

Zandi, Rahman; Zanganeh, Mehdi; Akbari, Ebrahim

**Article**

## Zoning and spatial analysis of poverty in urban areas (case study: Sabzevar City-Iran)

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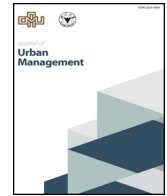


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## Zoning and spatial analysis of poverty in urban areas (Case Study: Sabzevar City-Iran)



Rahman zandi<sup>a,\*</sup>, Mehdi Zanganeh<sup>b</sup>, Ebrahim Akbari<sup>c</sup>

<sup>a</sup> Department of Remote Sensing and GIS, Faculty of Geography and Environmental Sciences, Hakim Sabzevari University, Sabzevar, Iran

<sup>b</sup> Department of Geography and Urban Planning, Faculty of Geography and Environmental Sciences, Hakim Sabzevari University, Sabzevar, Iran

<sup>c</sup> Master of Remote Sensing and GIS, Faculty of Geography and Environmental Sciences, Hakim Sabzevari University, Sabzevar, Iran

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### ABSTRACT

The present descriptive-analytical study employs a survey research method, documentary technique, and applied-developmental research design to zone the 18 neighborhoods of Sabzevar City in terms of urban poverty indicators. Data collection was done through a questionnaire distributed among a sample with the size of 384 participants selected from for citizens of 18 neighborhoods of Sabzevar City. A total of 17 urban poverty indicators were surveyed in the form of three sociocultural, economic, and access to urban services indicators. For data analysis, the analytic network process (ANP), Grey Relational Analysis (GRA), and spatial statistics tests were used. The results of the integration of the three economic, sociocultural, and access to urban services indicators depict that the highest urban poverty is in neighborhoods 17 and 18, 6, 14, 15, 13, 12, 11, and 9 respectively. All these neighborhoods are among the marginal neighborhoods of the city. The lowest urban poverty levels are in neighborhoods 1, 2, 3, 4, 5 and partly in neighborhoods 13, 14 and 16, which are part of the city's central neighborhoods, mostly including government employees, the salaried, and those with high-paying jobs. Comparing different types of urban textures via the Integrated Zoning Map of Poverty in Sabzevar City shows that urban poverty zones correspond to the areas of unofficial settlements and extension villages, and the economic poverty in the southern regions of the city is higher than other urban areas. According to the principles of Grey Relational Analysis (GRA), neighborhoods 1 and 2, which includes Southern Kashifi St., Northern Asrar St., and Imam Khomeini Blvd., is considered to be at a higher level than other areas in terms of poor urban poverty. The results of spatial statistics tests (spatial autocorrelation test and G-test) indicate the correlation and clustering of the data model or urban poverty indicators of the study area.

### Introduction

Poverty and its negative consequences limit human development, so that the poor are often at the ultimate level of vulnerability to health and economic turmoil and natural disasters. Now thinkers, policymakers, and urban managers are fully aware that the root of most sociocultural issues in cities is the concentration of poverty. Therefore, many empirical studies focus on poor urban areas (where poverty has a continuous presence) (Ren, 2011: 5). For more than a century, urban poverty has been one of the controversial sociological and political issues. In recent decades, due to the significant concentration of poverty in cities, causes, implications, and solutions have been significantly discussed (Curley, 2005: 1). Urban poverty is generally associated with unemployed or expelled

\* Corresponding author.

E-mail addresses: [rahmanzandi@gmail.com](mailto:rahmanzandi@gmail.com) (R. zandi), [mahdi820@gmail.com](mailto:mahdi820@gmail.com) (M. Zanganeh), [E.akbari.2791@gmail.com](mailto:E.akbari.2791@gmail.com) (E. Akbari).

