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Article

Examining the association between deteriorated urban fabric and socio-economic resilience in Tehran Metropolis

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ABSTRACT

Deteriorated urban areas usually face social, economic, and environmental problems. They often struggle with issues like poverty, inadequate housing, poor public spaces, social isolation and a sense of hopelessness, limited business opportunities, and a lack of investment. These complex problems cause significant disaster resilience challenges for these areas. This article investigates the association between urban deteriorated fabric (UDF) rate and socioeconomic resilience (SER) in the neighborhoods of Tehran Metropolis. Fourteen SER variables are identified through a literature review. Exploratory factor analysis is used to transform them into fewer factors. Four factors are extracted and are labelled as economic, social, economic-demographic, and community capital resilience. Similar extracted factors are combined to obtain social and economic resilience subcomponents. Jenks' Natural Break classification method is used to classify the UDF rate into five categories. Ordinary least squares (OLS) and Geographically Weighted Regression (GWR) are used to examine the association between UDF rate (dependent variable) and SER subcomponents (independent variables). The findings of the study show that: (a) the GWR better captures spatial relationships between UDF rate and SER factors than the OLS method, (b) the relationship between DUFs and social and economic resilience is complex and not definitively one-sided, and (c) social and economic resilience can occur concurrently in DUFs, (d) neighborhoods with high UFD rates are clustered in the mid-southern parts of the Tehran city. Understanding the interplay between social and economic resilience in DUFs is crucial for developing effective strategies to promote recovery and long-term disaster resilience and sustainability.

1. Introduction

One of the challenges that many large cities worldwide face is managing natural disasters, necessitating the development of solutions to enhance the capacity and resilience of communities while decreasing the susceptibility of urban areas to such disasters [1]. Iran ranks as one of the most susceptible countries globally to natural disasters, particularly earthquakes and floods, owing to its climatic, geological, and socio-spatial developmental traits [2]. Statistics show that in recent years, on average, a destructive and damaging earthquake has occurred in some part of the country every five years, and Iran is currently at the top of the list of countries where earthquakes are associated with high casualties [3]. The city of Tehran sits at the base of the Alborz Mountains and is at risk from several active faults that pose a constant threat to the city [4]. As a result, a crucial aspect of development planning in Tehran city is to highlight and consider its susceptibility, particularly the deteriorated urban areas, to natural disasters. Urban deterioration in Iran is characterized by the decay of urban fabrics, particularly in older areas, due to factors such as physical decay, aging infrastructure, structural instability, inadequate infrastructure, lack of basic amenities, uneven development, inadequate planning, and a lack of comprehensive renovation strategies [5-7]. This deterioration affects various aspects of city life, impacting residents' quality of life and posing challenges to sustainable urban development. The uneven distribution of resources and opportunities contributes to the concentration of deterioration in specific areas, exacerbating social and economic disparities. These areas frequently experience higher levels of poverty, unemployment, and social inequality, alongside limited access to essential services [8]. The High Council for Urban Planning and Architecture of Iran (HCUPAI) in a resolution issued in 2006, has defined Deteriorated Urban Fabric (DUF) as "areas within the legal boundaries of cities that are vulnerable due to physical deterioration, lack of proper access to vehicles, services, and urban infrastructure, that have low spatial, environmental, and economic value" [9]. To operationalize this definition, the HCUPAI [9] has introduced three indicators of (a) "fineness of the fabric", defined as blocks where more than 50% of their parcels have an area of less than 200 square meters, (b) "structural instability" which refers to blocks where more than 50% of their buildings are unstable and lack a sound structural system, and (c) "impermeability" defined as blocks where more than 50% of their surrounding streets are less than 6 meters in width. Areas of the city that meet all three criteria are called DUFs. There are approximately 53,000 hectares of DUFs in Iran, about 20 percent of which belong to the country's Metropolises [10]. The Tehran City Renovation Organization (TCRNO), using the three HCUPAI indicators of DUFs, identifies the areas of the city that fall in the DUF category and updates them periodically. While the area of DUFs in Tehran city is increasing annually, its annual rate of renovation is considerably low [8]. This discrepancy indicates a challenge in effectively addressing urban decay and improving the living conditions in these areas of the city.

Despite the presence and the increasing trends of DUF in many cities in Iran [11] and both in developing and developed countries [12], there is a lack of clear understanding of the association between DUF rates and the underlying socio-economic resilience in these areas. Most current studies examine urban decay or resilience separately, and analyzing their bidirectional relationship in a fast-growing city like Tehran is scant. Additionally, few studies have combined spatial analysis (GIS), exploratory factor analysis (EFA), and spatial regression analysis (OLS and GWR) to assess these relationships quantitatively. This study aims to fill these gaps by examining the spatial association between the DUF rate and the SER domains at the neighborhood level in Tehran Metropolis, specifically addressing the following questions: (1) How does the rate of urban deterioration vary across Tehran's neighborhoods, and (2) how does this variation correlate with socio-economic resilience?

This article is organized as follows: after the introduction, the socioeconomic indicators selection process is explained. In the next section, the study area and methodological framework of the study are presented. Then, the quantification of the SER and the examination of the relationship between DUFs and SER subcomponents are presented. In the latter parts of the paper, the results, discussion, and conclusions are presented.

