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Drawing a Long Shadow: Analyzing Spatial Segregation of Afghan Immigrants in Tehran

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Abstract: Although recent dramatic political changes in Afghanistan have brought that country to global attention, migration from Afghanistan to Iran has a long history. Nearly three quarters of Afghan immigrants in Iran are located in cities, particularly in Tehran's metropolitan area. However, despite the long-term presence of Afghan immigrants in Iran, research on patterns and drivers of spatial segregation of immigrants has been very limited. The research method involves a secondary analysis of census data. Therefore, this article utilizes 2006 Iran census tract data to examine patterns of spatial segregation of Afghan immigrants in the Tehran metropolis. The required data for two-group segregation indices, Getis–Ord statistics, and Geographically Weighted Regression, were analyzed as a map using ArcMap and Geo-Segregation Analyzer. The results reveal that the spatial segregation of Afghans is high and that most live in lower-SES census tracts. Multivariable analyses indicate that the extent of segregation can be explained by education, job class, and generation status. It can be concluded that generational transition and access to human capital have reduced various indicators of spatial segregation of Afghan immigrants in Tehran.

Keywords: spatial segregation; generational status; integration; human capital; Afghan immigrants; geographically weighted regression; Getis–Ord statistics; Tehran

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1. Introduction

The majority of population growth in the 20th century occurred in cities, making urban expansion a global phenomenon (Rabiei-Dastjerdi et al. 2023). Today, various aspects of human behavior in different urban neighborhoods and contexts are being studied (Matthews 2008; Rajabi et al. 2024). In all cities, specific neighborhoods can be found where particular groups of individuals or immigrants are concentrated and areas experiencing severe poverty. Conversely, there are also neighborhoods where high-income residents reside (Moya-Gómez et al. 2021). In other words, urban communities are not homogenous, resulting from a process involving infrastructures and amenities that cater to specific social groups such as immigrants and minorities (Rasse 2019). Therefore, segregation patterns reveal not only differences between separate spaces but also indicators of inequality.

Spatial segregation refers to the relative distribution of different groups about one another. Despite the presence of inequality in cities, segregation is not necessarily unfavorable. However, it becomes problematic when individuals become increasingly isolated from one another based on factors such as immigrant status, wealth, and occupation, leading to exclusion and feelings of discrimination. This issue is particularly prevalent when distinct spatial boundaries are established in cities (van Ham et al. 2016). Spatial segregation ultimately results in social segregation in such circumstances (Firman 2004; Yao et al. 2019).

Therefore, the residential segregation of a particular ethnic group or any subgroup within the population, defined by social, cultural, religious, or other criteria, signifies a spatial distribution that differs from the rest of the population (Benassi et al. 2020).

The study of migration volume and cross-border population movements has become increasingly significant as migration rates have risen rapidly over the past half-century. As a phenomenon, migration has played a fundamental role in reshaping urban spaces (Portes 2000). Immigrants play a crucial role in the dynamism, shaping, and configuration of socio-spatial structures in modern urban and metropolitan contexts and in their influence on urban population structures (Benassi et al. 2022b). The spatial distribution of migration occurs not only based on varying population levels but also in conjunction with the distribution of settlements in proportion to their population. Migration patterns can take on diverse spatial forms in different time periods depending on the circumstances of the time and place. Irregular migration patterns and their concentration in specific settlements have resulted in distinct spatial arrangements compared to other areas (Benassi et al. 2023).

International immigrants come from countries with diverse traditions, religions, and political institutions, bringing a wide range of backgrounds when they enter their destination country. These immigrants speak different languages and have distinct cultural practices and physical differences, such as varying skin tones and appearances. Many immigrant groups are concentrated in specific occupations, often with low social status, and live marginalized lives in low-income regions. Immigrants are often portrayed as having alien status or are seen as non-citizens.

The segregation of international immigrants is a social issue that impacts individuals, households, communities, and cities (Tammaru et al. 2016), especially when involuntary. Immigrants and their families often have limited choices and tend to settle in areas with affordable and accessible housing. This form of spatial segregation is typically associated with poverty and inequality (van Ham et al. 2016). Therefore, immigrants are one of the primary groups affected by segregation, whether by choice or circumstance (Benassi et al. 2022a).

Therefore, forming specific immigrant communities is one of the most common segregation patterns in urban spaces. These communities, which emerge due to segregation, become hubs for creating, developing, and perpetuating a distinct culture and way of life. Both segregation and the culture of the segregated group heavily influence them. Immigrants who face obstacles such as acceptance by the host community, religious disparities, and language barriers are often the most vulnerable social group in modern urban settings (Martín-Legendre et al. 2021).

Crises in neighboring countries and the Middle East/Persian Gulf region have significantly influenced Iran. These include Iraq's invasion of Kuwait in 1989–1990, the U.S. invasion and subsequent occupation of Iraq in the early 2000s, the Soviet–Russian occupation of Afghanistan during the 1980s, and the Taliban's rise, fall, and resurgence over the last two decades. Periodic instability in Afghanistan has triggered multiple waves of Afghan migration into Iran. These events have profoundly affected Iran's urbanization dynamics, impacting the socio-spatial patterns within its cities (Rabiei-Dastjerdi 2023).

Over the past four decades, Iran has become a significant destination for forced migration from neighboring countries to its west and east, particularly Afghanistan. According to the 2016 census, there were 1,654,388 foreign nationals in Iran, with 96% being Afghans (Statistical Center of Iran 2016). Since the Taliban's rise to power in 2021 and the resulting new wave of migration, this number has now exceeded five million (Zandi-Navgran et al. 2023).

The UNHCR reported that by the end of 2020, the majority of Afghan refugees, 85 percent, were located in neighboring countries such as Iran and Pakistan. Germany ranked third with approximately 148,000 Afghan refugees, making up around 5.5 percent of the total (Rahimitabar et al. 2023). Austria, France, and Sweden are also significant destinations for Afghan refugees in Europe.

The distribution of Afghans across Iran's provinces, as shown in the 2016 census, reveals that Tehran is a primary hub, with approximately one third (32%) of Afghans residing there. As the capital and a major metropolis, Tehran plays a crucial role in the

national system. Its continuous development has led to imbalances within this system (Rabiei-Dastjerdi and Kazemi 2016). Consequently, Tehran significantly influences the socioeconomic situation of the country and remains a primary center of population attraction, particularly for Afghan immigrants.

Afghans in Iran have access to different rights and services depending on their residency status (Amayesh card holder, passport/visa holder, undocumented). In 2022, out of the 4.2 million Afghan immigrants living in Iran, 24 percent were registered with Amayesh cards; 18 percent had short-term passports; 3 percent held long-term residence permits, and 55 percent lived in the country without any legal documentation (Sadeghi 2022).

Due to the limitations and challenges immigrants face when fully adapting to their new society, unique social networks develop distinct qualities in social interactions. This can result in a diverse mix of cultures, languages, and backgrounds while also causing service disruptions, increased demands for housing and employment, heightened class divisions, and social tensions in cities. This situation presents both opportunities and threats for immigrants. Socioeconomic and cultural differences may marginalize immigrant minorities and reinforce a sense of exclusion from the new society, further isolating them. Therefore, it is essential to examine the spatial patterns of immigrant concentrations, as an overconcentration of immigrants in specific areas indicates a lack of social integration in the host country. Understanding the spatial manifestation of these processes provides valuable insights into the mechanisms at play (Benassi et al. 2022a; Pratschke and Benassi 2024). Thus, measuring and modeling spatial inequality better allows us to understand the main mechanisms or driving factors in the spatial patterns of immigrants (Kim 2008; Shorrocks and Wan 2005; Benassi et al. 2023). Although we may have some understanding of who the marginalized and underserved populations are, as well as their numbers, identifying "where" spatial inequality exists requires mapping and disaggregation. Without this, generating hypotheses about the underlying processes becomes difficult. In the same way, it is crucial to measure and map various aspects of segregation across different levels of integration (Rabiei-Dastjerdi and Matthews 2021; Gupta et al. 2024).

Despite the long-standing presence of Afghan immigrants in Iran, research on the social aspects of their integration remains limited (Rabiei-Dastjerdi 2023; Zandi-Navgran et al. 2024; Fattahzadeh et al. 2024; Sohrabi et al. 2022; Abbasi Shavazi and Sadeghi 2015; Songori et al. 2014), as well as the spatial and residential segregation of immigrants. This study aims to address three main questions: (1) What is the spatial distribution of Afghan immigrants in Iran? (2) To what extent are Afghan immigrants segregated in Tehran? (3) What spatial segregation patterns are based on generational, educational, and occupational groups?

