DISENTANGLING RESIDENTIAL GEOGRAPHIES OF SELECTED FOREIGN POPULATION GROUPS IN A CONTEXT OF LOW IMMIGRATION[1]

Federico Benassi, Alessio Buonomo, Rosaria Simone, Salvatore Strozza

Abstract. Foreign presence is an intrinsically spatial phenomenon, characterized by strong geographical variability across different territorial contexts. This variability becomes progressively more intense as we move down the territorial scale of analysis. This contribution proposes an empirical evaluation of the residential geographies of EU foreign citizens and non-EU foreign citizens residing in the Metropolitan City of Naples (Campania, Southern Italy), a context characterized by a low level of immigration. The empirical analysis uses data from the 2021 permanent demographic census and is carried out using census tracts as the primary statistical units and an *ad hoc* geographical framework ('quartieri' for the municipality of Naples and municipalities for the rest of the Metropolitan City of Naples). The residential geographies of foreign groups are summarized using the dissimilarity index of Duncan and Duncan in the adjusted version proposed by Mazza and Punzo. This index informs us about the level of evenness between the spatial distribution of foreigners compared to that of Italians (who act as the reference group). The adjusted version of the index allows us to control for some biases that normally arise in cases with a low number of foreigners. The geographical distribution of the bias-corrected index for the two foreign population groups is represented by thematic maps. Then, its level of spatial autocorrelation (global and local) is analyzed. The results allow us to appreciate the spatial variability of the foreign population residing in the Metropolitan City of Naples and to provide initial insights into their spatial patterns using a multiscale geographical approach, which serves as a first step toward a better understanding of their residential behaviours.

1. Introduction

The foreign population in Italy has surged in recent decades, jumping from just over a million residents in 2001 to now, 2024 January the 1st, over 5.3 million, comprising 8.8% of total population. Their settlement patterns vary widely, reflecting different adaptation strategies ranging from concentrated to dispersed models (Strozza, 2006). These settlement choices are influenced by various factors, including community ties and labor specialization (Ferrara *et al.*, 2010; Conti *et al.* 2023). The study of settlement patterns of different foreign communities residing in Italy is particularly relevant as it

[1] The authors contributed equally to the conception and realization of the contribution.

provides essential elements for understanding the characteristics of foreign presence in different local and regional contexts, especially in metropolitan areas where spatial inequalities, including residential segregation, are more frequent (Benassi *et al.*, 2023a). The spatial polarization of the foreign population is an issue that is still particularly evident in Italy. The last data provided by Istat certify that in the North reside slightly less than 59% (3,1 million) of the total foreign population while the South count only the 16.9% (897 thousand) of them. The spatial distribution is even more unequal if bear in mind that the 14 Italian Metropolitan Cities[2] host the 37.4% of the total foreign population resident in Italy with the seven Metropolitan Cities of the Centre-North that, alone, host slightly less than 1/3 of the total foreign population resident in Italy. This framework is not new, as shown in previous studies on the subject (Strozza *et al*., 2016).

The paper represents a first attempt to disentangle the residential geographies of selected foreign groups (EU and non-EU foreign citizens) resident in the Metropolitan Cities of Naples (MCN hereafter). Studies on the geographical distribution of foreign population in Italy and its level of residential segregation are numerous (Benassi *et al.*, 2022; Bitonti *et al.* 2023a, 2023b; Conti *et al.*, 2023; Pratschke and Benassi, 2024; Rimoldi *et al.*, 2024) including contributions specifically referred to Southern urban contexts (Benassi *et al.*, 2023b; Busetta *et al.*, 2015; Mazza *et al.*, 2018; Mazza and Punzo, 2016). Nevertheless, to the best of our knowledge, this is the first contribution that use data coming from the permanent Census (2021) and that focussing on a single Metropolitan City of South Italy combine a multiscale approach of analysis using an *ad hoc* geographical partition that include both sub municipal (s.c. 'quartieri') and municipal territorial units and implementing both global and local indexes (Brown and Chung, 2006).