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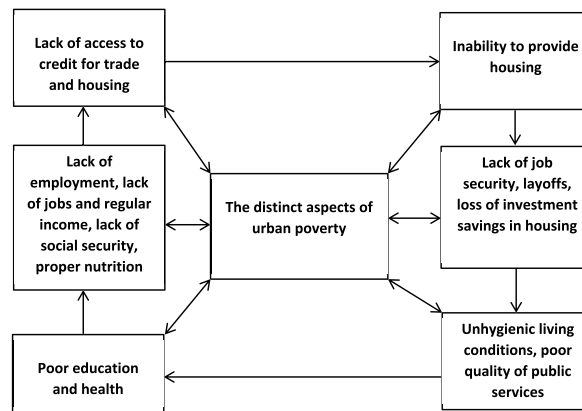


Fig. 1. Aspects of urban poverty (WorldBank, 2002: 1).

workers, and poor rural immigrants, so that it changes the sociocultural structure and spatial pattern of urban areas (Liu & Wu, 2006: 61). Urban poverty is a sociocultural, economic, and spatial issue. (see Tables 4 and 5, Figs. 1 and 2)

Most methods developed for coping with poverty are focused on economic methods and have not been considered from a socio-cultural and geographical perspective. Urban poverty is not an individual problem, but a socio-cultural and environmental challenge. Poverty and deprivation are nothing more than income differences and inequalities as well as factors such as educational opportunities, health, housing conditions, etc. More importantly, the role of the environment in defining and shaping the issue of poverty and inequality is not nearly as emphasized, because the urban environment is like a hospital affecting people's behaviors. Employment, academic achievement, sociocultural mobility, and so on all are affected by the geographical environment in which the individuals have grown (Pinoncelly, 2016: 3). The twenty-first century cities will undoubtedly face major challenges, one of the most