2. Theoretical Background

The concept of segregation encompasses a range of theoretical approaches. The Chicago School was the first serious trend related to spatial–physical segregation (Fainstein 2005; Van Kempen and Murietheе 2009). According to the Chicago School, spatial segregation is an ecological process that involves the voluntary or forced separation of social groups or classes at different stages of life (Jalilisadrabad et al. 2018). Based on the fundamental principles of the ecological model, cultural and social cohesion drive residential movements (Bernt and Volkmann 2023). A key theory suggests that new immigrants, for various reasons, prefer to live in neighborhoods dominated by their ethnic group, forming strong local social networks known as ethnic enclaves (Fong and Chan 2010).

Marxists perceive urban segregation as a consequence of capitalist production and the unequal distribution of urban resources (Kaplan et al. 2004). The Neo-Marxist approach regards spatial segregation as reflecting social classes and the economic structure, emphasizing power. They believe that justice in cities can only be achieved through the fair distribution of resources (Harvey 2009). Neoclassical economic models were initially criticized for their strong focus on economic factors alone. To address this, behavioral and life-cycle models were introduced in the 1970s and 1980s, offering a more nuanced understanding of how households make decisions. A household's characteristics and

changes throughout its life cycle became central to these models (Haandrikman et al. 2023). It was assumed that households adjust their housing needs according to their life stage (single, families with or without children, elderly households) by modifying their living conditions to suit their evolving needs (Van Ham 2012).

The behavioral approach to segregation focuses on the behaviors of social groups as they choose their place of residence. This includes personal preferences, the labor market, land, and real estate markets, as well as government and investment policies. Segregation can be based on personal preferences, as people prefer neighbors similar to themselves (Schelling 1971; Feitosa 2010). For instance, research shows that unemployed individuals living with other unemployed people are less likely to feel bad (Goyal and Ghiglino 2010).

The labor market approach reveals that the labor market, with its social and economic impacts such as deprivation and social inequality, contributes to segregation and creates unsafe living conditions for low-income families (Gerometta et al. 2005). The government and investment policies approach emphasizes how government actions can lead to segregation and perpetuate it through unequal capital distribution, extensive public housing projects, and regulatory tools like exclusive zoning (Anderson 1999; Glynn 2010; Massey and Denton 2001).

In the social approach, the influence of social status and social class on ethnic and racial segregation and the process of choosing neighborhoods is analyzed. There are two hypotheses regarding this approach: the first is the attraction hypothesis, which states that as socioeconomic status rises, the spatial integration of minorities into the majority group also increases. The second hypothesis, the social distance hypothesis, suggests that physical distance in an urban space is directly related to the social distance of ethnic groups. This means that the segregation of ethnic groups is due to their social distance rather than their different socioeconomic status. The social network theory in this approach emphasizes that individuals are not isolated but are connected through social networks across different geographical locations (Ryan 2009). The migration network can be defined as a combination of interpersonal relationships where immigrants interact with their families and friends (Haug 2009). These networks are crucial in understanding migration patterns, settlement, employment, and connections with their home country (Ryan 2002).

According to the spatial integration theory, immigrants typically begin their employment in a new country by moving to neighborhoods where people of their ethnicity reside. However, as time passes, many relocate to residences and communities that better suit their preferences, resources, and requirements. The theory assumes that the preferences of immigrant minorities for settling in neighborhoods with nearby peers depend on their level of social integration into the new society and the degree of discrimination they experience. New immigrants and less-integrated minority groups often require greater support from ethnic networks in their area, which influences their housing choices. Conversely, residents of segregated areas, who establish a stronger foothold in the new country over time, may shift their preferences towards moving away from these areas. The spatial integration theory is based on a series of assumptions. Firstly, it is assumed that new and less-integrated immigrants prefer to settle in neighborhoods where people of the same ethnicities reside. Secondly, as immigrants' financial situations improve over time, they integrate into the host country, leading them to adopt the norms and core values of the native population. Thirdly, changes in integration are believed to influence their preferences for residing in segregated areas. Lastly, these evolving preferences are expected to result in residential mobility away from ethnically diverse communities. Furthermore, their housing preferences may influence the spatial clustering of immigrants. Numerous studies indicate that immigrants prefer renting compared to natives, which limits their housing and neighborhood options (Andersen 2010; Khosravi Kazazi et al. 2022; Rabiei-Dastjerdi 2019).

Spatial segregation can result from various economic, social, cultural, political, and urban management forces. As a result, different theories regarding spatial segregation exist, with each theory and approach focusing on a specific factor. These theories can help explain the spatial segregation of Afghan immigrants in Iran because each focuses on different

factors that may play a role in creating the residential patterns of these immigrants. For example, spatial integration theory suggests that Afghan immigrants may prefer to settle in neighborhoods with a large Afghan presence due to their need for social support from ethnic networks. The Marxist and Neo-Marxist approaches examine the role of economic inequalities and the unfair distribution of urban resources that can create segregated areas for immigrants. Labor market theory also shows that the limited access of Afghan immigrants to suitable job opportunities leads them to live in low-income neighborhoods. Finally, combining these theories can provide a more comprehensive understanding of the complex dynamics of the spatial segregation of Afghan immigrants in Iran.

3. Materials and Methods

3.1. Data

This study utilizes data from the 2006 census of Tehran at the census tract level. The census recorded 90,057 Afghan immigrants. The detailed demographic information, including the gender distribution of Afghan immigrants, provides a nuanced understanding of the city's population. According to the 2006 census, Tehran comprises 22 urban districts (Figure 1a) and 4334 census tracts (Figure 1b). The most significant feature of the city is the north–south spatial inequality. The north of Tehran, at the foot of the Alborz Mountain range, enjoys better economic and social conditions, where the wealthy reside. In contrast, the southern part faces challenges, such as high population density, poverty, low access to urban facilities and services, and environmental pollution.

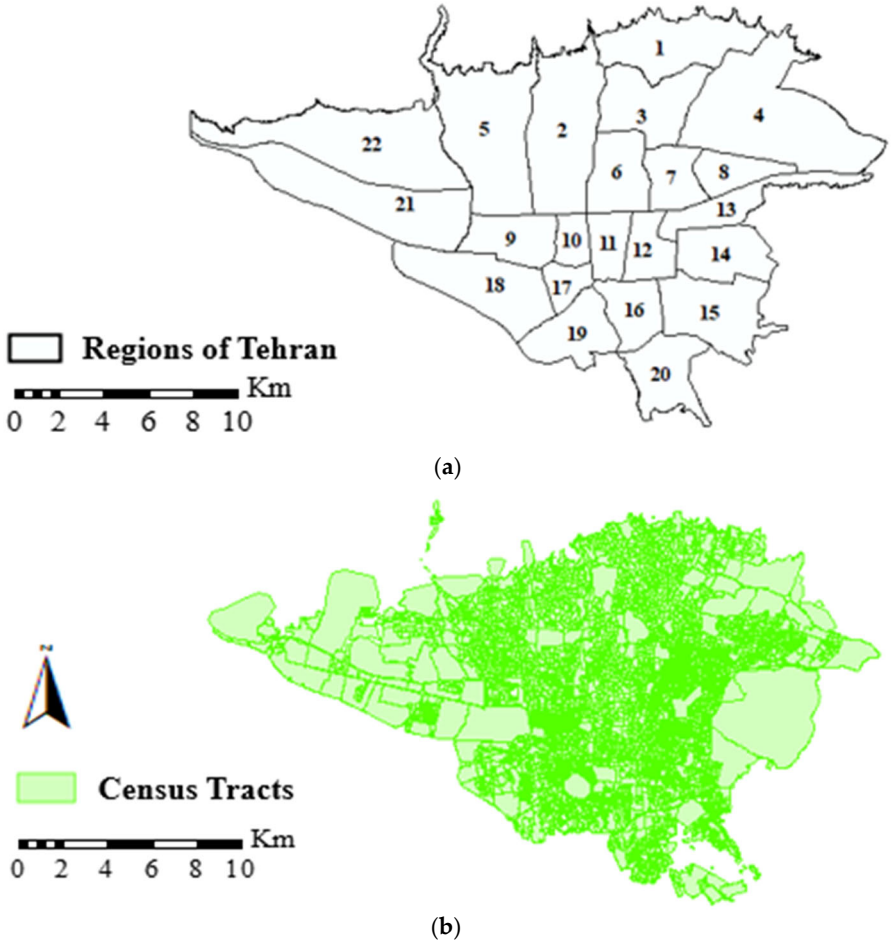


Figure 1. (**a**) Map of regions of Tehran city, 2006. (**b**) Map of census tracts in Tehran city, 2006.

3.2. Methodology

The research method of this study is a secondary analysis of census data at the census tract level. It includes four sections:

1. Descriptive section: This section uses a map to illustrate the spatial distribution of Afghan immigrants and reveal their residential distribution patterns.

