are no significant differences between cores and commuting areas. In general, the analysis indicates that, in the 2001–2021 time span, the residential distribution of foreigners changed slightly, especially in the first decade, with a more widespread orientation over the territory, as shown by the reductions in dissimilarity indices.

Subsequently, to analyse residential segregation, we considered the change in the location quotient of the foreign resident population in the same reference years (2011–2021) for the FUA census sections of Bologna and Milan. When distinguishing between urban cores and commuting areas, some trends are evident (Table 2).

**Table 2.** The evolution of the location quotient in the cores and commuting areas in Bologna and Milan FUAs. Source: authors' elaboration on ISTAT data (2001–2021).

FUA	Year	Spatial Units	Census Sections LQ > 2	Census Sections Total	% LQ > 2
Milan	2021	Core areas	1412	7086	19.93
		Commuting areas	977	11,395	8.57
	2011	Core areas	1505	7078	21.26
		Commuting areas	1064	11,358	9.37
	2001	Core areas	2094	7084	29.56
		Commuting areas	867	10,675	8.12
Bologna	2021	Core areas	282	1936	14.57
		Commuting areas	112	1651	6.78
	2011	Core areas	282	1929	14.62
		Commuting areas	150	1637	9.16
	2001	Core areas	286	1885	15.17
		Commuting areas	867	10,675	8.12

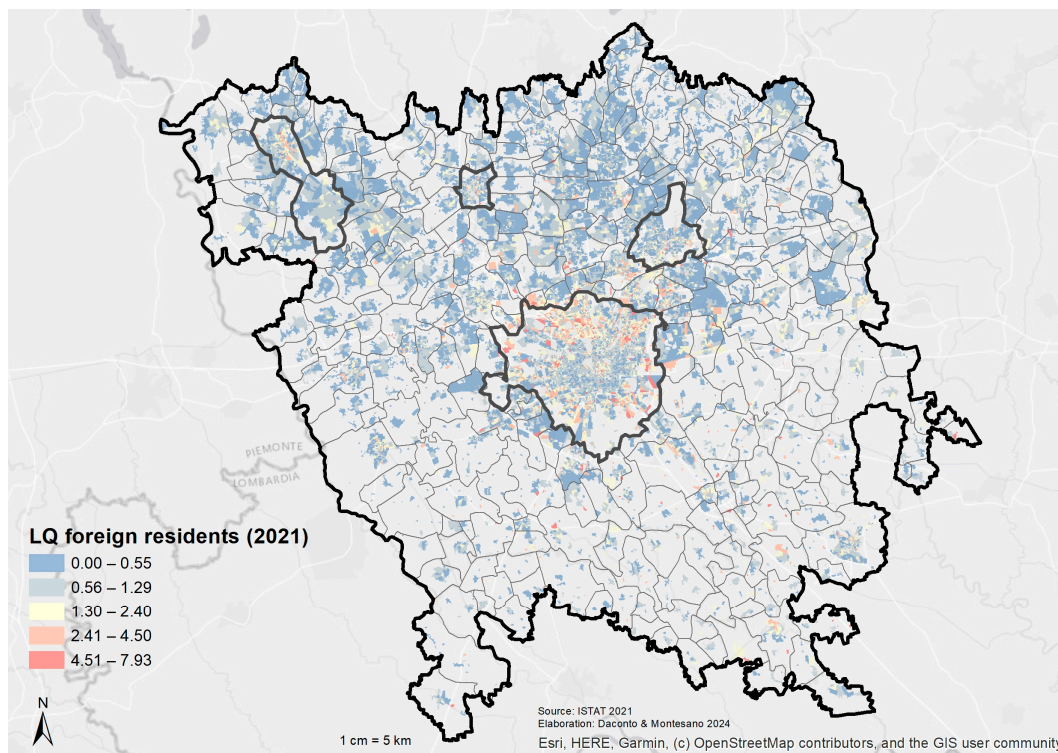
In both cases and types of area, there is at least double the share of sections with an overrepresentation of the foreign resident population. In 2021, the percentage in Bologna is higher in the core area (14.57%) than in the commuting area (6.78%), as well as in Milan (19.93% and 8.57%, respectively).