2. Socioeconomic resilience indicators

In recent years, the concept of resilience has gained considerable attention because of the continued vulnerability of cities to adverse effects of growing urban population, climate change, increasing trends in natural disasters, and aging public infrastructure [13,14]. Bruneau et al. [15] quantify the disaster resilience of a community in the context of four specific dimensions of resilience: technical, organizational, social, and economic. Later research contributions, such as the disaster resilience of place (DROP) model by Cutter et al. [16], build upon these categorizations of multi-dimensional behavior by pinpointing particular sets of quantitative indicator variables that can be used to analytically represent the various traits of resilience across its multiple dimensions. Cutter's work builds on the four dimensions suggested by Bruneau et al. [15] and adds two new dimensions of ecological resilience and community competence [16]. Subsequent disaster resilience (DR) frameworks reviewed by Asadzadeh et al. [17] show that in all of the 36 DR frameworks reviewed, the social and economic dimensions of resilience are present. As Kumar and Mehany state, socioeconomic factors play a crucial role in building disaster resilience, as disaster occurrences impact the social and economic development of urban areas; the socioeconomic dimension "has been seen as a facilitator of disaster resilience" [18]. Despite the relative importance of the community SER, there have been few studies focused on it, and even fewer have tried to quantify it, highlighting a significant issue that requires attention. Of the several studies that have identified and used sets of indicators to assess socioeconomic resilience [18-26], the socioeconomic resilience capacity index (SERCI) proposed by Gatiso & Greenhalgh [23] is taken as a basis here and other relevant studies [18, 21, 24, 25, 27] are used to identify and adapt the appropriate indicators that could represent the socioeconomic resilience at the neighborhood level in Tehran city. After eliminating highly correlated variables, fourteen variables are used to measure the SER at the neighborhood level in Tehran city (Table 1).

3. Methodology

Tehran Metropolis, with a population of 8.6 million, is the capital and the most populous city in Iran. The city is composed of 22 districts and 354 neighborhoods with a total area of about 730 km^2. The city is located in the northern part of the country (Figure 1). According to Tehran City Deputy Mayor for Urban Planning and Architecture, the DUFs in Tehran city cover an area of 4,400 hectares [29], which is about 6.1 percent of the total area of the Tehran Metropolis. The number of residents living in these DUFs is about 15 percent of the total population of Tehran City. About 22 percent of Tehran city's parcels are located in DUFs [3]. The population density in the DUFs of Tehran city is about 395 persons per hectare, which is more than two and a half times the population density of the entire city [10]. To achieve the mentioned objectives, the methodological framework of the study is presented in Figure 2.

Table 1. Selected indicators to measure SER at the neighborhood level in Tehran Metropolis

No	Dim	Indicators	Acronym	References
1	Social	Proportion of population with university diploma (%)	HED	Landry et al. [25] 2020
2	Social	Land use diversity	LUD	Hafsi et al. [21] 2023
3	Social	Population density	DEN	Landry et al. [25] 2020; Yin et al. [24] 2025
4	Social	Sense of belonging	BEL	Gatiso & Greenhalgh [23] 2025; Navidpour et al. [27] 2025
5	Social	Satisfaction with neighborhood relations	REL	Gatiso & Greenhalgh [23] 2025; Navidpour et al. [27] 2025
6	Social	Satisfaction with participation in neighborhood decisions	PAR	Gatiso & Greenhalgh [23] 2025; Navidpour et al. [27] 2025
7	Social	Proportion of population without a high-school diploma (%)	LIT	Landry et al. [25] 2020
8	Economic	Household income	INC	Gatiso & Greenhalgh [23] 2025; Yin et al. [24] 2025
9	Economic	Car ownership	CAR	Gatiso & Greenhalgh [23] 2025
10	Economic	Number of employed per household	NEH	Lau [28] 2013
11	Economic	Ratio of skilled labor to total workforce	SKL	Yin et al. [24] 2025
12	Economic	Housing unit ownership	OHS	Landry et al. [25] 2020
13	Economic	Percent employed	EMP	Kumar & Mehany [18] 2022
14	Economic	Population dependency	DEP	Hafsi et al. [21] 2023

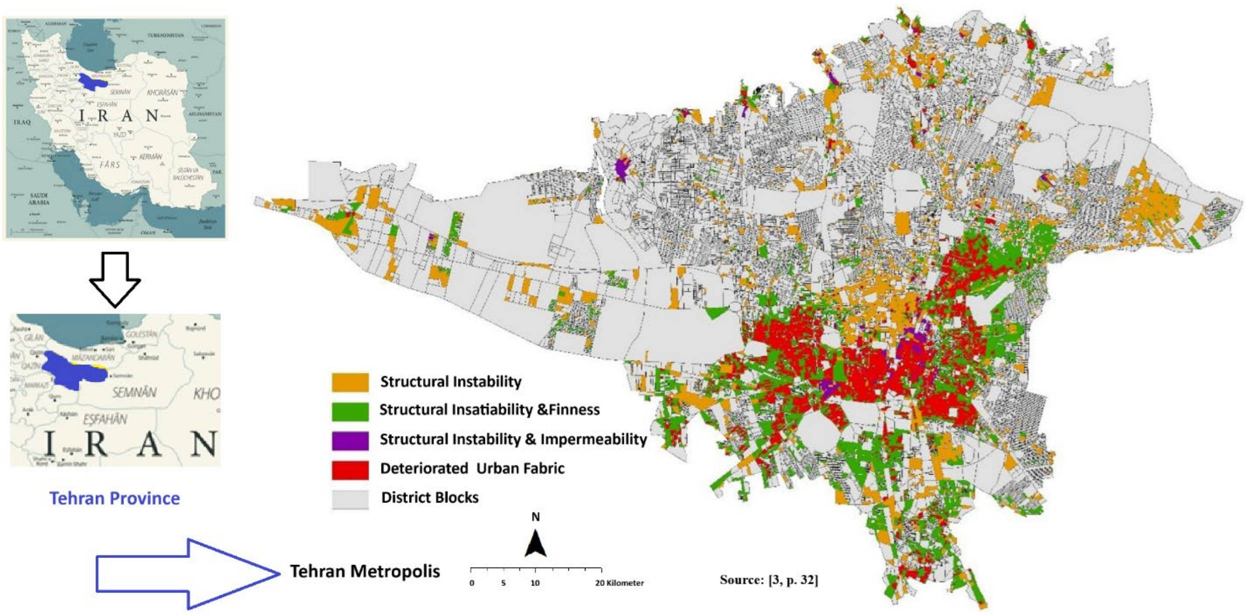

Figure 1. Spatial distribution of DUF and its composing indicators in Tehran Metropolis

4. Analysis

In the analysis part of the study, the steps identified in the methodological section are undertaken. To quantify the socioeconomic resilience at the neighborhood level, exploratory factor analysis (EFA) is performed to extract the underlying dimensions of the SER. The extracted factors are then combined to obtain a theoretically coherent set of factors that represent the SER. To examine the relationship between urban deterioration rate and SER factors, spatial regression analyses (OLS and GWR) are performed.