2. Utilizing the Hot Spot Analysis (Getis–Ord statistics): The Hot Spot Analysis has been used to identify the areas with the highest spatial concentration of various variables. This analysis evaluates each individual within the context of their neighbors (Fischer and Getis 2009). While it may be intriguing and significant if an individual has high values, they alone may not constitute a statistically significant hot spot. For an individual to be categorized as a hot spot and statistically significant, they and their neighboring individuals must display high values. A positive Z-score indicates that the higher the score, the more clustered the high values are, forming a hot spot. Conversely, a negative Z-score suggests that the lower the Z-score, the more clustered the low values are, indicating cold spots (Getis and Ord 1992). Where x_i is the attribute value for feature j, w_{ij} is the spatial weight between feature i and j, and n is equal to the total number of features.

$$G_i^* = \frac{\sum_{j=1}^{i} w_{i,j}x_j - \overline{X}\sum_{j=1}^{n} w_{i,j}}{S\sqrt{\frac{\left[n\sum_{j=1}^{n} w_{i,j}^2 - \left(\sum_{j=1}^{i} w_{i,j}\right)^2\right]}{n-1}}}$$

3. Applying Geographically Weighted Regression (GWR): This statistical method is crucial in the analysis as it considers spatial dependency and spatial heterogeneity in data. The rationale behind using spatial models and the GWR method is rooted in the first law of geography, which states that nearby things are more related than distant things (Brunsdon et al. 1998; Matthews and Yang 2012). The development of Geographical Information Systems (GIS) and the increased availability of georeferencing data have enabled us to explore spatially heterogeneous patterns of social phenomena. GWR allows for different relationships in various spaces based on multiple regression models using spatial weights. It provides location-based information that highlights spatial changes in the relationships between variables. Therefore, the maps generated from these analyses are crucial in describing and interpreting the spatial dynamics between the variables.

The general GWR equation is defined as:

$$y_i = \beta_0(u_i, v_i) + \beta_1(u_i, v_i)x_{1i} + \beta_2(u_i, v_i)x_{2i} + \ldots + \beta_k(u_i, v_i)x_{ki} + \epsilon_i$$

where:

y_i: The dependent variable at location i.

$\beta_0(u_i, v_i)$: The intercept for location (u_i, v_i).

$\beta_k(u_i, v_i)$: The coefficient for the k-th independent variable at location (u_i, v_i).

x_{ki}: The value of the k-th independent variable for observation i.

ϵ_i: The error term for observation i.

(u_i, v_i): The geographic coordinates (or other spatial variables) associated with observation i.

GWR constructs a separate equation for every spatial unit (i) of the area that is being studied, incorporating the dependent and explanatory variables. The weights for each observation are usually determined by a kernel function, which is often expressed as:

$$w_{ij} = \mathrm{K}\left(\frac{d_{ij}}{h}\right)$$

w_{ij}: The weight of observation j in the estimation for observation i.

d_{ij}: The distance between locations i and j.

h: The bandwidth parameter that controls the size of the neighborhood around observation *i*.

K: The kernel function.

In this article, the dependent variable (y) is the concentration of Afghan immigrants. The independent variables (x) are sex ratio, age structure (0–14, 15–64, and 65+), literacy rate, different levels of education (primary, lower and upper secondary, and tertiary), economic participation rate, employment rate, and job levels (low, middle, and high).

4. Calculating spatial segregation indices: Two-group segregation indices were used to measure the spatial segregation of immigrants. These metrics comprise indices for two groups within the studied area (Bruch 2014). Numerous indices have been employed in studying residential segregation and its effects. Among these, measures of evenness are the most commonly utilized in research. Evenness refers to how evenly subgroups within a population are spread across a particular geographic area. In contrast, exposure measures the likelihood of individuals from one group interacting with members of either their own group or other groups (Table 1). The "exposure index" is designed "to measure the experience of segregation as felt by the average minority or majority member" (Massey and Denton 1988).

Table 1. The formula of two-group segregation indices.

Indices	Formula
Segregation Index (*IS*)	$IS = \frac{1}{2}\sum_{i=1}^{n}\left\lvert\frac{x_i}{X} - \frac{t_i - x_i}{T - X}\right\rvert$
Isolation Index (*xPx*)	$xPx = \sum_{i=1}^{n}\left[\left(\frac{x_i}{X}\right)\left(\frac{x_i}{t_i}\right)\right]$
Absolute Concentration Index (*ACO*)	$ACO = 1 - \left\{\frac{\left[\sum_{i=1}^{n}\left(\frac{x_i A_i}{X}\right) - \sum_{i=1}^{n1}\left(\frac{t_i A_i}{T_1}\right)\right]}{\left[\sum_{i=n_2}^{n}\left(\frac{t_i A_i}{T_2}\right) - \sum_{i=1}^{n1}\left(\frac{t_i A_i}{T_1}\right)\right]}\right\}$
Absolute Clustering Index (*ACL*)	$ACL = \frac{\left\{\left[\sum_{i=1}^{n}\left(\frac{x_i}{X}\right)\sum_{j=1}^{n}\left(c_{ij}x_j\right)\right] - \left[\frac{X}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n}c_{ij}\right]\right\}}{\left\{\left[\sum_{i=1}^{n}\left(\frac{x_i}{X}\right)\sum_{j=1}^{n}\left(c_{ij}t_j\right)\right] - \left[\frac{X}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n}c_{ij}\right]\right\}}$
A_i	Area of spatial unit *i*.
A_j	Area of spatial unit *j*.
A	Area of metropolitan area.
c_{ij}	Cell value of the binary contiguity matrix: 1 where *i* and *j* are contiguous and 0 otherwise.
n	Number of spatial units in the metropolitan area.
n_1	Rank of spatial unit where the sum of all t_i equals X (from 1 to n_1).
n_2	Rank of spatial unit where the sum of all t_i equals X (from n to n_2).
T	Total population in the metropolitan area.
T_1	Sum of all t_i in spatial unit 1 to spatial unit n_1.
T_2	Sum of all t_i in spatial unit n_2 to spatial unit n.
t_i	Total population in spatial unit *i*.
t_j	Total population in spatial unit *j*.
X	Total population of group *X* in metropolitan area.
x_i	Total population of group *X* in spatial unit *i*.
x_j	Total population of group *X* in spatial unit *j*.

Table 2 illustrates the dimensions and indices of spatial segregation. The segregation index was used to measure evenness, the isolation index for exposure, the absolute concentration index for concentration, and the absolute clustering index for clustering, all to analyze the spatial segregation of immigrants.

Table 2. Dimensions and indices of spatial segregation used in this study.

Dimensions	Indices	Definition
Evenness	Segregation Index (*IS*)	Segregation is a widely used index in this field (Duncan and Duncan 1955). Its straightforward calculation and clear interpretation make it popular among sociologists and demographers, and this method has been utilized for many years. The value of this index ranges from 0 to 1, with 0 indicating a fair and unbiased distribution and 1 indicating complete segregation.
Exposition	Isolation Index (*xPx*)	This index measures the amount of space that minority group members exclusively allocate to their peers. It ranges from 0 to 1, with 0 indicating no exposure and 1 indicating high exposure. A higher value suggests greater segregation within the group based on ethnicity.
Concentration	Absolute Concentration Index (*ACO*)	This index is calculated by determining the total residential area occupied by a group and comparing it to the minimum and maximum possible areas that the group could occupy within the city. The value of this index ranges from 0 to 1, with 0 indicating the minimum concentration and 1 indicating the maximum concentration.
Clustering	Absolute Clustering Index (*ACL*)	This index measures the degree of clustering in an urban area. It was initially developed by establishing spherical and central coordinates for spatial units within urban areas and then defining a distance function between these areas. The value of the index ranges from 0 to 1, where 0 signifies no proximity and 1 signifies high proximity.

4. Result

4.1. The Spatial Distribution of Afghan Immigrants

The spatial distribution of Afghan immigrants within the city is heterogeneous. Afghans choose specific areas to reside in, resulting in notable segregation from the native population. Figure 2 shows that around 37% of Afghan immigrants reside in Districts 15 and 20. Following closely behind, Districts 17, 12, and 5 also have significant Afghan populations. In contrast, the majority of Iranians reside in Districts 4, 5, 2, and 15 of the city.