Looking at the change in values over time, in Bologna, there is a stronger decrease in census sections, with QL values above 2, especially in the commuting areas. On the other hand, in Milan, the decrease affects the cores, while in the commuting areas, the situation remains almost unchanged.

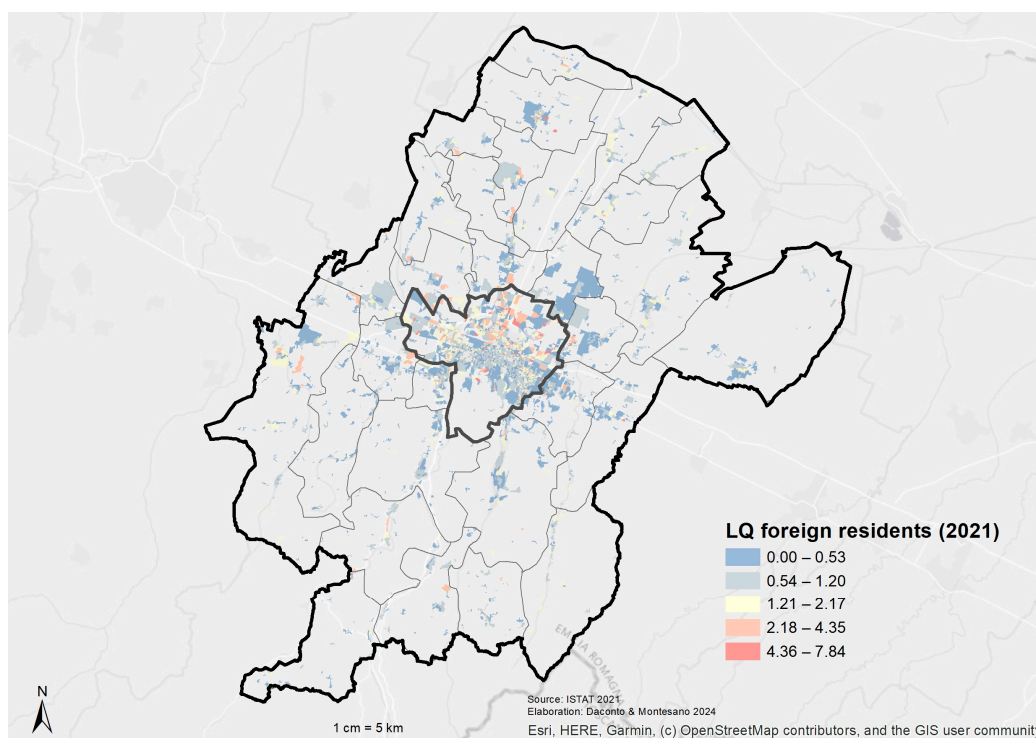
The cartographic representation of the location quotient makes it possible to identify areas characterised by under- or overrepresentation of the foreign resident population. As seen in Figure 1, the sections in Milan with the highest LQ are found in the peripheral areas of the metropolitan area's core and in the belt municipalities in the FUA of Milan. Other areas of overrepresentation are found in more peripheral areas of the metropolitan area.

In Bologna (Figure 2), the sections with the highest LQ values are found in the northern area of the core and other municipalities of the FUA, in particular, the municipalities along the borders of the central municipality, with a distribution that seems to follow the mobility axes of commuting flows. Other areas of concentration are distributed in the unions of the small municipalities of Reno Galliera and Terre di Pianura in the northern part of the Bologna FUA.