4.1 Exploratory factor analysis to extract dimensions of SER

EFA is performed to extract factors from the fourteen SER variables. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy of 0.755 and Bartlett's sphericity test result (χ^2 = 2691.92; df = 91; ρ= 0.0001) indicate the suitability of the performed EFA. A varimax rotation and Kaiser criteria (choosing factors with eigenvalues greater than one) are used to select a small number of factors that include important variables that have high factor loadings while minimizing the factor loadings of the unimportant ones, thus making it easier to interpret and label the factors. Four factors are extracted which cumulatively explain about 68.71% of the data variance. Based on the highlighted variables for each factor, the four extracted factors are labeled as "economic resilience", "economic-demographic resilience", "social resilience", and "community-capital resilience" (Table 2).

Factor 1, which explains about 20.76% of the data variance, has high loadings with percent employed (0.836), number of employed per household (0.835), and housing unit ownership (-0.712). These indicators reflect a household's capacity to withstand economic shocks and stressors through income generation, employment stability, and asset ownership. This factor is labeled as economic resilience.

Factor 2 accounts for 14.2% of the data set's common variance and has a significant positive loading on the proportion of the population without a high-school diploma (0.771), car ownership (0.695), household income (0.686), and ratio of skilled labor to total workforce (0.682). It also has a negative loading with population dependency (-0.681). Car ownership and household income are indicators of financial resilience, while the ratio of skilled labor to the total workforce and population dependency reflects demographic resilience. This factor represents economic-demographic resilience. Accounting for 15.78% of the data variance, factor 3 has high loadings with population density (0.836), the proportion of the population with a university diploma (0.723), and land use diversity (-0.717). It represents social resilience.

Factor 4 explains 11.57% of the data variance and has a significant positive loading on satisfaction with neighborhood relations (0.848), sense of belonging (0.732), and satisfaction with participation in neighborhood decisions (0.444). These variables relate to the social cohesion and support systems that help individuals and communities withstand challenges and adapt to change. They contribute to the overall strength of social ties and a community's ability to cope with adversity. This factor, therefore, is labeled community-capital resilience.

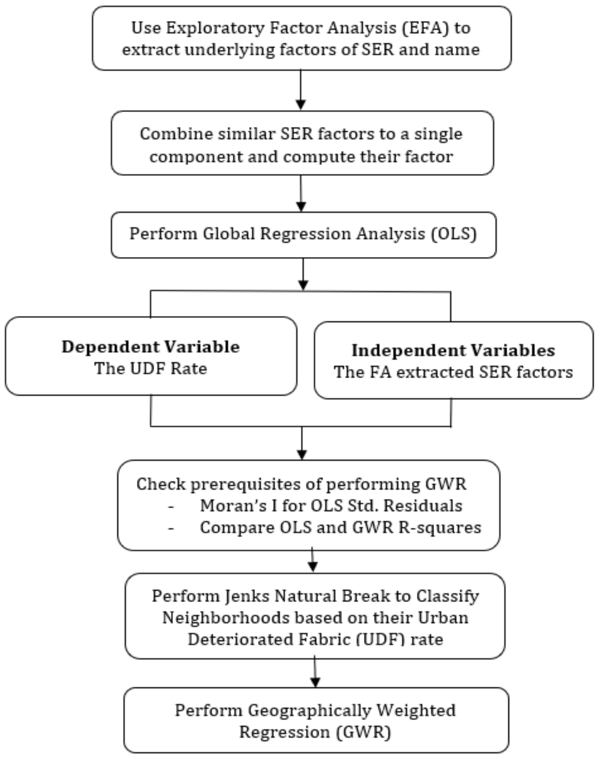

Figure 2. Methodological framework of the study

4.2 Combining similar extracted SER factors into a single subcomponent

In EFA, it is customary to combine similar extracted factors into a new composite subcomponent to simplify interpretation or enhance theoretical coherence [30], even if EFA initially separates them [31]. Similar factors one and two are combined to represent the economic subcomponent, and similar factors three and four are combined to represent the social subcomponent of the SER.

Table 2. Extracted factors, their corresponding variables, and labels

Original variables	Acronym	Factors			
		(F1) Economic Resilience	(F2) Economic-Demographic Resilience	(F3) Social Resilience	(F4) Community-capital Resilience
Percent employed	EMP	0.836	-0.231	0.249	-0.075
Number of employed per household	NEH	0.835	-0.061	-0.160	-0.143
Housing unit ownership	OHS	-0.712	0.336	-0.026	0.006
Proportion of population without a high-school diploma (%)	LIT	-0.452	0.771	-0.001	0.158
Car ownership	CAR	0.119	0.695	-0.296	0.082
Household income	INC	-0.406	0.686	-0.426	0.062
Ratio of skilled labor to total workforce	SKL	-0.396	0.682	0.202	0.223
Population dependency	DEP	0.573	-0.681	0.044	-0.014
Population density	DEN	0.002	-0.194	0.836	0.094
Proportion of population with university diploma (%)	HED	0.015	-0.105	0.723	0.173
Land use diversity	LUD	-0.015	-0.046	-0.717	0.173
Satisfaction with neighborhood relations	REL	-0.236	-0.063	-0.100	0.848
Sense of belonging	BEL	-0.179	0.397	0.005	0.732
Satisfaction with participation in neighborhood decisions	PAR	0.214	0.124	0.252	0.444
Eigenvalues		4.98	2.22	1.35	1.07
Percent variations explained		20.76	20.52	15.78	11.57