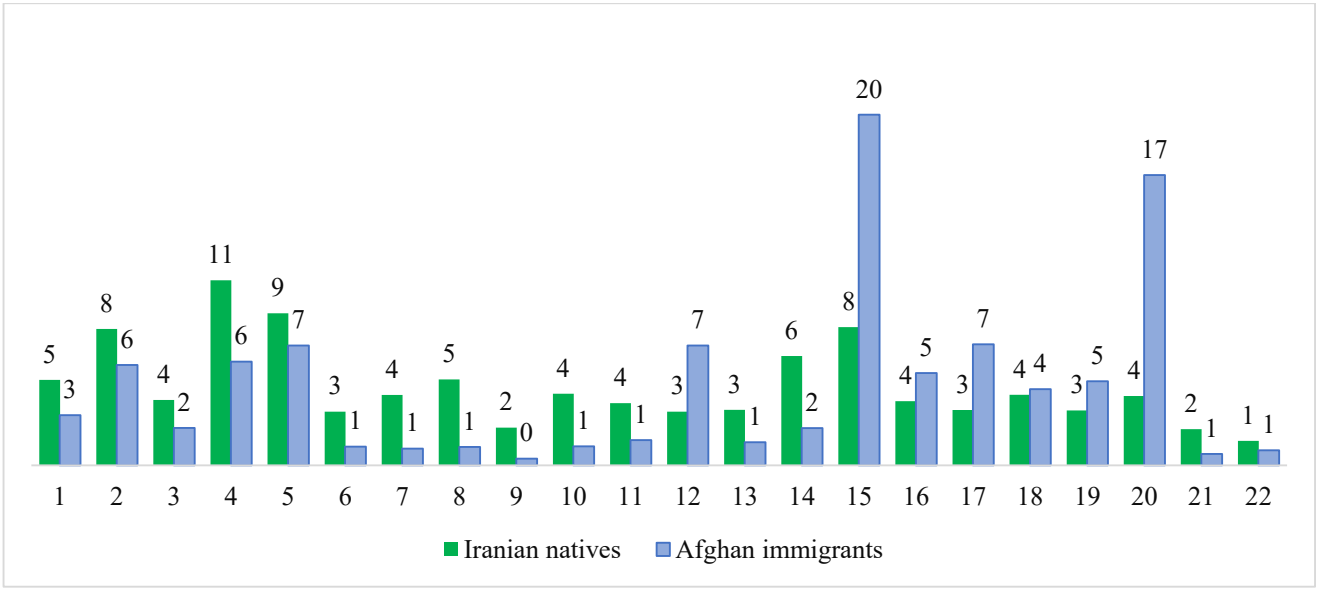


Figure 2. Distribution of Afghan immigrants and Iranian natives by 22 districts of Tehran, 2006 (%).

According to the 2006 census data, there were a total of 90,057 Afghan immigrants living in Tehran city. Among them, 62% were male and 38% were female. The average age of Afghan immigrants was 23.2 years, with 30% under the age of 15, 68% in the 15–64 age group, and 2% aged 65 and above. Regarding education, 40% were illiterate, 33% had lower secondary education, 24% had upper secondary education, and 3% had tertiary education. Of those aged ten and above, 55% were employed and 45% were non-employed. Regarding marital status, 52% were married, 44% were never-married, and 4% were divorced or widowed. Additionally, 65% of Afghan immigrants were first-generation immigrants, while 35% were second-generation immigrants (see Table A1 in Appendix A).

Figure 3 illustrates the spatial distribution of Afghan immigrants based on various variables at the census tract level in Tehran. The highest number of Afghan immigrants is located in the southern part of the city. The spatial distribution pattern of first- and second-generation Afghan immigrants in Tehran is clustered. The southern areas of the city have underdeveloped socioeconomic structures and urban infrastructure. Due to the deteriorating fabric of these areas, it is easier for individuals to form kinship networks, live in clusters, and avoid paying upfront housing costs.

The spatial distribution of first- and second-generation immigrants across Tehran indicates notable differences in their residential areas. While first-generation Afghan immigrants are more prevalent in the northern and southern parts of Tehran, they are dispersed across all geographical levels of the census tracts. One significant reason for the presence of first-generation Afghans in affluent areas in the north of Tehran (Districts 1, 2, 3, and 5) is employment opportunities as custodians and guards in exchange for housing. In contrast, most second-generation Afghan immigrants reside in the central and western parts of Tehran, where social and economic conditions are more favorable. (See Figure 3a,b).

Afghan immigrants in Tehran have an unusual gender composition, with a sex ratio above 110. It seems that job opportunities for Afghan immigrants in Iran are gender-based, as most positions are more easily accessible to men. Additionally, the spatial distribution map indicates that the majority of Afghan immigrants aged 0–14 are concentrated in the southern districts of Tehran, particularly in Districts 15, 16, 17, 18, 19, and 20. However, the age group 0–14 makes up less than 15% of the Afghan immigrant population in the central areas (Figure 3c). More than 70 percent of the Afghan immigrant population in Tehran are between the ages of 15 and 64. The northern areas of Tehran, particularly Districts 1, 2, 3, 5, and 22, have a higher concentration of this age group compared to the southern areas. In most census tracts, Afghan immigrants aged 65 and above make up less than 4% of the population. However, the central parts of Tehran have the highest number of Afghan immigrants in this age group (Figure 3d,e).

Literacy and educational levels play a significant role in immigrant integration. Individuals with higher education are better equipped to adapt to diverse environments because they have more opportunities to secure jobs, internalize social values and norms during their education, and are more adept at problem-solving (Renee Reichl 2010; Shaykh-Baygloo and Soltani 2021). Among Afghan immigrants, the spatial distribution of literacy rates is less than 70% in most census tracts. Additionally, more than 20% of Afghan immigrants have only primary education in nearly all areas where they reside. Notably, Afghan immigrants with primary education are more prevalent in the northern part of Tehran compared to the southern part (Figure 3g).

According to Figure 3, in most areas where Afghan immigrants reside, less than 20% possess an upper secondary education. However, in some northern parts of Tehran, approximately 20–25% of immigrants have completed upper secondary education. Regarding spatial distribution, most immigrants with tertiary education are concentrated in the northern regions of Tehran. Those with tertiary education exhibit a clustered spatial pattern. As a result, immigrants tend to relocate as their educational level increases. For example, most Afghan immigrants with tertiary education reside in Districts 2, 3, and 6, which are considered developed and privileged (Figure 3j).

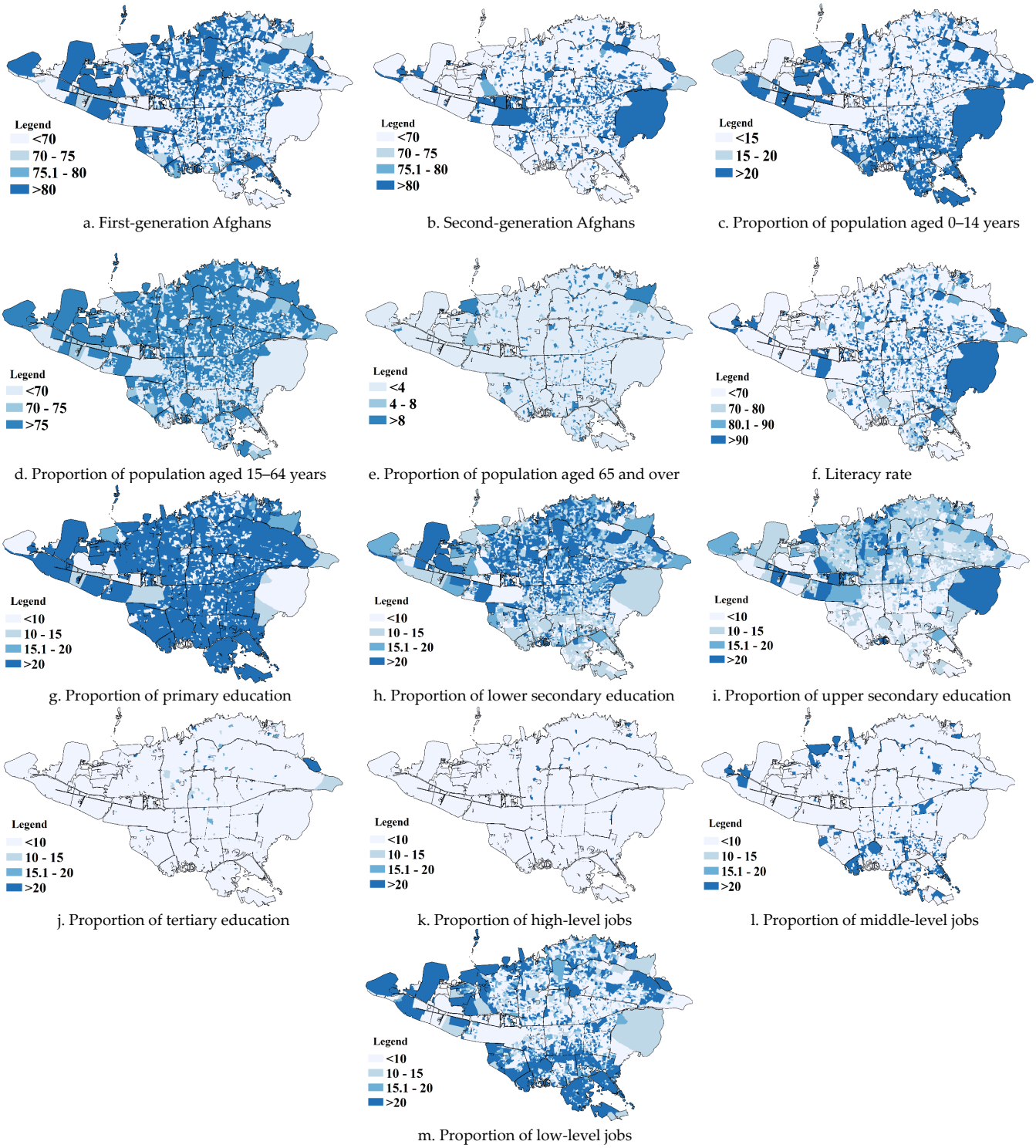


Figure 3. Spatial distribution of Afghan immigrants by selected variables in census tracts of Tehran, 2006.