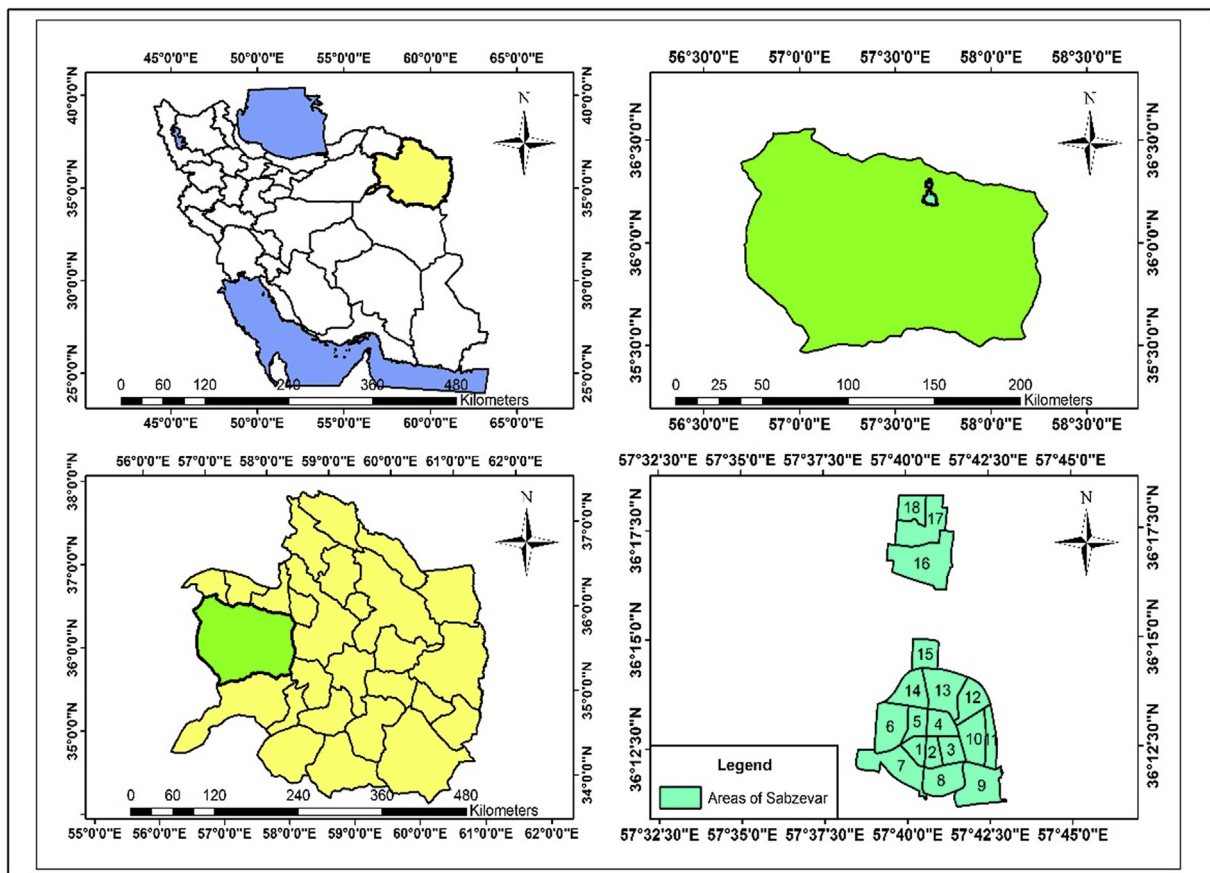


Fig. 2. Zoning the study area (researchers' investigations, 2018).

important of which is the concentration of poverty. Although rural poverty is deeper than urban poverty, and cities have high potential for living in and enjoyment and access to people's livelihoods, urban poverty, especially in developing countries, is expanding at higher rates and levels (UNFPA, 2007: 15). In these countries, rapid urban growth is typically greater than the capacity of local governments to provide services and infrastructures that will increase urban poverty and inequality in cities (Duque and *ibid*, 2015: 2). Moreover, the damages that poverty imposes are so wide and long-term that threatens the sustainability of cities in terms of economic, sociocultural, cultural, environmental, and security dimensions (Gray & Moseley, 2005: 2). Therefore, planning for this rooted phenomenon requires accurate knowledge of the poor areas and the mechanisms that create them.

Eradicating poverty and adjusting income inequality in such countries is the most tremendous goal and most difficult task for economic policymakers. However, one of the important consequences of their economic development policies is the increasing growth of the black economy. Evidence indicates that economic growth in the Iranian economy is likely to expand because with the growth of the black economy in accomplishing social security programs, which in turn increases poverty (Pormosavi et al., 2013: 45). Therefore, eradicating poverty and creating justice is important in Iran.

Considering that in the last five years, the rehabilitation projects have been carried out by the Urban Renewal Headquarters of Sabzevar City and other relevant institutions in the target areas, the present study attempts to examine the status of poverty in terms of spatial dimensions and locations, as well as to compare the urban poverty areas with metropolitan urban regeneration targets in terms of three economic, sociocultural, and access to services indicators, so that planners and urban managers can use it in defining poverty alleviation policies. The study seeks to find out the results of the following research hypotheses: it seems that economic poverty in the southern regions of the city is higher than in other parts of the city, and the majority of poverty zones are located in the marginal neighborhoods of Sabzevar.

### Review of literature

In a study investigating urban understanding and strategies for reducing urban poverty, Mitlin (2004) identified income inequality in rural and urban areas as factors affecting urban poverty and introduced citizens' access to urban essential services such as education and health from actions as essential factors for reducing poverty. Conducting a research on urban poverty. Hidayah et al. (2012) pointed out that urban poverty is not just about citizens' lack of income, but also a lack of human, sociocultural, and financial capital.

He, Liu, Wu, and Webster (2012) conducted a study on the concentration and distribution of poverty in sociocultural groups in the Chinese cities, showing that poverty is more severe than what is shown in official state statistics in some sociocultural groups, including the working classes, unemployed and rural migrants. They also suggested identification and support of those groups via the Sociocultural Security Network.