To combine these factors to obtain the economic and social subcomponents of SER, their factor scores are first normalized using Equation (1) [32]:

$$NFS_{ij} = \frac{(FS_{ij} - FS_{iMin})}{(FS_{iMax} - FS_{iMin})} \quad (1)$$

Where, NFS_{ij} is the normalized factor score for factor i in neighborhood j, FS_{ij} is the factor score for factor i in neighborhood j, FS_{iMin} and FS_{iMax} are the minimum and maximum value of factor score for factor i, respectively.
Then, the factor scores for the combined factors of SER are computed by way of equation (2) [33] wherein the variance explained by each factor is used as a measure of the importance of that factor:

$$CombResSubcomp_{kj} = \frac{\sum_{i=1}^{m}(\lambda_{F_i} \times NFS_{ij})}{\sum_{i=1}^{m}\lambda_{F_i}} \quad (2)$$

Where, $CombResComp_{kj}$ is the combined resilience subcomponent k score in neighborhood j, λ_{F_i} is the percent variance explained by factor i, NFS_{ij} is the normalized factor score for factor i in neighborhood j, m is the number of factors to be combined to arrive at the combined resilience subcomponent k.
The combined economic resilience subcomponent, which measures the neighborhood economic vitality, suggests that the economic resilience in DUF neighborhoods exhibits high percentages of employed, a higher number of employed per household, lower levels of educational equality, higher percentages of inhabitants with vehicle access and household income, and those with fewer housing ownership and also fewer population dependency.

The second combined subcomponent measures the social capacity of the DUF neighborhoods. It shows that the social resilience in the DUF neighborhoods is accompanied by such characteristics as areas with higher population density, higher levels of educational equality, lower rate of land-use diversity, and higher levels of social capital.

4.3 Examining the relationship between urban deterioration and socioeconomic resilience

To examine the relationship between urban deterioration and SER, the UDF rate is taken as the dependent variable, and the two combined subcomponents of the SER, namely economic resilience and social resilience subcomponents, are used as the independent variables in the following OLS and GWR regression analyses. UDF rate is computed by dividing the UDF area of a neighborhood by its total area. It is categorized into five classes (very low, low, moderate, high, and very high UDF) using Jenks Natural Break in ArcGIS and is presented in Figure 3. The spatial distribution pattern of UDF rate at the neighborhood level (Figure 3) shows that neighborhoods with high UDF rates are clustered in the mid-southern parts of the city.

4.4 Performing ordinary least squares (OLS) regression analysis

The OLS is a type of global statistics that assumes a constant relationship over space; therefore, the parameters are estimated to be the same for all the study areas [34]. To examine the relationship between urban deterioration and socioeconomic resilience at the neighborhood level, first, an OLS method is applied.