There is a significant difference between Afghan immigrants and Iranians regarding the spatial distribution of high-status jobs, such as lawmakers, managers, and specialists. In most census tracts, less than 10% of Afghan immigrants hold high- or middle-status jobs, which include technicians, technical personnel, administrative workers, service workers, industrial employees, and military personnel. However, Afghan immigrants with middle-status jobs are more prevalent in the south of Tehran compared to those in other areas. The

distribution of individuals employed in low-status jobs, such as farmers and unskilled workers across Tehran, shows that more Afghan immigrants in the south and north of Tehran hold low-status jobs than in other areas. The spatial distribution pattern of Afghan immigrants working low-status occupations is also clustered (see Figure 3m). Afghan immigrants in northern Tehran are mainly employed as guards or custodians, while those in the northwest of Tehran work as construction workers due to ongoing construction projects in District 22. Additionally, many of them live in groups in unfinished buildings.

Higher economic participation rates, lower unemployment rates, and higher employment rates among Afghan immigrants in low-status jobs highlight the importance of livelihood strategies within this population. Afghan immigrants tend to hold low-status, unskilled jobs, with most working as laborers in occupations that do not require specialized skills. Furthermore, due to deteriorating infrastructure, weak social and economic foundations, declining environmental quality, low housing rents, wholesale markets, warehouses, some manufacturing facilities, and the preference of locals to live in more upscale areas, the southern part of Tehran has presented a unique opportunity for skilled and semi-skilled Afghan immigrants to settle.

4.2. The Hot Spot Analysis (Getis–Ord Statistics)

The Getis–Ord index reveals that the spatial distribution of Afghan immigrants across different areas of Tehran varies according to factors such as migration generation, age group, literacy level, and employment status.

Geographical hot and cold spots based on migration generation: In the southern parts of Tehran, first-generation Afghan immigrants are concentrated in hot spots, meaning there is a higher-than-average concentration of first-generation immigrants in these areas. In contrast, in the northern parts of the city, cold spots (lower-than-average values) have formed, indicating a negative spatial autocorrelation and fewer first-generation Afghan immigrants. Second-generation Afghan immigrants form hot spots in the central areas of Tehran, indicating a higher concentration of second-generation immigrants in these regions.

Age analysis and hot spots: In the southern areas of Tehran, Afghan immigrants aged 0–14 form hot spot clusters, showing a high number of Afghan children residing in these areas. Afghan immigrants aged 15–64, considered the active workforce, are concentrated in hot spots in the northern parts of the city. Older individuals (65 years and above) form hot spots in the central areas of Tehran.

Literacy analysis: Hot spots in terms of literacy are observed in the southern and certain northern parts of Tehran, indicating a higher-than-average literacy rate among Afghan immigrants in these regions. Conversely, central and southern areas of Tehran display cold spots, indicating lower literacy levels among Afghan immigrants in these areas.

Employment status analysis: Regarding high-status jobs, a small area in northern Tehran shows a hot spot, indicating relatively fewer Afghan immigrants in these jobs. For middle-status jobs, the southern parts of Tehran display hot spots, while the central and northern areas show cold spots, reflecting the concentration of middle-status jobs in the south and their scarcity in the center and north. For low-status jobs, hot spots are observed in both the northern and some southern parts of Tehran.

Hot spots in the southern areas suggest a high concentration of characteristics such as children, active workforce, and literate individuals. In contrast, cold spots in the northern and central areas indicate lower levels of these characteristics. Additionally, spatial disparities across Tehran regarding job opportunities for Afghan immigrants are evident, which could result from socio-economic factors and housing and employment policies in these regions (Figure 4).

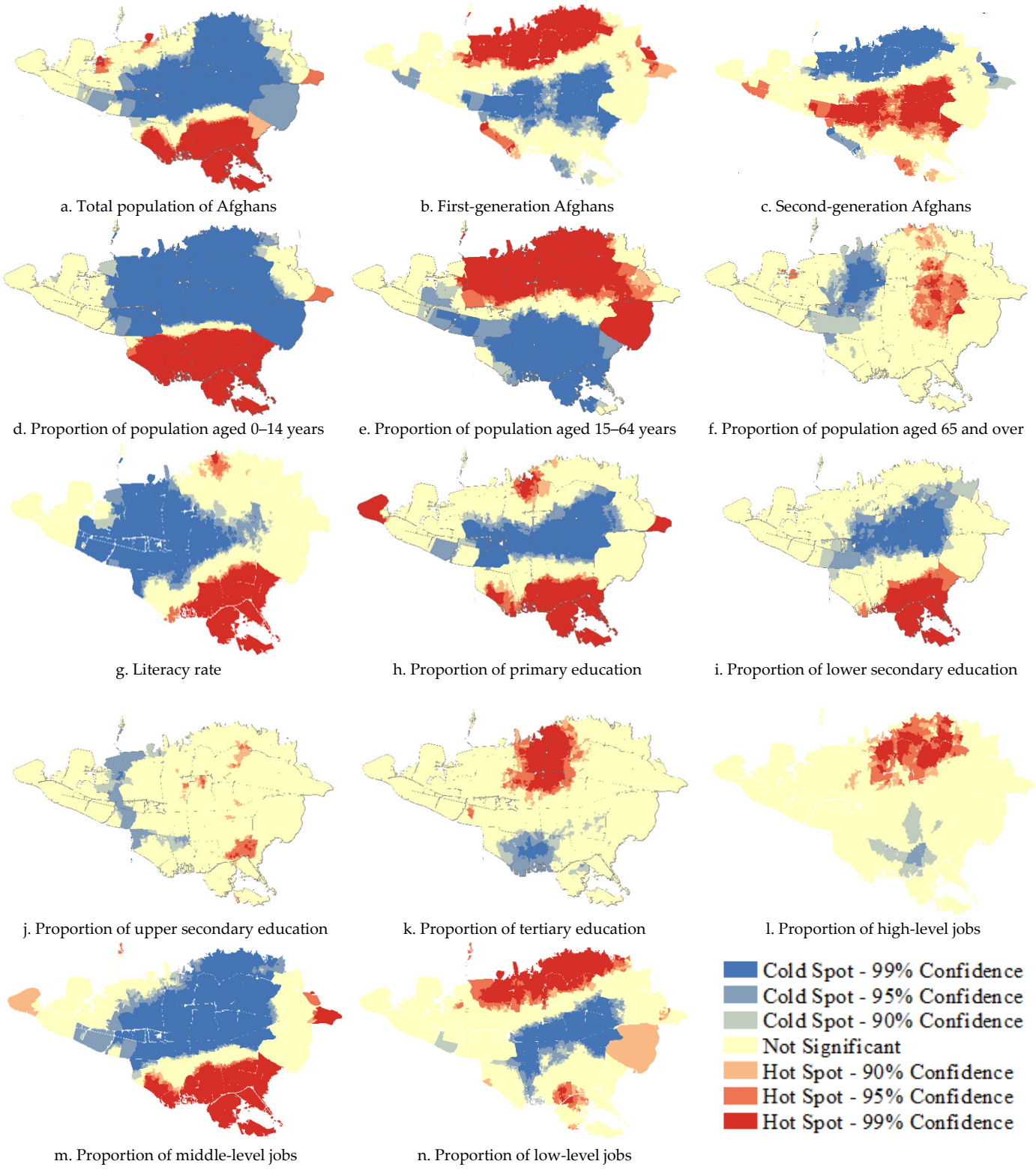


Figure 4. Getis–Ord statistics for Afghan immigrants by selected variables in census tracts of Tehran, 2006.