Measuring the urban poverty in Medline City of Columbia, Duque and *ibid* (2015) argued that the physical system of poor urban areas reflects its sociocultural system, and secondly, people living in poor urban areas are similar to each other in terms of their physical and housing conditions as well as socioeconomic statuses.

In the study titled as “urban poverty, segregation and sociocultural networks in Sao Paulo and Salvador, Brazil”, Marques (2015) argued that the heterogeneous distribution of the networks in the study area is related to the individuals' access to opportunities in the study area. He pointed out that this heterogeneous distribution contributes to the production (reproduction) of urban poverty.

In his article titled as “consequences from the redistribution of urban poverty during the 1990's”, Galster (2016) came to the conclusion that the redistribution of urban poverty is not a proper strategy and does not show a promising future and external influences on neighbors.

In their article “is poverty decentralizing? Quantifying uncertainty in the decentralization of urban poverty”, Kavanagh, Duncan, and Pryce (2016), shows that poverty is concentrated in Glasgow, Dundee and Aberdeen in 2011, while it is decentralized in Edinburgh.

Hlahla (2016) conducted a study in KwaZulu-Natal, South Africa titled as “green economy: strategy to alleviate urban poverty and safeguard the environment?” showed that the green economy strategy helps reducing urban poverty, because it provides employment and income among the poor and indirectly manages the environment.

In a study explaining the extent of poverty from the perspective of social justice in Nasimshar Town of Tehran, Iran, Ghasemi Siani and Haghi (2016) zoned its neighborhoods using AHP model and ArcGIS with three social, economic and physical criteria. They suggested that neighborhoods with informal settlements had the highest urban poverty.

In a study conducted on, Iran, Roustaei et al. (2016) zoned Miandoab City in Iran with three social, economic and physical components using the Local Moran statistic and spatial statistics model, and ArcGIS. They showed that the social component is more dominant in the distribution of poverty, and the poverty has a cluster mode. They also suggested that the city's suburbs suffers from more poverty.

Farhadikhah et al. (2017) conducted a study on Mashhad City in Iran to investigate urban poverty in terms of three social, economic and physical dimensions using the AHP model and ArcGIS. The results indicated that poverty in the city has a cluster mode concentrated in suburbs.

Analyzing the dynamics of poverty in the Tehran metropolis in Iran, Movahhedi and Vali Noori (2017) investigated the social, economic, cultural, and physical criteria using the Local Moran statistic and found that over time, poverty in the Tehran Metropolis has been deformed from a cluster mode to a dispersed one.

## Theoretical framework

Poverty is defined as deprivation from basic capabilities, human rights, freedom of choice and equal opportunities (Odekon, 2010: 2), and is associated with several aspects of daily life such as low income, hunger, living in unhealthy conditions, inadequate access to urban and basic services, vulnerability, sociopolitical deprivation, deprivation from voting right, insecurity, etc. (Simler et al., 2003: 1).

Generally speaking, poverty can be defined through consideration of its indicators in the following main areas:

Income and cost; distribution of capital and income; assets and ability to use; essential needs, including health, education and sociocultural services; basic services, such as a healthy network, distribution of facilities and other infrastructure services; health services, security of life and assets; standard of living in comparison with eyes and expectations; acceptance and respect by the community; the right to choose and access opportunities for personal and family life; - understanding and responding to wishes; And the voice of the people; and the provision of spiritual and non-spiritual needs (Jitsuchon, 2001: 9-box1). The issue of poverty and its measurement in the texts related to development economy has a special status which has become more important in recent decades in the economic policies of countries in the world, especially in developing ones. But urban poverty is a multi-dimensional phenomenon that planners and policy makers face with many challenges. The most common way to measure poverty is using income or based on household consumption and households' purchasing power. But the category of urban poverty goes beyond measuring the income of its inhabitants and it involves a lack of human, sociocultural, and financial capital (Hidayah Chamhuri, 2012).