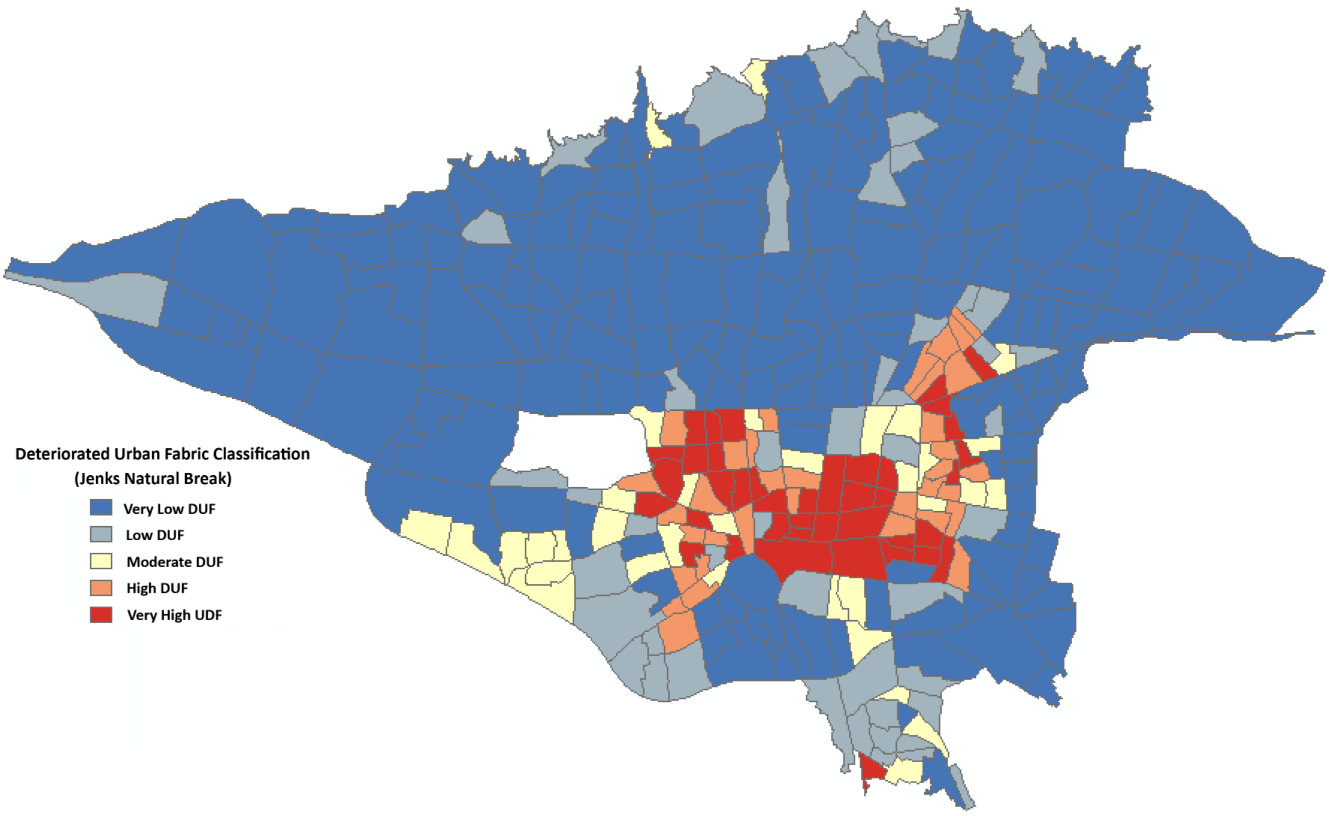

Figure 3. UDF rate classification of the neighborhoods using the Jenks Natural Break method

As shown in the methodological framework of the study (Figure 2), in the OLS regression analysis, the dependent variable is the UDF ratio, and the independent variables are the two SER factors, namely, the economic and social resilience. The results of the OLS regression analysis are shown in Table 3. The OLS regression result indicates that, with about 9.9% accuracy (adjusted R^2= 0.0996) and for all the neighborhoods in the city, the urban deterioration is negatively significantly associated with economic resilience and positively significantly related with the social resilience subcomponents of the SER.

4.5 Performing Geographically Weighted Regression (GWR)

GWR is an extension of the traditional standard regression framework, which allows local rather than global parameters to be estimated [35]. It is a type of local statistics that produces a set of local parameter estimates that show how a relationship varies over space [34].

To examine the possibility of applying a GWR, it's crucial to ensure that spatial autocorrelation is present in the OLS residuals and that the R^2 of the GWR is greater than the R^2 of the corresponding OLS regression [35]. Moran's I is computed for controlling the presence of spatial autocorrelation in the OLS residuals. Moran's I result indicates that the standardized residual of the OLS regression is spatially autocorrelated and is distributed in a clustered manner (Figure 4: Moran's I = 0.757, p-value = 0.000). The adjusted R^2 of the applied GWR (0.648) is greater than that of the corresponding OLS (0.099) regression. Since the prerequisites of applying a GWR are met, the GWR results (Table 4) could be used for further analysis. The results of the GWR analysis in Table 4 and the spatial variation of the negative and positive coefficients of the independent variables from the GWR model are shown in Figure 5.

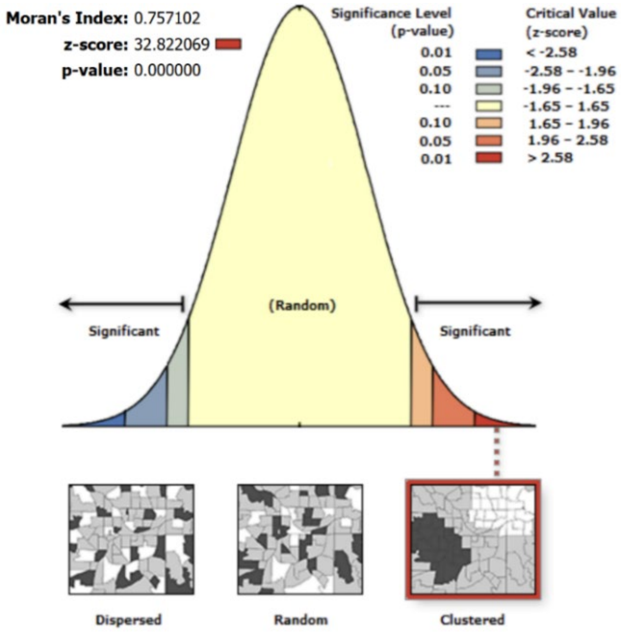

Figure 4. The Moran's Index for the standardized residual of the OLS regression

Table 4 and Figure 5 show that the intercept coefficients and coefficients of both economic and social subcomponents of SER have, concurrently, a negative and positive relationship with the DUF rate, depending on their location:

- The intercept coefficients in Figure 5 (a) show that positive coefficients (in about 58% of the neighborhoods) belong to the neighborhoods located in the southern and western parts of the city, and the negative coefficients (in about 42% of the neighborhoods) are located in the north-eastern parts of the Metropolis. This implies a generally higher DUF rate in the southern parts of the city.

Table 3. Results of the OLS regression analysis

SER subcomponents	Coefficient	Robust SE	Robust t	Robust p	VIF
Intercept	0.169	0.107	1.581	0.115	--
Economic Resilience	-0.691	0.162	-4.249	0.000	1.000
Social Resilience	0.520	0.156	3.328	0.000	1.000
Model diagnostics	Multiple R^2= 0.105; Adjusted R^2= 0.0996; AICc= 46.52				

Table 4. The results of the GWR

SER subcomponent	GWR coefficients				Directions of relationships in the GWR model			
	Min	Max	Mean	SD	+ (%)	+ sig. (%)	- (%)	- sig. (%)
Intercept	-0.860	1.253	0.126	0.393	58.09	23.88	41.91	3.45
Economic Resilience	-2.163	1.632	-0.196	0.730	44.64	10.57	56.36	30.26
Social Resilience	-0.757	2.221	0.262	0.539	70.23	26.34	29.77	14.56
Model diagnostics	Multiple R^2= 0.725; Adjusted R^2= 0.648; AICc= - 228.27							