4.3. Geographically Weighted Regression Results

The Geographically Weighted Regression (GWR) method was used to analyze the impact of socio-demographic and economic variables on the concentration of Afghan immigrants. Initially, an Ordinary Least Squares (OLS) regression was performed. The

results of both regressions were compared to determine the most appropriate model. Table 3 illustrates that variables such as age structure (age groups 0–14, 15–64, and 65 and above), primary education, and lower secondary education have positive impacts. Conversely, the level of literacy, upper secondary and tertiary education, employment rates, and high-value jobs have negative and significant effects on the concentration of Afghan immigrants in Tehran. On the other hand, variables such as gender ratios, economic participation, and low- and middle-status jobs do not significantly influence the concentration of Afghan immigrants in Tehran. Based on the OLS regression, these variables account for 25% of the variance in the dependent variable. We excluded variables with a Variance Inflation Factor (VIF) exceeding 7.5 in the OLS regression for the GWR analysis. Specifically, sex ratio, economic participation, and low- and middle-status jobs were removed. Eliminating these variables led to a decrease in the GWR's Akaike Information Criterion (AIC), indicating improved efficiency and model implementation, making it suitable for use. According to the GWR findings, the independent variables explain 38% of the variance in the distribution of Afghan immigrants, which is higher than the OLS regression.

Table 3. GWR regression model of the effects of independent variables on the distribution of Afghan immigrants in Tehran.

Independent Variables		Coefficient	STD	t	*p*	VIF
Intercept		0.03	1.34	4.01	0.001	–
Sex ratio		0.10	0.07	1.33	0.175	10.7
Age structure	0–14	0.17	0.05	18.4	0.001	1.2
	15–64	0.23	0.04	10.9	0.001	4
	65+	0.32	0.09	3.24	0.001	1.1
Literacy rate		−0.35	0.03	−12.09	0.001	1.1
Education	Primary	0.68	0.06	24.5	0.001	1.3
	Lower secondary	0.19	0.09	12.7	0.001	2.1
	Upper secondary	−0.18	0.10	−7.41	0.001	1.1
	Tertiary	−0.25	0.11	−2.14	0.001	3.2
Economic participation rate		−0.12	0.13	−2.88	0.166	32.9
Employment rate		−0.21	0.12	−2.69	0.008	5
Job levels	Low	0.02	0.15	1.24	0.101	9.1
	Middle	0.16	0.08	1.54	0.071	12.1
	High	−0.19	0.12	−2.07	0.029	4.1
F				147.3		
Sig.				0.001		
R^2 (%)				25.4%		
Adjusted R^2 (%)				25.1%		
AIC				462.5		
After removing variables with high VIF (7.5+)				R^2 = 39% adj R^2 = 38% AICc = 438.9		

According to Figure 5, age groups, literacy rate, educational level, employment rate, and high-status jobs are more effective in explaining the variance of the spatial distribution of Afghans in Tehran city (39%). These independent variables explain the highest variance rate in the concentration of Afghan immigrants in the eastern areas (Districts 1, 4, 8, 13, 14, 15, and 20), central areas (District 9 and around Azadi Square), and a small part of the western region of Tehran (Chitgar). However, they exhibit the lowest variance rate in the northwestern areas (e.g., Districts 2, 5, 21, and 22). Such that the independent variables explain less than 38% of the spatial concentration of Afghan immigrants (dependent variable) in these areas.

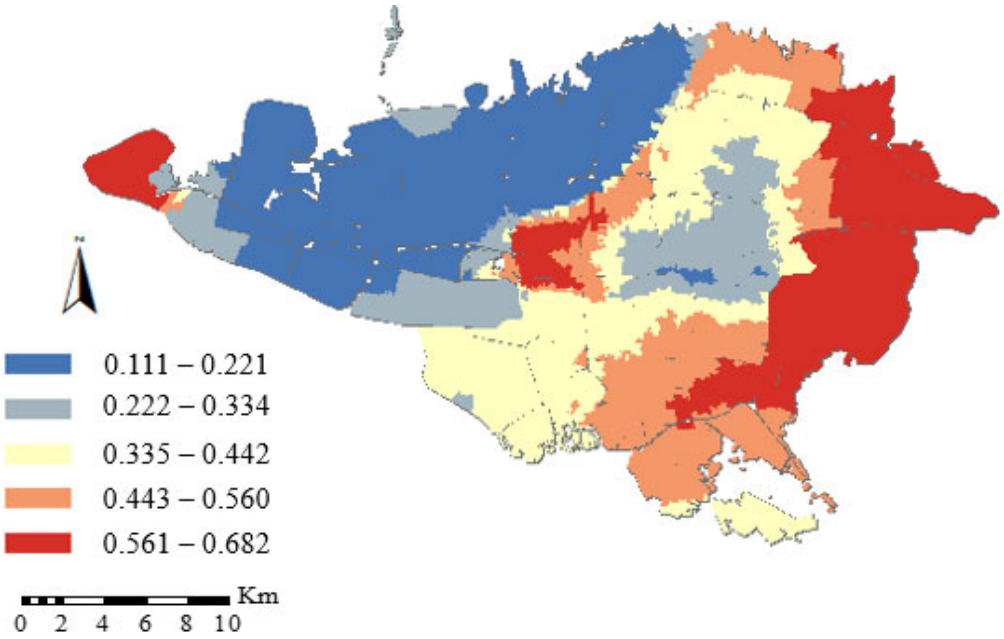


Figure 5. Local R-squared coefficient based on GWR for Afghan immigrants.

According to the results shown in Figure 6, when holding other variables constant, the concentration of Afghan immigrants in the south and northwest of Tehran increases by 0.39–0.45 with a 1-unit increase in the population share of the 0–14 age group. In contrast, in the central and northern areas of Tehran, the concentration of Afghan immigrants rises by 0.15–0.21 with the same increase in the population share of the 0–14 age group. The 15–64 age group also positively influences the concentration of Afghan immigrants in Tehran, with the strongest impact observed in the south and a lesser effect in other parts of the city. A 1-unit increase in the population share of the 65 and above age group results in a concentration increase of 0.65–0.83 in the south and northwest of the city, indicating the highest impact of this age group on Afghan immigrant concentration in those areas. Conversely, it has the least effect on the concentration of Afghan immigrants in Tehran's central and western parts.

If we include the variable of literacy rate in the model and keep the other variables constant, a 1-unit increase in literacy rate decreases the concentration of Afghan immigrants by 0.57–0.46 in the south of Tehran, which is the most significant reverse effect of literacy rate on the concentration of Afghan immigrants in Tehran. This variable has the least impact in the central, northern, eastern, and western areas of Tehran. A 1-unit increase in the literacy rate decreases the concentration of Afghan immigrants by a range of 0.16–0.07. However, primary and lower secondary education levels have a positive effect on the concentration of Afghan immigrants. These two variables have the highest and lowest impacts in the south and north of Tehran, respectively. Conversely, upper secondary and tertiary education negatively impacts the concentration of Afghan immigrants. In other words, a 1-unit increase in upper secondary education decreases the concentration of Afghan immigrants in the western half of Tehran by 0.21–0.18, the greatest reverse impact of upper secondary education on the concentration of Afghan immigrants in Tehran. Regarding tertiary education, this variable decreases the concentration of Afghan immigrants by 0.29–0.24 in almost all areas of the city.

Furthermore, employment rates negatively impact the concentration of Afghan immigrants in almost all areas. Moreover, when we include the variable of high-status jobs in the model while holding other variables constant, a 1-unit increase in the rate of high-status jobs decreases the concentration of Afghan immigrants by 0.41–0.34 in the central and northern areas of Tehran. This signifies the most significant reverse impact that high-status

jobs have on the concentration of Afghan immigrants in Tehran, with the smallest impact observed in the southern part of the city.