The paper is structured as follows: the next section presents the materials and methods, followed by the results in section 3, and finally, discussions and conclusions are provided in section 4.

2. Geographical contexts of analysis, data and methods

2.1. The geographical context of analysis

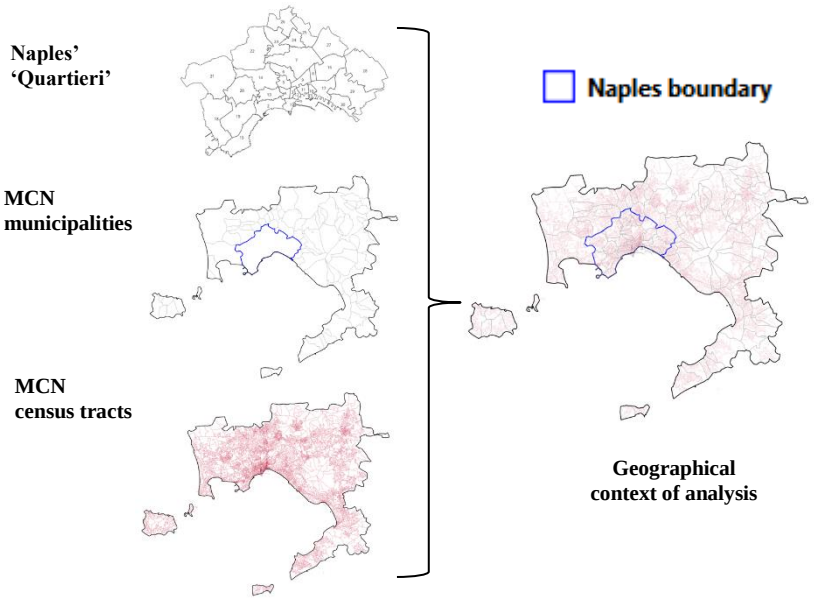
The idea of focusing on the MCN arises from the necessity of limiting the empirical analysis to the urban contexts of the Campania region. Moreover, the relevance of Italian Metropolitan Cities as pole of attraction for international migrations flows is known and underlined in a recent contribution of Buonomo and

[2] These are represented by the province of Milan, Turin, Venice, Genoa, Bologna for the North; Florence and Rome for the Centre; Naples, Bari, Reggio di Calabria, Palermo, Catania, Messina and Cagliari for the South. Please note that Cagliari is the only case in which the Metropolitan City is different from the province.

colleagues (Buonomo *et al.*, 2024). Using MCN assures an adequate minimum number of foreign resident population, and it allows us to better analyse processes (like residential segregation) that should be considered as purely 'urban' (Feitosa *et al.*, 2007).

Basically (Figure 1) we built an *ad hoc* geographical context: the 30 districts ('quartieri') of Naples plus the rest of the municipalities that for the MCN (91) for a total of 121 territorial units (e.g. statistical cases). For each of the 121 territorial units the elementary territorial units are represented by the census tracts (as at 2011).

Figure 1 – *The geographical context of analysis (an* ad hoc *construction).*



Considering the municipality of Naples according to its division into districts (i.e. 'quartieri') allows us to appreciate the internal heterogeneities within the capital city of the MCN, which, as evident, are not few and can significantly contribute to a better interpretation, also in this explorative phase, of the residential geographies of foreign population groups and their possible drivers. About the choices of 'quartieri' as sub municipality units of analysis it is important to provide some other details.
For Naples, 'quartieri' are not proper administrative units, yet these sub-municipalities represent, to a certain extent, the social history of the municipality and they contribute differently to its economic and social dynamics. Moreover, they guarantee a balanced distribution in terms of resident population. In 2021 the resident population in the municipality of Naples was 921,142 with a minimum population resident in the *Porto* district (4,469 residents) and a maximum population resident in

Fuorigrotta district (63,049 residents). For an ovierview on the geographies of the 'quartieri' see the Appendix.