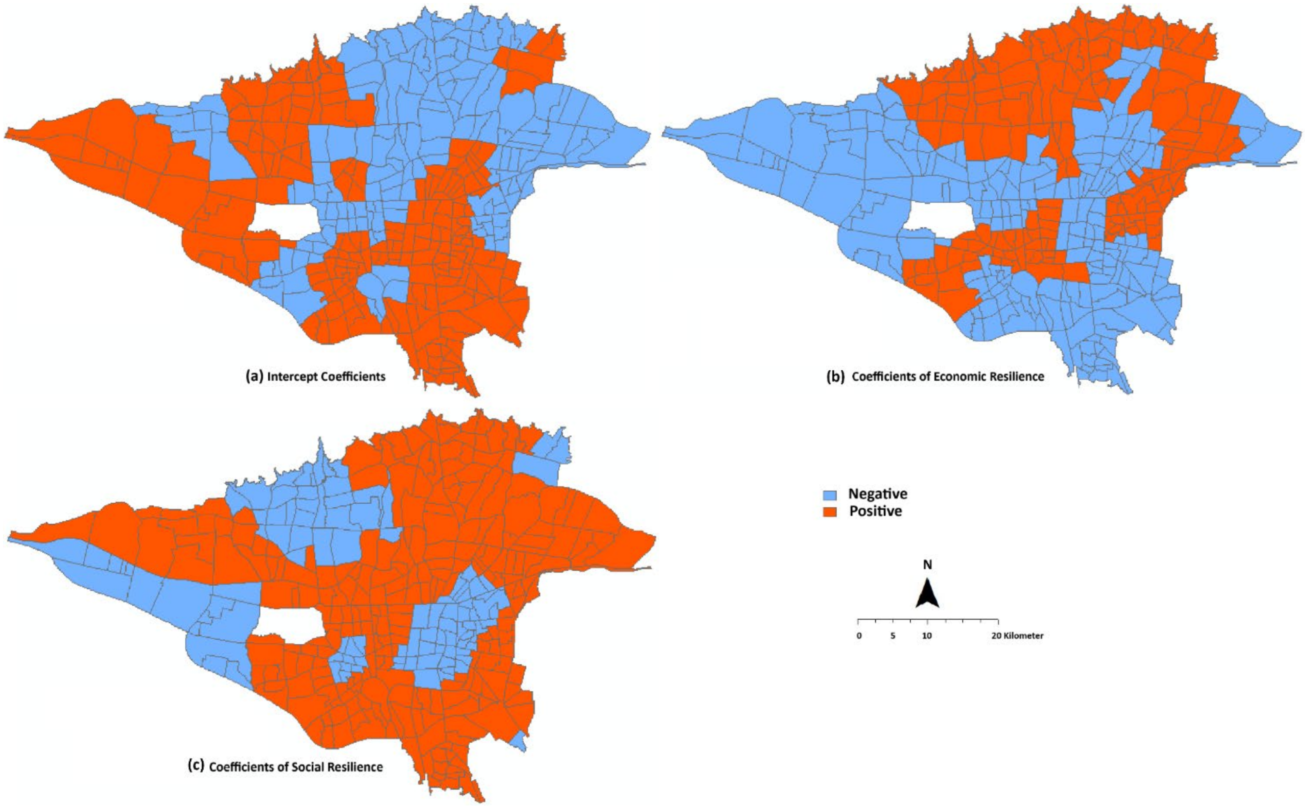

Figure 5. Spatial variation of the negative and positive coefficients of the intercept and the independent variables from the GWR model

- In 44.6% of the neighborhoods, the DUF rate is positively associated, and in the remaining 56.4% it is negatively associated with the economic resilience of the SER (Figure 5 (b)).
- In 70.2% of the neighborhoods, the DUF rate is positively associated, and in 29.8% of the neighborhoods, it is negatively associated with the social resilience of the SER (Figure 5 (c)).
- Of the 75 neighborhoods that are categorized as neighborhoods with high and very high DUF rate:
  - 42 neighborhoods (56%) have a negative relationship (14 of them are statistically significant), and the remaining 33 neighborhoods have a positive relationship with economic resilience.
  - 38 neighborhoods (50.7%) have a positive relationship (14 of them statistically significant) and the remaining neighborhoods have a negative relationship (24% of them statistically significant) with social resilience.

5. Results and discussion

The findings of applying the OLS regression (Table 3) indicate that:

- Both economic and social subcomponents representing SER have a statistically significant relationship (p=0.05) with the DUF rate.
- The adjusted R^2 of 0.099 of the OLS model indicates that about 9.9% of the variations in the DUF rate is explained by the two SER subcomponents.
- The DUF rate has a negative significant relationship with the economic and a positive significant association with the social subcomponents of the SER.

The OLS results suggest that across all neighborhoods, as the rate of DUF rises, the social resilience improves, but the economic subcomponents of SER decline. To explore potential local differences in how the DUF rate correlates with SER subcomponents, the GWR outcomes are compared with those from the OLS regression. The global R^2 of GWR (0.725) in comparison with the R^2 of corresponding OLS regression (0.105) shows a dramatic improvement in R^2 of GWR over the OLS. The R^2 values in GWR range from 0.0004 to 0.5058 (Figure 6), which is indicative of a local variation in the relationship between DUF rate and SER subcomponents. The GWR indicates that, in contrast to the OLS regression, the relationship between the DUF rate and SER subcomponents varies across different areas, with the highest coefficient of determination (R^2) found in neighborhoods situated in the central parts of the city. The comparison between OLS and GWR analyses indicates that the GWR model is better at capturing the spatial relationships between urban deterioration and the SER subcomponents in the DUFs of the city.

The spatial distribution of the significant coefficients of the intercept and the two SER subcomponents is presented in Figure 7. The findings of this part of the study (Table 4 and Figure 7) indicate that the association of the DUF rate with the economic resilience subcomponent of the SER is positively statistically significant in 10.57% and is negatively statistically significant in 30.26% of the city's neighborhoods. This finding implies that DUFs concurrently have significant challenges and opportunities with economic resilience. This is contrary to the general consensus that DUFs face significant challenges in terms of economic resilience: they often struggle to attract investment [36], retain residents, and recover from economic shocks due to factors like reduced economic activity [36, 37], out-migration [37, 38], and decreased property values [38,39].