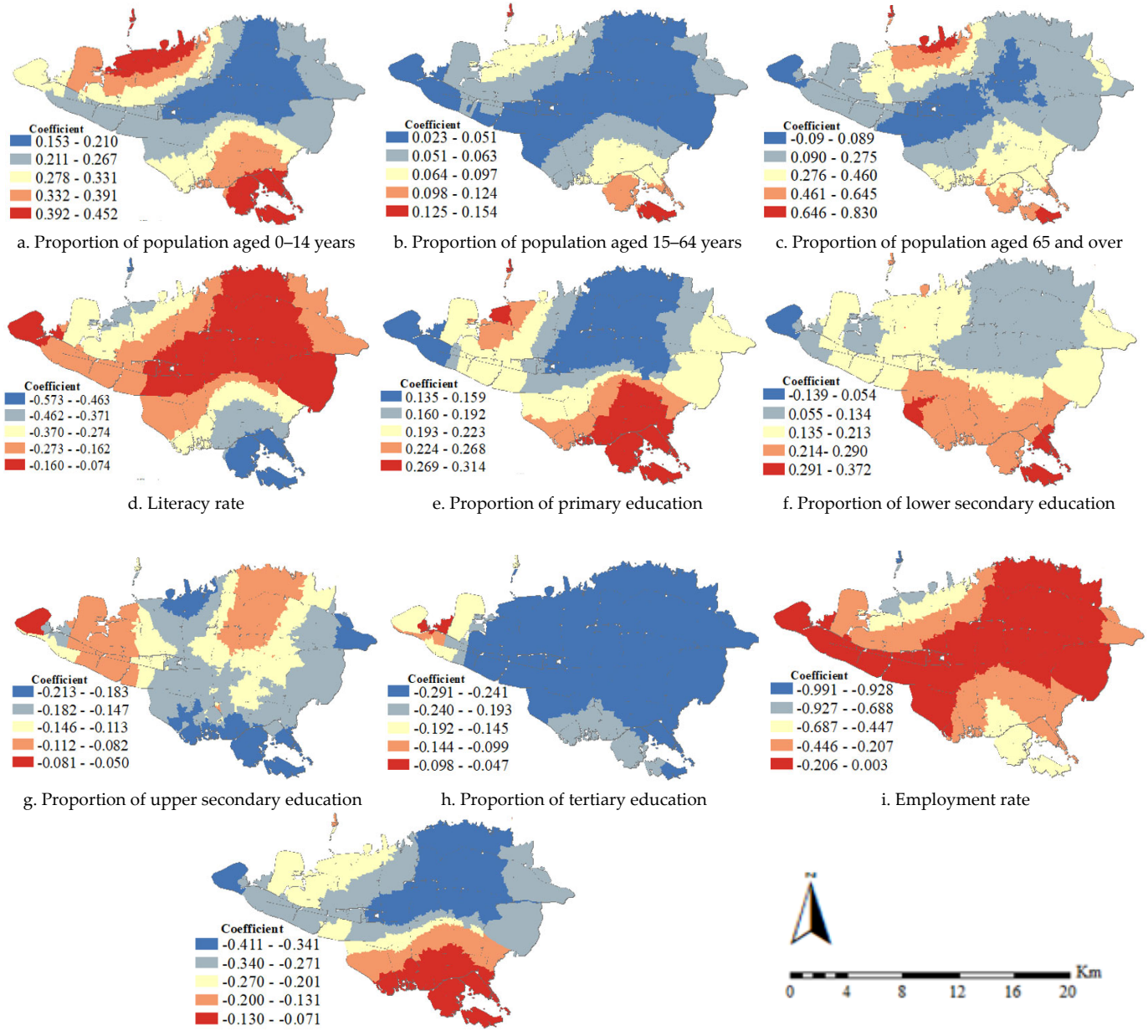


Figure 6. The net effects coefficient of selected variables on the distribution of Afghan immigrants from GWR.

4.4. Two-Group Segregation Indices

Table 4 displays the values of two-group segregation indices for Afghan immigrants compared to the Iranian natives across various economic and demographic variables. The Evenness Dimension index reveals that the distribution of Afghan immigrants across various ages, genders, generations, education levels, and occupational groups is less equitable than that of Iranians. Instead, they experience a high level of segregation. This is particularly pronounced among women, the 0–14 age group, first-generation immigrants, the illiterate, and those with primary education and low-status jobs. While segregation persists, enhancing education and occupational status can help decrease segregation among Afghan immigrants.

Table 4. Two-group segregation indices for Afghan immigrants at the census tract level by selected variables, 2006.

Variables	Segregation Index (*IS*)	Isolation Index (*xPx*)	Absolute Concentration Index (*ACO*)	Absolute Clustering Index (*ACL*)
Afghan immigrants (Total)	0.77	0.78	0.79	0.50
Afghan males	0.59	0.64	0.85	0.69
Afghan females	0.76	0.75	0.72	0.81
Aged 0–14	0.48	0.66	0.34	0.67
Aged 15–64	0.47	0.67	0.56	0.51
Aged 65+	0.37	0.49	0.26	0.47
Afghan first-generation	0.94	0.86	0.89	0.59
Afghan second-generation	0.79	0.75	0.41	0.23
Illiterate population	0.74	0.82	0.81	0.70
Literate population	0.31	0.67	0.71	0.50
People with a primary education	0.57	0.78	0.56	0.74
People with a lower secondary education	0.41	0.37	0.32	0.37
People with an upper secondary education	0.39	0.31	0.28	0.41
People with a tertiary education	0.20	0.28	0.24	0.25
Economic active population	0.32	0.73	0.30	0.58
Employed population	0.37	0.62	0.37	0.47
People with a low-level job	0.49	0.58	0.66	0.41
People with a middle-level job	0.27	0.33	0.33	0.20
People with a high-level job	0.10	0.13	0.20	0.10

Regarding the Isolation Index, Afghan immigrants experience significant segregation based on various variables. Members of this group primarily live in areas where their peers reside. Table 4 depicts that the first-generation, the illiterate, and those with primary education experience the most isolation, while individuals with upper secondary and tertiary education, as well as those with high-status jobs, experience the least segregation. Another segregation index studied is the Absolute Concentration Index, which is obtained by calculating the total residential area occupied by a group and comparing it to the minimum and maximum possible areas that the group could occupy within the city. The results show that the first generation of immigrants, Afghan men and women, and individuals with low-status jobs are more segregated than other groups in Tehran. Lastly, according to the Absolute Clustering Index, Afghan immigrants are more segregated and tend to settle in the proximity of similar groups.

Therefore, the results suggest that there are high levels of segregation among Afghan immigrants in Tehran. However, there is a noticeable decrease in segregation as the first-generation transitions to the second-generation and as educational and occupational statuses improve. This reduction in segregation levels can be attributed to the generational shift and increased access to human capital among Afghan immigrants in Tehran.

5. Discussion

As previously mentioned, this paper explores the spatial segregation of Afghan immigrants through a secondary analysis of the 2006 census data, utilizing spatial models, statistics, and segregation indices. The results indicate that the spatial distribution of Afghan immigrants is influenced by the socio-economic situations of Tehran's districts, with a tendency for them to settle in less developed areas in the south or southeast of the city. However, there is a gradual shift in the distribution of immigrants in Tehran, a trend expected to continue with the new generation. The first-generation Afghan immigrants primarily reside in the southern regions, whereas the second-generation are more concentrated in the central and western parts of the city.

Based on the results of the Getis–Ord statistics, it is evident that Afghan immigrants are clustered in specific hot spots in southern Tehran. The age group of Afghan immigrants

in the southern areas skews towards a younger population, whereas those in the north and center are predominantly of working age. Regarding education, Afghan immigrants with lower educational levels tend to reside in the south or a portion of the center, while those with upper secondary and tertiary education primarily live in the north and a section of the west. Afghan immigrants in high-status jobs are mainly located in the north of Tehran, while those with low-status occupations are more commonly found in the south. Thus, Afghan immigrants experience varying spatial distribution patterns in the census tracts of Tehran. Social, economic, and cultural factors highly influence these patterns.

Furthermore, the results showed that Geographically Weighted Regression (GWR) was more efficient in explaining the correlation between research variables and the spatial concentration of Afghan immigrants. They also revealed that the adjusted R-squared values varied in different areas of Tehran. Several variables, such as the younger and older age groups, positively impacted the concentration of Afghan immigrants. Additionally, literacy rates, upper secondary and university education, and high-status occupations had a negative effect on immigrant concentration, while low-status jobs had a positive impact. These results are consistent with previous studies (Sadeghi and Abbasi-Shavazi 2016; Murayama and Nagayasu 2021; Maré et al. 2016; Iceland and Scopilliti 2008; Wessel et al. 2017; Čermáková and Leontiyeva 2017; Hao 2015; Andersen 2010; Namvari et al. 2023). As Massey (1981) stated, the spatial segregation of immigrants in Tehran is significantly influenced by social status, opportunities, and unequal benefits.

Therefore, the spatial distribution of Afghan immigrants in most studied variables is clustered. This means that immigrants accumulate in urban areas regardless of their characteristics. This phenomenon demonstrates that factors such as social networks, mass migration, housing conditions, and the labor market influence people's decisions regarding their residence in a census tract or neighborhood. These results align with the findings of previous studies (Rabiei-Dastjerdi 2023; Ghalehnoee and Sabet 2020; Rafieian et al. 2018; Pourahmad and Biranvand 2019; Zaki et al. 2020; Galeano and Carrasco 2018; Andersen 2016; Willem et al. 2021; Čermáková and Leontiyeva 2017; Török 2017; Wu et al. 2014; Ellis et al. 2006; Pan Ké Shon 2011; Stachowski 2020; Warfa et al. 2012). Moreover, according to the behavioral approach, immigrants may consider their personal preferences (e.g., language, culture, economics, and amenities in the destination) when choosing where to reside. Labor market conditions also play a significant role in immigrants' decisions on where to settle. People may seek good job opportunities and choose neighborhoods with better labor market conditions and higher-status jobs (Feitosa 2010). On the other hand, housing costs and availability in different areas are crucial factors in immigrants' decision-making processes when selecting their residence. Considerations such as buying and renting prices, public amenities, neighborhood conditions, and proximity to the city center all come into play (Gauvin et al. 2013). Additionally, government policies such as immigration laws, unequal resource distribution, labor market support for immigrants, and public housing initiatives influence immigrants' decision-making processes.