2.2. Data and methods

Data used are from the permanent census (2021) and they refer to resident population (stock) by country of citizenship. In order to have a sufficient number of individuals in each territorial unit (30 districts and 91 municipalities) but also considering the inner heterogeneity inside the foreign population we used two sub population groups: EU foreign citizens and non-EU foreign citizens. Of course, a certain degree of inner heterogeneity remains, but this way to classify the foreign population is quite common in studies on settlement models and residential segregation (Benassi *et al.*, 2020a, Malmberg *et al.*, 2018). In Table 1 are shown the population groups used in the analysis as of 2021.

Table 1 – *Resident population by groups of citizenship and territorial units. MCN, end of 2021 (permanent census).*

Territorial units	EU-foreign	Non-EU foreign	Italians	Total
Naples municipality	4,753	48,687	867,702	921,142
Rest of the MC	11,980	55,887	1,999,367	2,067,234
Total	**16,733**	**104,574**	**2,867,069**	**2,988,376**

The residential geographies of foreign populations are here analysed in terms of evenness (using the Italian population as reference group). Evenness is the first dimension of the Massey and Denton's (1988) conceptual model of residential segregation. Evenness concerns with the differential distribution of foreigners (or, more generally, social groups) in the area units. More specifically, evenness measures of segregation compare the spatial distributions of different groups among units. When majority and minority populations are evenly distributed, segregation is smallest. There are many different evenness measures of segregation, for an overview we remind to the existing literature (Fossett, 2017; Reardon and O'Sullivan, 2004; Tivadar, 2019). The most widely used is the dissimilarity index (*ID*), firstly proposed by Ducan and Duncan (1955a, 1955b) which is calculated according to the formula:

$$ID = \frac{1}{2}\sum_{i=1}^{n}\left|\frac{z_i}{Z} - \frac{y_i}{Y}\right| \quad (1)$$

where *i* is used to identify each of the *n* territorial units (in our case enumeration areas of each single 'quartieri' for the municipality of Naples and of each single

municipality for the rest of the MCN), while z_i and y_i are the total of the foreign group (EU or non-EU) and Italians, respectively, in the *i-th* territorial unit, and *Z* and *Y* are the overall total number of residents of the two groups, respectively.

ID measures the percentage of a group's population that would have to change residence to have the same percentage of that group as the city overall. The index ranges from 0 (absence of segregation) to 1 (complete segregation).

ID is widely known and widespread measures in study on the residential geographies and residential segregation of migrants (Friedman, 2008; Iceland *et al.*, 2013, 2014; Logan and Parman 2017; Malmberg *et al.*, 2018). Despite its widespread adoption, the index also presents some limitations and weakness that have been addressed by many scholars (Morrill, 1991; White, 1983, 1986; Wong, 1993; Reardon and O'Sullivan, 2004; Yao *et al*., 2019).

As clearly explained in Busetta *et al.* (2015), a problem with the Duncan and Duncan's dissimilarity index is that it appears to be an upward biased estimator of systematic dissimilarity. Within plausible assumptions, Allen *et al.* (2009) demonstrate, using Monte Carlo simulations, that random allocation generates substantial unevenness, and hence an upward bias, especially when dealing with: small units sizes, a small minority proportion and a low level of segregation. These are three aspects that potentially characterized the MCN and that cannot be ignored in measuring the residential geographies of the selected foreign groups.

To partially mitigate these problems proper to the *ID*, we resort to the *ID* bias-corrected estimator introduced by Mazza and Punzo (2015), which outperforms many other resampling based bias corrections in terms of both bias and mean square errors[3].