On the social resilience subcomponents of the SER, the findings of the study indicate that, similar to the economic resilience, the DUF rate association with the social resilience subcomponent of the SER is positively statistically significant in 26.34% and is negatively statistically significant in 14.56% of the neighborhoods (Table 4). This finding is contrary to the findings of Taghvaei & Asadi [40] and Sarrafi & Razavian [41] that the DUFs are one-sidedly negatively related to social resilience. The findings of this study show that the relationship between DUFs and social and economic resilience is complex and not definitively one-sided. The relationship between urban deterioration and SER subcomponents is mixed and varies across the city neighborhoods. In some neighborhoods of the city, the DUF rate is positively related, and in others it is negatively related to both social and economic subcomponents of the SER. This is true even in neighborhoods located in the “high and very high DUF rate” areas (Figure 7). This study suggests that social and economic resilience can occur concurrently in DUFs. This may be due to the interconnectedness of social and economic factors, and interventions may have positively or negatively impacted both social and economic resilience in the DUFs.

On the positive relationship between DUF rate and social and economic resilience, the findings of this study support the earlier assertions by Giacometti & Teräs [42] that a community with high social resilience may be better able to mobilize resources and support one another during economic downturns and conversely, social norms that emphasize adaptability or collective action can also contribute to economic resilience. On the negative relationship between DUF rate and social and economic resilience, this study supports the findings of (a) Hassanvand et al. [43] that social inequalities such as unequal access to education, healthcare, or job opportunities, can make certain groups more vulnerable to economic shocks and less able to recover, even if the overall economy is resilient, and, (b) Hegazy et al. [22] that economic hardship can lead to social vulnerability and decreased community participation, hindering the development of social resilience and potentially leading to further economic decline. This study has a limitation that needs to be taken into consideration. The findings of this study are based on data gathered at the neighborhood level in Tehran Metropolis, Iran; therefore, the results cannot be generalized to other large cities or metropolises in Iran. Further analysis based on nationally representative data is required. But the methodological framework used in the study is innovative and could pave the way for similar studies in other countries.