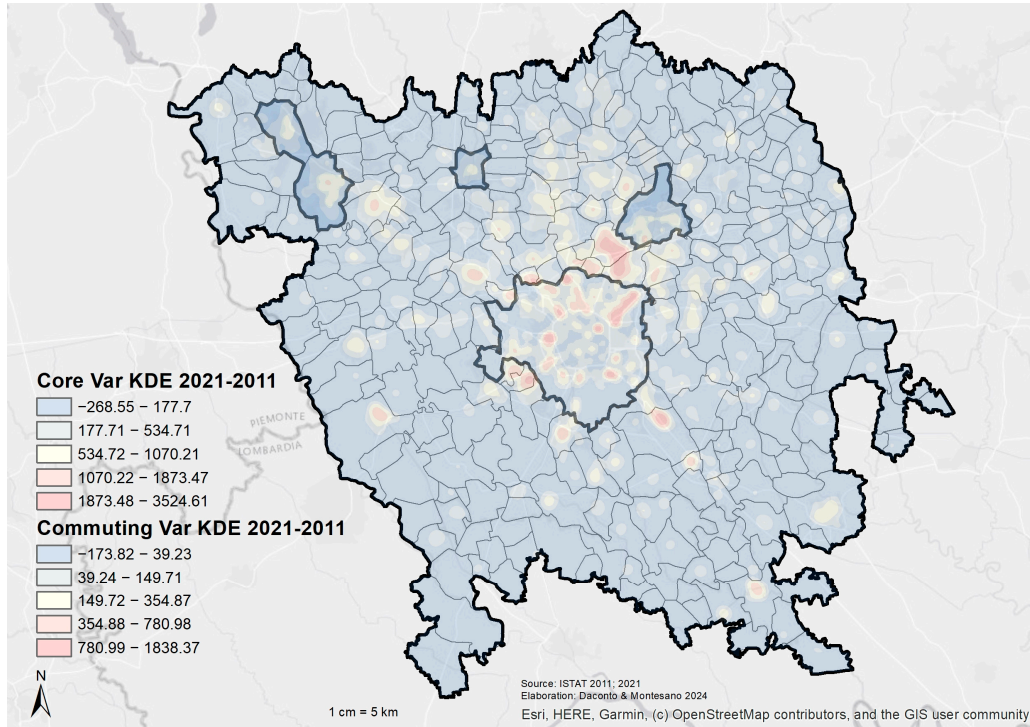
**Figure 1.** The location quotient of foreign residents in Milan in 2021. Source: authors’ elaboration on ISTAT data (2021).



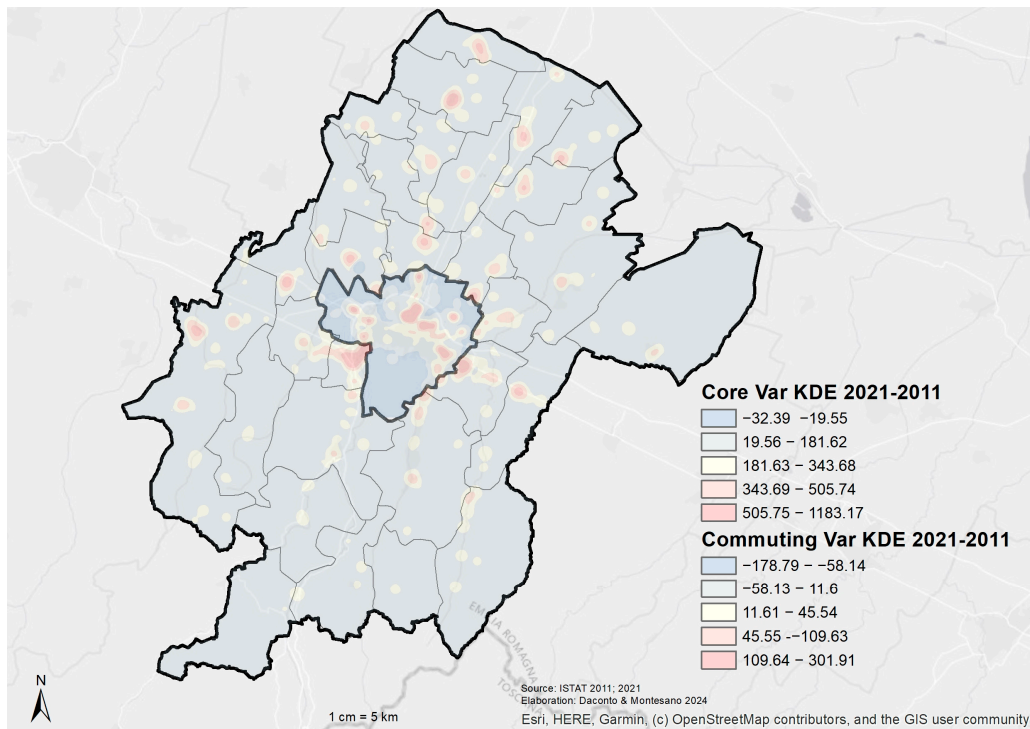
**Figure 2.** The location quotient of foreign residents in Bologna in 2021. Source: authors’ elaboration on ISTAT data (2021).