There are different views on how urban poverty is formed. The World Bank has presented various aspects of urban poverty, which are outlined as follows.

Based on the issues discussed in each of the perspectives presented and aspects of urban poverty from the World Bank's view, it can be stated that some of the variables of poverty formation in each Iranian city are taken from the factors mentioned in each aforementioned views. In addition, some part of the various aspects of urban poverty presented by the World Bank are available in Iranian cities. Therefore, the aforementioned views and aspects of urban poverty are presented as the basis of the present study because Sabzevar as one of the mid-sized cities in Iran has suffered from aspects of urban poverty due to the social, economic, and accessibility criteria that are more tangible.

### Introducing the study area

Sabzevar City is one of the central cities of Iran, located in the dry and desert region, west of Khorasan Razavi Province. It is located 240 km west of Mashhad and is located on the main road of Tehran-Mashhad. Sabzevar, in terms of mathematical and planetary position, is located in range from 57°37'30" to 57°46'10"E and 36°9'7" to 36°22'30"N at 965 m above sea level. Sabzevar City is located in Sabzevar Plain and it is 31.7 square kilometers in size. Its population of in 2016 was estimated as 243,700 individuals (Iranian Statistics Center, 2016).

### Methodology

The present descriptive-analytic was done via a survey research and documentary technique as well as an applied-developmental design. The data was collected through a researcher-made questionnaire. According to population of Sabzevar City in 2016 as 243,700 individuals, the questionnaire was distributed to 384 participants selected from among citizens of 18 Districts (Neighborhoods) of Sabzevar. The ANP was used for analyzing the data, 20 experts in the field weighted the indicators.

In addition, Grey relational analysis (GRA) was used to rank the urban poverty indices in urban areas of the study area. Finally, spatial statistics tests (spatial autocorrelation and general population statistics) were used to determine the distribution pattern of urban poverty indices in the study area. Poverty zoning has been conducted with three main economic, socio-cultural and access to urban services indicators, and several criteria have been measured for each criterion in the ANP. The GRA has also used for ranking areas of poverty for three main economic, socio-cultural and access to urban services indicators. For doing spatial statistics tests (spatial autocorrelation test and G-test) the dotted and final layer obtained from the ANP were used. Below, more explanations are provided for the models employed in the research.

### Analytic network process (ANP)

In 1996, Thomas Saaty presented a hierarchical analysis method called the ANP which is hierarchical network structure as a multifunctional decision-making method widely used in solving complex decision-making problems. In fact, the ANP is a two-part linkage: the first part consists of a set of network and hierarchical control criteria and sub-criteria that controls interactions and interactions and the second is a network of excellences and influences between elements and clusters (Saaty, 1999).

### Grey relational analysis (GRA)

The GRA is a multi-criteria decision making method used to evaluate a number of options based on a number of criteria. In this technique, the analysis basis is the decision matrix. After the formation of this matrix, the grey-field analysis algorithm is used to select the optimal option. The algorithm of this technique can be done with both grey numbers and definite (crisp) numbers. The concept of grey analysis can be used to obtain a correlation between the main factors and the reference with other factors. The GRA

**Table 1**  
Different views regarding the formation of urban poverty.

Resource	Content	View
Ren, 2011: 25	With the invasion, sequences, and succession, urban neighborhoods are the arenas for conflicts of social groups.	Urban ecological view
Massey & Denton, 1993:123	The dynamics of urban neighborhoods are driven by the supply-demand mechanism and the characteristics of the housing market and racial and discrimination factors.	Economic view
Kaplan, Wheeler, Holloway, & Wiley, 2012: 133	Lack of economic opportunity leads to structural disadvantages and changes in community culture.	Poverty culture view
Brenner, 2009: 202	It emphasizes the criticism of ideology, power, inequality, injustice, and exploitation within and between cities.	Critical view
Elhadary & Samat, 2012: 217	It emphasizes the distribution of power and wealth and how the state plays a role in the city.	Politico-economic view

Resource: the mentioned references.

analyzes the relationships between a main factor and all other factors of a system (Anabastani & Javanshiri, 2018) (see Table 1).