A second aim of the study was to measure the level of global and local spatial autocorrelation of the bias-corrected *ID* for the two foreign populations here observed. Spatial autocorrelation can be detected using the global Moran's *I* (Moran, 1948) to determine whether the bias-corrected ID is similar in spatially adjacent territorial units. In its global form, Moran's *I* computes a unique value for the MCN and is calculated as follows:

$$I = \frac{n \sum_{i=1}^{n} \sum_{j=1}^{n} w_{ij}(x_i - \bar{x})(x_j - \bar{x})}{\sum_{i=1}^{n} \sum_{j=1}^{n} w_{ij} \sum_{i=1}^{n} (x_i - \bar{x})^2} \quad (2)$$

where x_i is bias-corrected *ID* in the territorial units *i*, *n* is the number of territorial units (121 in our case), w_{ij} denotes the elements in the spatial weight matrix, and $\bar{x}$ denotes the average bias-corrected *ID*. Global Moran's *I* ranges within the interval [-1,1]. Values greater than 0 correspond to positive spatial autocorrelation, and

[3] The analysis has been carried out also using the classic version of the ID. Results are available from the Authors upon reasonable request.

values smaller than 0 indicate negative spatial autocorrelation. We tested different spatial weight matrices and chose first-order queen (i.e. two territorial units are neighbors if they share a boundary and/or a geographical vertex). The clusters of bias-corrected *ID* were identified using the local version of the univariate Moran's *I* as proposed in Anselin (1995). The univariate local Moran's *I* (i.e., I_i) for the *i-th* territorial unit is calculated as follows:

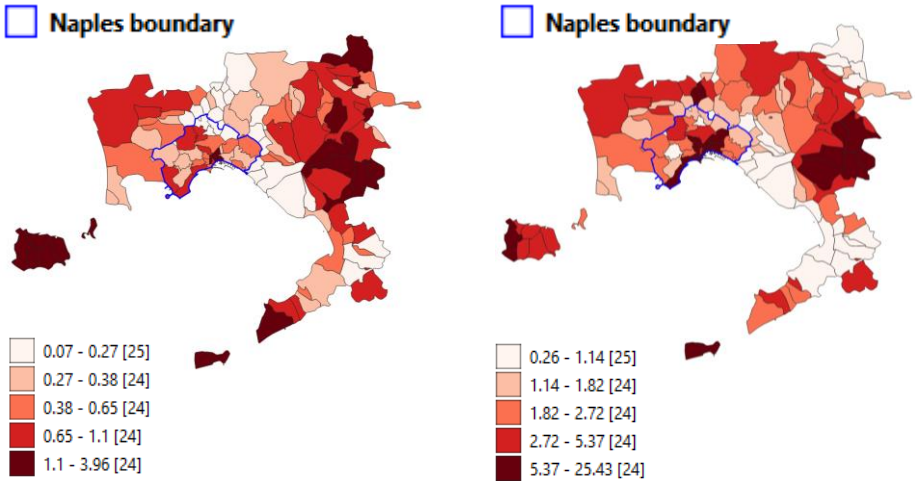
$$I_i = \frac{(x_i - \bar{x})}{\sum_{h=1}^{n}(x_h - \bar{x})^2/(n-1)} \sum_{\substack{j=1 \\ j \neq i}}^{n} w_{ij}(x_j - \bar{x}) \quad (3)$$

where x_i is the bias-corrected ID for the *i-th* territorial unit and x_j's are the bias-corrected ID values in adjacent areas.

3. Results

The geographical distribution of the two populations groups is quite variable underlying different spatial patterns. For a sake of brevity, we report here only the distribution of the ratio between foreign population (EU and Non-EU foreign citizens) and Italians (Figure 1).