The characteristics of the residential settlement pattern of the foreign resident population in the metropolitan areas of Milan and Bologna are even more evident when analysing the variation in the density of foreign residents between 2011 and 2021 (Figures 3 and 4).

In short, concentrations in core areas—with different demarcations (concentric in Milan and north/south in Bologna)—have persisted and strengthened over time. This trend is also accompanied by an increase in the foreign population in the commuting areas, where concentrations also emerge.



**Figure 3.** Change in foreign resident population density in Milan between 2011 and 2021. Source: authors' elaboration on ISTAT data (2011–2021).



**Figure 4.** Change in foreign resident population density in Bologna between 2011 and 2021. Source: authors' elaboration on ISTAT data (2011–2021).

## 7. Discussion and Conclusions

The analysis presented here indicates that, over the last twenty years (2001–2021), the levels of segregation, according to the indices used, have slightly decreased for the EU and non-EU foreign population in both Milan and Bologna FUAs. As the trend of de-segregation is observed in the two different cases, the results confirm the specificity of the Northern Italian metropolitan model found in previous studies (Pratschke and Benassi 2024; Guerzoni 2018). Within this desegregation framework, our analysis shows some significant differences that have occurred over the time period considered (2011–2021). Different areas of concentration have emerged in the two cities, particularly in commuting areas, although the central municipalities remain an important attractive force in the settlement processes of the foreign population. Nevertheless, considering the importance of the housing system in shaping the distribution of social groups in the urban space, it is necessary to consider further studies on additional segregation mechanisms that will allow us to understand the specific residential patterns of the foreign population on different scales. By adopting the territorialist perspective emphasising the specificities of territories, several investigations have illustrated the roles of public housing and the public-housing privatisation process in determining micro-segregation mechanisms in the cases of both Bologna and Milan (Bergamaschi and Maggio 2020; Costarelli 2023). Moreover, many surveys have shown that the foreign population is characterised by poor housing conditions (housing deprivation, overcrowding, higher rents, limited ownership rates, etc.) (Cafora et al. 2023). Thus, it can be argued that the “de-segregative” trend (understood as the reduction in segregation indices) and the increasing spread in the metropolitan area are associated with the marginality of foreigners relative to housing tenure and quality; dispersion may be accompanied by a downward rather than an upward movement in the housing and residential trajectory of the foreign population. From this point of view, the category of urban diaspora serves to explain the segregation dynamics that characterise the foreign population in these two Italian contexts.

This paper has several limitations, primarily related to the selection of two very different cases and of very small spatial units, such as census sections, which hinder the generalisation of results. From this perspective, further research is desirable to interpret the relationship between the dispersion trends described in this paper and the dynamics of micro-segregation and housing marginality to test the urban diaspora hypothesis at the metropolitan scale in an Italian context. The spatial analysis can instead be deepened by considering the socioeconomic status of resident populations, in addition to nationality, to verify the intersectionality of the ethnic and socioeconomic dimensions in residential segregation. Finally, further research must focus on factors related to the housing market, urban policies, residential paths, preferences, etc., to explain the spatial dynamics of ethnic residential segregation.

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