### Spatial statistics

Spatial statistics have different types of variations. In this study, spatial autocorrelation and G-statistics are employed. The methods are explained as follows (Table 2) (see Table 3).

With regard to the selection of multiple criteria and indicators in this research, the research procedure is presented in the following flowchart for a better understanding of the steps involved.

### Discussion

Initially, participants’ personal characteristics are as follows: from a total sample size as 384 participants, 192 participants (50%) were male and 192 of them (50%) were female; the majority of participants (62%) held graduate and postgraduate degrees and 38% of them were aged from 35 to 45 year. For measuring the poverty distribution in Sabzevar, the ANP model and GRA, the Spatial Structure Analysis of 18 neighborhoods of Sabzevar City were employed in terms of three sociocultural, economic, and access to urban services criteria.

#### ANP

At first, findings from the research sociocultural indicator and selected criteria for this indicator are explained. Then, the findings of the economic indicator and selected criteria for this indicator are introduced. In addition, findings from the access to urban services indicator and criteria effective on urban poverty are also outlined in this indicator. Finally, the results of the three main research indicators are argued, and the urban poverty indicator is analyzed in this section. In Table 2, the research findings are presented in the selected criteria in percentage (see Fig. 3).

#### Sociocultural indicator

The sociocultural indicator of urban poverty for inhabitants of the 18 districts (neighborhoods) of Sabzevar City, which eventually gained 0.28% of the total weight of the indicators, were classified into five categories, the first being classified as poor urban poverty and the fifth category classified as very poor urban poverty. The results of Fig. (4) show that the highest sociocultural poverty is related to neighborhoods 1, 7, 8 and 9, including areas of Modarres Blvd, Imam Khomeini Blvd, Sarbedaran Blvd., Sana’at Blvd., Haft Tir St., Islamabad St., Imam Reza Blvd. and Salman Farsi St. It is also observed that they covered some part of the marginal areas of the city and in fact the poor areas of the city is adapted to its geographical south.

The lowest sociocultural poverty is in neighborhoods 16, 17, and 18, covering the areas of Hekamt St., Erfan St., Allameh Ja’fari St. and Molavi St., covering some part of the planned areas of the city where include the majority of government employees and the salaried. In fact, the rich part of the city corresponds to its geographical north.

**Table 2**  
Measurement method of spatial statistics models.  
Source: (Anabastani & Javanshiri, 2018).

Measurement method for spatial autocorrelation	Measurement method for G-statistic
$S_0 = \sum_{i=1}^n \sum_{j=1}^n w_{ij}$ $E(I) = -1/(n - 1)V[I] = E[I^2] = E[I]^2$	$G(d) = \frac{\sum \sum w_{ij}(d) x_i y_j}{\sum x_i \sum y_j}$
	$I = \frac{n}{S_0} \frac{\sum_{i=1}^n \sum_{j=1}^n w_{ij} z_i z_j}{\sum_{i=1}^n z_i^2}$ $Z_I = \frac{I - E[I]}{\sqrt{V[I]}}$



**Table 3**

Weight of the criteria used in the sociocultural indicator of urban poverty.

Source: the research findings (2018)

Indicator	Density	Literate	Disabled	Migration	Total
Weight	0.11	0.09	0.06	0.02	0.28

**Table 4**

Weight of the criteria related to the economic indicator of urban poverty.

Source: the research findings (2018)

Indicator	Income	Employment	Unemployment	Tenancy	Housing	Vehicle	Total
Weight	0.18	0.13	0.04	0.06	0.03	0.02	0.46

**Table 5**

Weight of the criteria related to the access to public urban services indicator of urban poverty.