Figure 1 – *Ratio between foreign population and Italians. EU foreigners (left panel), Non-EU foreigners (right panel). Percentage values.*



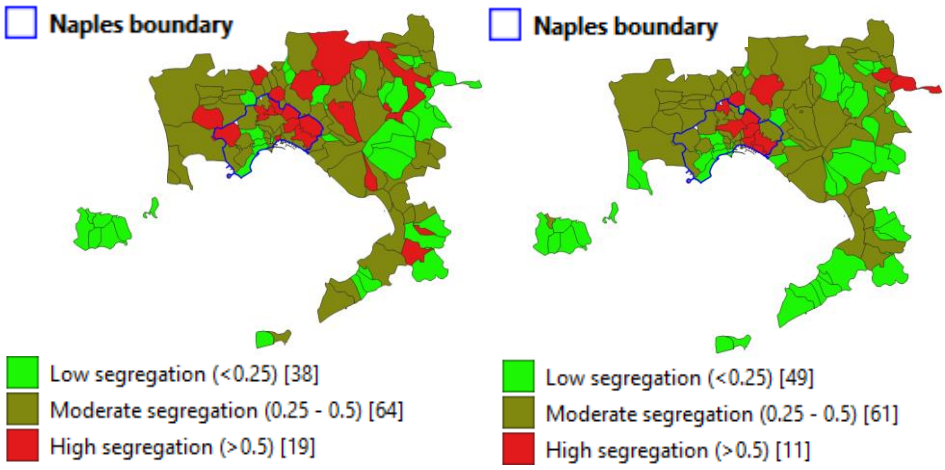
For the non-EU foreign population, the highest values of the indicator are recorded in some districts of the municipality of Naples: *Zona Industriale* (25.4%),

Mercato (24.2%), *San Lorenzo* (22.6%) and *Stella* (21.8%), but also in two neighbour municipalities located across the eastern quadrant of the MCN area, Palma Campania (19.6%) and San Giuseppe Vesuviano (19.4%). The EU-foreign population records the higher values of the indicator outside the Municipality of Naples in some specific municipalities that in some cases are very famous touristic destinations and place with a high level of amenity - Procida (3.9%) and Serrata Fontana (2.3%) – or in more marginal area, located on across the eastern quadrant of the MCN – Poggiomarino (3.3%) and Liveri (2.9%). The district of Naples with the highest level of the indicator is, for this population, *Pendino* that is actually quite far compared to the other contexts (1.6%).

The level of dissimilarity is not particularly high for both populations (0.34 and 0.32 are the average values of bias-corrected ID for EU foreign and non-EU foreign citizens respectively) with a certain degree of spatial variability. The territorial units with high level of dissimilarity (>0.5) are more numerous in the case of EU foreign population (19) compared to non-EU Foreign population (11). Another element of distinction is that in the first case the 47.3% of the territorial units with an ID >0.5 is included in the municipality of Naples. A percentage that in the case of non-EU foreign population rise to 63.6% (Figure 2).

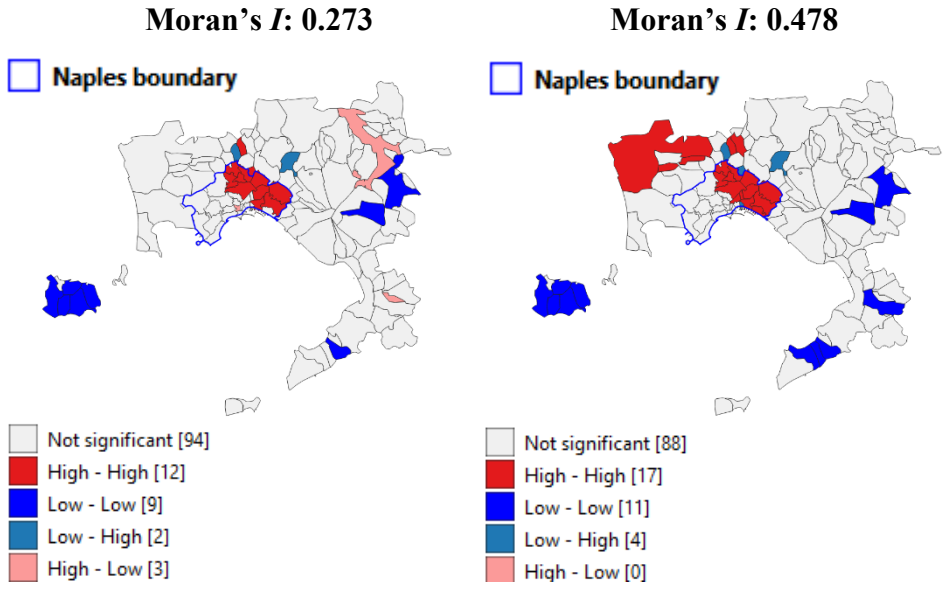
The highest level of residential segregation is recorded, in the case of EU foreign population, in Pimonte (0.82) a quite small municipality of about 6 thousand residents while in the case of non-EU foreigners the highest level of bias-corrected *ID* is the one recorded in Scampia (0.70) in the norther part of the municipality of Naples.