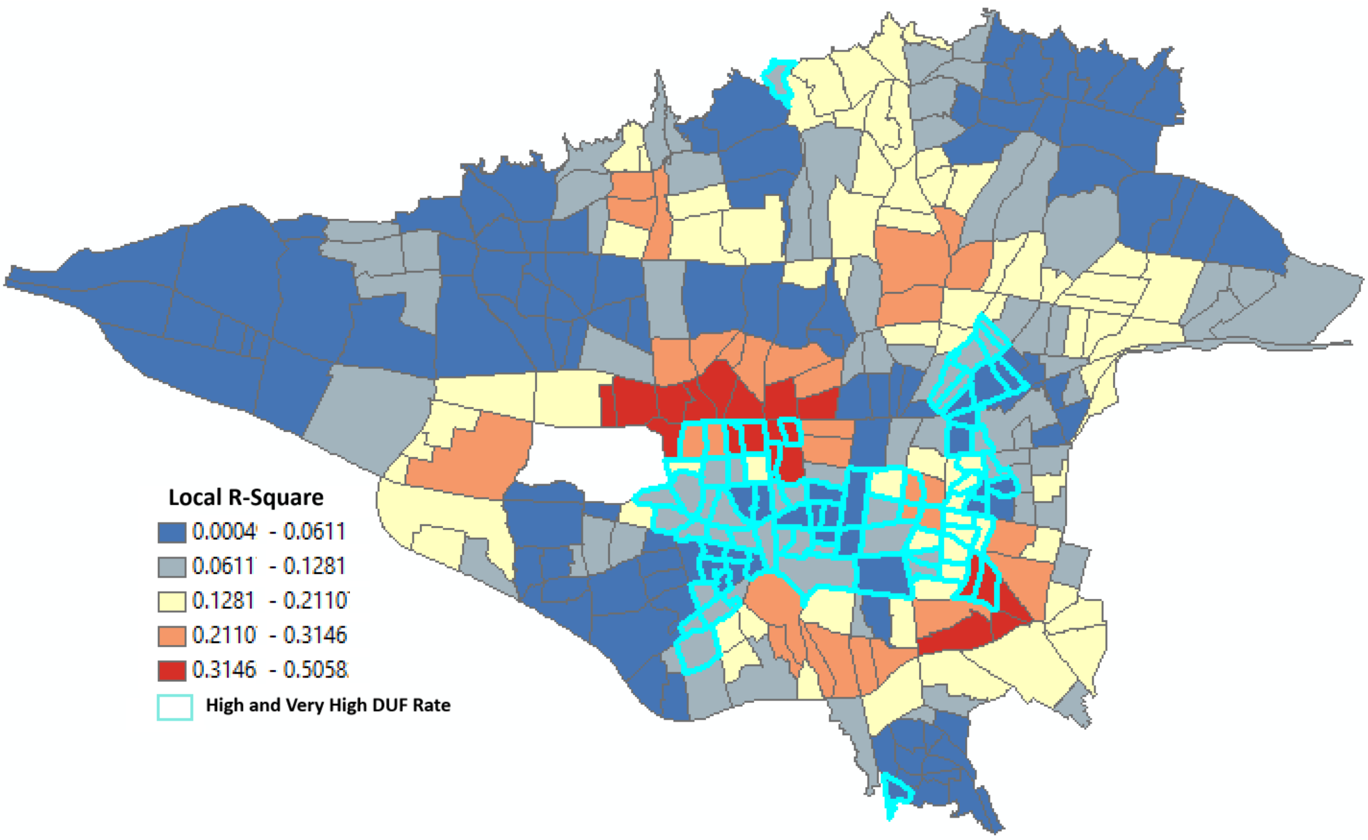

Figure 6. The local R^2 classification by Jenks' Natural Break method

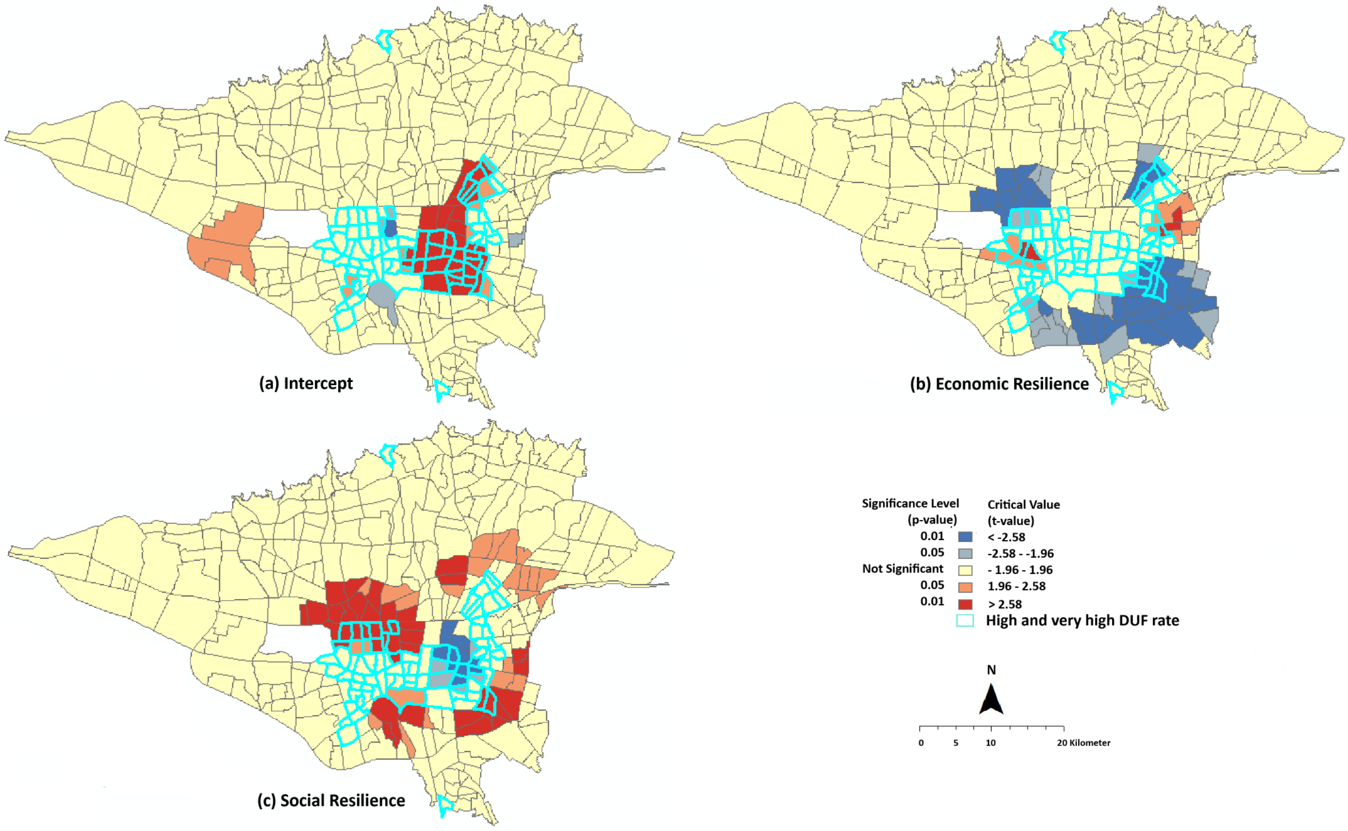

Figure 7. The spatial distribution of the significant coefficients of the intercept and the two SER subcomponents

6. Conclusion

This study examined the relationship between urban deterioration rate and fourteen variables depicting the SER. The results of this study show that (a) the UFD rates among the city's neighborhoods is clustered in nature and neighborhoods with high and very high UDF rates are clustered in the mid-southern parts of the city, (b) the relationship between DUFs and socio-economic resilience is complex, not definitively one-sided, mixed and varies across different neighborhoods of the city, (c) that social and economic resilience may happen simultaneously in DUFs. The methodological framework used in the study, including EFA, combining similar extracted EFA factors to arrive at new composite SER subcomponents, global spatial autocorrelation (Moran's I), Jenks Natural Break clustering, GWR and OLS regression analyses, can be applied to any other global location with similar datasets to contribute to the existing knowledge about urban decay and SER at the local scale. In the context of DUFs, understanding the interplay between social and economic resilience is crucial for developing effective strategies to promote recovery and long-term sustainability. Targeted interventions that address both social and economic vulnerabilities, while also fostering positive interactions between them, are likely to be more successful in building overall socioeconomic resilience. This includes taking proactive steps to improve infrastructure, boost collaboration across various sectors, utilize technology effectively, and encourage community involvement. The ultimate aim is to enable cities to absorb, recover from, and adapt to shocks while fostering sustainable development.

Ethical issue

The authors are aware of and comply with best practices in publication ethics, specifically with regard to authorship (avoidance of guest authorship), dual submission, manipulation of figures, competing interests, and compliance with policies on research ethics. The authors adhere to publication requirements that the submitted work is original and has not been published elsewhere.

Data availability statement

The manuscript contains all the data. However, more data will be available upon request from the corresponding author.

Conflict of interest

The authors declare no potential conflict of interest.

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