Source: the research findings (2018)

Criteria	Access to streets	Healthcare	Educational	Administrative	Commercial	Cultural	Facilities and parking lots	Total
Weight	0.08	0.06	0.04	0.03	0.02	0.01	0.01	0.25

### *Economic indicator*

The economic indicator of urban poverty among the residents of the 18 districts of Sabzevar City, which eventually gained 0.46% of the total weight of the indicators, is classified in five categories, the first category is considered as very low urban poverty and the fifth category is classified as very high urban poverty. The results of Fig. 5 show that the highest economic poverty in areas 9, 11, and 15, including the areas of Islamabad and Imam Reza Blvds.; 8-m Sajjadiyeh St.; Kheyrabadi, Rezvani and Ferdowsi districts, Salamat Park, Shohada Haste'ei Blvd., and Pomp Gaz area where cover a part of the unofficial and marginal texture of the city. The lowest economic indicator of urban poverty is in districts 3, 4, 5, 6, 10, 13, covering areas of the western side of Shariati Sq., South Kashefi St., and Kargar Square, southwest of Sarbedaran St., northwest of Shahid Beheshti Sq., Asad Abadi St., the area between Towhid Shahr Blvd. to Daneshgah St. and Pasdaran Blvd., the area between Shahid Chamran Blvd. and Jihad Keshavarzi Ave., where are part of the city's central districts.

### *Access to urban services indicator*

The access to urban services indicator of urban poverty for the residents of the 18 districts of Sabzevar City, which eventually gained 0.25% of the total weight of the indicators, was categorized into five categories, the first category was considered as very poor urban poverty and the fifth category is classified as very high urban poverty. The results of Fig. (6) show that the highest poverty in terms of access to urban services is observed in districts 17, 18, where are part of the planned urban texture are and are deprived from access to services due to the dormitory function of Towhid Town. The lowest poverty in terms of access to urban services is in districts 1, 2, 3, 4, 5, 8, 7, 14, 16, where are the majority of the central urban neighborhoods. The names of the areas in these districts are not mentioned because of the avoidance of repetition.

The results of the integration of the three economic, sociocultural and access to urban services indicators show that in the integrated urban poverty indicator, the highest weight is related to the economic indicator and the lowest one to the access to public services indicator. The results of Fig. (7) show that the highest urban poverty is related to neighborhoods 17, 18 and margins of neighborhoods of 6, 14, 15, 13, 12, 11 and 9, where are part of the marginal neighborhoods of the city. The names of the areas in these districts are not mentioned because of the avoidance of repetition. The lowest urban poverty is related to neighborhoods 1, 2, 3, 4, 5 and partly in neighborhoods 13, 14 and 16, where are part of the city are central and often residences of government employees, the salaried, and those with high-paying jobs. Comparing different types of urban textures via the Integrated Zoning Map of Poverty in Sabzevar City shows that urban poverty zones correspond to the areas of unofficial settlements and extension villages, and they are part of the target neighborhoods needing urban renewal (see Fig. 8).

Ranking of the 18 neighborhood of Sabzevar City in terms of urban poverty.

In order to determine the urban poverty level of the 18 neighborhoods of Sabzevar, the GRA and multi-criteria decision-making models were used. GRA was done via coding in Microsoft Excel. The economic, sociocultural and access to urban services indicators were considered for analysis. Therefore, the weight of each indicator must first be determined. To measure the weight of each of the indicators used, the ANP was employed.