Previous studies have indicated that Afghan immigrants in Iran have achieved significant educational success but face challenges in the job market due to lower human capital and legal restrictions (Hugo et al. 2012). At the micro level, Afghans exhibit various adaptation strategies, with integration being the most prevalent, followed by separation, assimilation, and marginalization (Abbasi Shavazi and Sadeghi 2015). Emotional experiences of Afghan immigrants in Iran are generally negative (Zandi-Navgran et al. 2023). Afghanophobia, a core social process, hinders positive changes despite efforts to promote intergroup interactions (Ruhani et al. 2023). Furthermore, Iran's immigration policies have shifted from open-door to restrictive (Siavoshi 2022), resulting in economic disparities, educational limitations, and identity uncertainty among Afghan immigrants (Zandi-Navgran et al. 2024). Consequently, the interplay of immigration regulations, policies, societal attitudes, and individual situations has led to a partial and uneven integration of Afghan immigrants in Iran.

The urban space of Tehran is plagued by social, economic, and service imbalances, as reflected in spatial segregation (Ghaderi et al. 2024; Farash et al. 2021; Sadeghi and Zanjari 2017; Rabiei-Dastjerdi et al. 2018; Rabiei-Dastjerdi et al. 2024). According to segregation indices, Afghan immigrants experience high levels of segregation. They often reside in close proximity to one another, particularly in areas with a high Afghan population. While improvements in education and employment can help reduce segregation, it persists. However, the transition from the first- to the second-generation and increased educational attainment and job status have significantly decreased segregation levels. It can be concluded that generational transition and access to human capital lead to decreased segregation indices among Afghan immigrants in Tehran.

6. Conclusions

Overall, it can be concluded that most Afghans still need to successfully integrate into the urban community of Tehran despite their long-standing presence and efforts to improve their conditions. Due to differences in backgrounds, such as educational levels, employment, history of residence, first- or second-generation status, and legal status, Afghan immigrants experience various paths to spatial integration or segregation. Those with higher education or better job opportunities have a greater chance of integration. However, over time, the segregation indices of Afghan immigrants, especially for the second generation, have decreased due to improved education, employment, social situations, and living conditions. Changes in the social and economic circumstances of immigrants can influence their preferences for residence and lead them to choose areas with better amenities for further integration.

This study relied solely on official data, primarily concerning legal immigrants. However, there may be discrepancies between the data and actual social conditions. With the rise of the Taliban in 2021, there has been an influx of Afghan immigrants, many of whom have entered Iran illegally. Data on this particular group of immigrants are not readily available, and analyzing new data may uncover changes in their situations. The lack of access to updated data on Afghan immigrants was another limitation of this research. Ultimately, qualitative and field data are needed to fully understand the dynamics of spatial segregation among Afghan immigrants.

Author Contributions: Conceptualization, H.R.-D. and R.S.; methodology, H.R.-D. and N.F.; software, N.F.; validation, R.S. and H.R.-D.; formal analysis, H.R.-D.; investigation, N.F. and H.R.-D.; resources, N.F.; data curation, H.R.-D. and N.F.; Writing—original draft preparation, N.F. and R.S.; writing—review and editing, H.R.-D.; visualization, N.F.; supervision, H.R.-D. and R.S.; project administration, H.R.-D. All authors have read and agreed to the published version of the manuscript.

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Appendix A

Table A1. Description of Afghan immigrants in Tehran based on the composition of age, sex, generational status, and education by urban areas.

Zone	Age Structure (%)			Sex (%)		Generational Status (%)		Education (%)				
	0–14	15–64	65+	Male	Female	First	Second	Illiterate	Primary	Lower Secondary	Upper Secondary	Tertiary
1	1.6	3.4	3.9	3.5	1.9	3	2.7	3	1.3	2.6	3.9	10.7
2	4.9	6.3	3.7	6.7	4.5	5.9	5.6	6.2	4.8	5.8	6.5	10.5

Table A1. *Cont.*

Zone	Age Structure (%)			Sex (%)		Generational Status (%)		Education (%)				
	0–14	15–64	65+	Male	Female	First	Second	Illiterate	Primary	Lower Secondary	Upper Secondary	Tertiary
3	0.8	2.7	3.7	2.7	1.3	2.3	1.9	2.4	0.6	1.7	4.5	17.7
4	4.7	6.6	5	6.3	5.5	6.4	5.1	7.4	4	5.1	6.6	4.2
5	6.5	7.2	4.1	7.7	5.7	7.7	5.4	8.7	4.4	4.9	6	9.4
6	0.6	1.4	1.1	1.6	0.5	1.2	0.9	1.3	1	0.7	1.6	6.1
7	0.5	1.1	2.7	1.1	0.7	0.8	1.2	0.9	0.4	0.6	2.3	3.3
8	0.8	1.1	1.7	1.3	0.7	1.1	1	1.3	0.6	0.9	0.9	3.1
9	0.3	0.4	0.2	0.5	0.3	0.4	4.3	0.4	0.4	0.1	3	1
10	0.8	1.2	1.2	1.1	1.1	1.1	5.2	1.1	1.2	1.2	2.2	2
11	1.5	1.4	2.6	1.5	1.4	1.4	6.5	1.6	1.4	1.5	1.8	3
12	7.4	6.8	3.6	7	6.8	7.9	9	8	4.2	6.1	4.9	5
13	0.6	1.7	0.5	1.7	0.8	1.3	5.4	1.8	1.2	0.6	2.1	1.9
14	1.3	2.4	4.1	2.5	1.5	2.2	6.1	2.7	1	1.3	4.4	3.2
15	24.5	18.3	16.8	17.6	24	19.9	8.2	16.8	27.7	21.5	15.3	5.9
16	5.9	5	6.6	4.8	6.1	5.4	5.1	5.2	5	6.4	5.1	1.1
17	7.9	6.5	7.2	6.1	8.2	6.7	10.6	6	8.3	7.5	9.3	0.9
18	4.5	4.3	3.7	4.8	3.8	4.8	3.6	5.6	3.1	4.6	1.6	2.1
19	4.8	4.8	7	4.7	5.1	5.2	4.1	5.3	4.5	4.7	2.9	1.1
20	19.3	15.5	18.8	15	19.4	13.7	7.5	12.2	24.2	20.8	14.4	4.5
21	0.4	0.8	0.8	0.7	0.5	0.6	0.8	0.8	0.4	0.4	0.6	3.3
22	0.5	1	1.3	1.2	0.4	1	0.6	1.3	0.2	0.9	0	0
total	100	100	100	100	100	100	100	100	100	100	100	100

Table A2. OLS results after excluding variables with a VIF 7.5 or more (output from ArcMap).

Independent Variables		Coefficient	STD	t	*p*	VIF
Intercept		0.04	1.1	3.2	0.001	-
Age structure	0–14	0.18	0.02	3.6	0.001	1.6
	15–64	0.22	0.02	20.5	0.001	4.1
	65+	0.24	0.05	31.4	0.001	1.1
Literacy rate		−0.31	0.01	−23.6	0.001	1.1
Education	Primary	0.08	0.03	7.5	0.001	1.3
	Lower secondary	0.02	0.04	1.8	0.034	2.1
	Upper secondary	0.07	0.04	−6.3	0.001	1.1
	Tertiary	−0.18	0.06	−7.1	0.001	3.2
Employment rate		0.26	0.02	14.9	0.008	5
Job levels (High)		−0.09	0.08	−3.8	0.029	4.5
F				528.4		
Sig.				0.001		
R^2 (%)				36.8%		
Adjusted R^2 (%)				36.7%		
AIC				402.45		

Table A3. OLS results after excluding variables with a VIF 7.5 or more (output from SPSS).

Independent Variables		Model1		Model2		Model3	
		Beta	*p*-Value	Beta	*p*-Value	Beta	*p*-Value
Age structure	0–14	0.130	0.001	0.198	0.001	0.166	0.001
	15–64	0.312	0.001	0.254	0.001	0.224	0.001
	65+	0.342	0.001	0.273	0.001	0.239	0.001
Literacy rate				−0.370	0.001	−0.312	0.001
Education	Primary			0.079	0.011	0.079	0.001
	Lower secondary			0.013	0.042	0.019	0.071
	Upper secondary			−0.083	0.001	0.075	0.001
	Tertiary			−0.097	0.001	−0.176	0.001
Employment rate						0.256	0.001
Job levels (High)						−0.088	0.001

Table A3. *Cont.*

Independent Variables	Model1		Model2		Model3	
	Beta	*p*-Value	Beta	*p*-Value	Beta	*p*-Value
r	0.52		0.57		0.60	
R^2 (%)	0.27		0.33		0.36	
Adjusted R^2 (%)	0.27		0.33		0.36	
F	66.1		60.7		52.4	
Sig.	0.001		0.001		0.001	

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