Figure 2 – *Bias-corrected ID, thematic maps. EU foreign population (left panel), non-EU foreign population (right panel).*



The level of global clustering is higher for the bias-corrected *ID* of non-EU foreign population (0.478 versus 0.273) (Figure 3). At the local level it is quite interesting to note that the HH (high-high) clusters inside the municipality of Naples are the same for both foreign populations but in the case of non-EU foreign population there is a further area located on the west upper quadrant of the MCN formed by the municipalities of Giuliano in Campania and Villaricca. What emerges therefore seems to indicate rather contained levels of dissimilarity but with areas where the levels are quite high, tending to cluster particularly within the municipality of Naples where, moreover, the presence of non-EU foreigners is larger than in the rest of the MCN compared to Eu foreigners (46.5% versus 28.4%).

Figure 3 – *Univariate global and local Moran's I. EU foreign population (left panel), non-EU foreign population (right panel).*



p-value ≤ 0.05, Queen contiguity matrix of 1st order

4. Discussion and conclusions

The topic of settlement geographies of the immigrant foreign population and its level of segregation is of primary interest in order to assess the level of integration and social cohesion of the host contexts (Bolt et al., 2010).

In the past, the levels of residential segregation of immigrant foreigners were quite low in Southern Europe compared to those in Central and Northern Europe (Malheiros, 2002). However, some more recent studies, using 2011 census data, have shown how things have changed, both as a result of the 2008 economic crisis and the increasing weight of the foreign population residing in contexts traditionally areas of emigration (Benassi et al., 2020a, 2020b).

This contribution, exploratory and descriptive in nature, fits into this line of study by proposing an analysis of the level of dissimilarity in the distribution of foreigners (both EU and non-EU foreign citizens) residing in the MCN compared to Italians.

The results obtained using a custom-built geography, a robust index, and based on the 2021 permanent census data, have shown that the average level of dissimilarity is quite low (<0.5) for both foreign populations, with a slight advantage for the non-EU population which, however, shows higher levels of clustering of the indicator both globally and locally. Another interesting difference between the settlement geographies of the two populations, compared to those of Italians, is that in the case of the non-EU foreign population, the areas with higher levels of segregation are mostly located within the municipal perimeter, where their concentration is also higher.

The results represent a first step towards further investigations that should concern the estimation of the determinants of dissimilarity levels through appropriate regression models capable of controlling the level of ID autocorrelation and possibly providing local estimates.

Appendix

The "Quartieri" of Naples municipality

Acknowledgements

Contribution conceived and realized as part of the PRIN 2022-PNRR research project "Foreign population and territory: integration processes, demographic imbalances, challenges and opportunities for the social and economic sustainability of the different local contexts (For.Pop.Ter)" [P2022WNLM7]. Funded by European Union – Next Generation EU, component M4C2, Investment 1.1.

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Federico BENASSI, Università di Napoli Federico II, federico.benassi@unina.it
Alessio BUONOMO, Università di Napoli Federico II, alessio.buonomo@unina.it
Rosaria SIMONE, Università di Napoli Federico II, rosaria.simone@unina.it
Salvatore STROZZA, Università di Napoli Federico II, strozza@unina.it