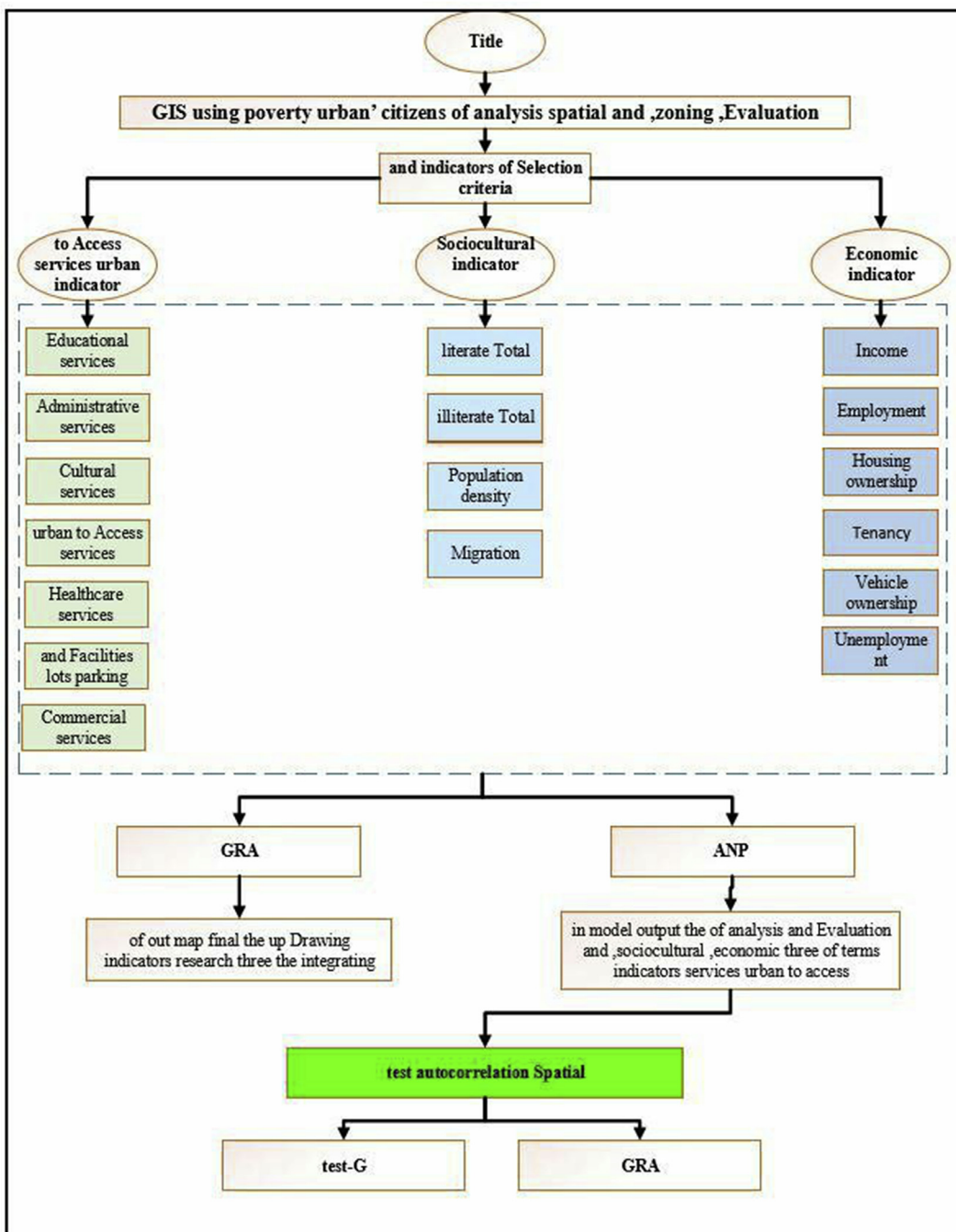


Fig. 3. Flowchart of the research procedure.

Unsealing decision matrix

When the measurement units of performance of different indicators are different, the influence of some indicators may be ignored. Therefore, the conversion of all functional values of each option into a series of comparisons seems to be necessary, i.e. normalization is carried out. For normalization of values, one of the following three formulas is used:

$$X_{ij} = \frac{y_{ij} - \min(y_{ij})}{\max(y_{ij}) - \min(y_{ij})}$$

Equation 1

The bigger the value is, the better it is



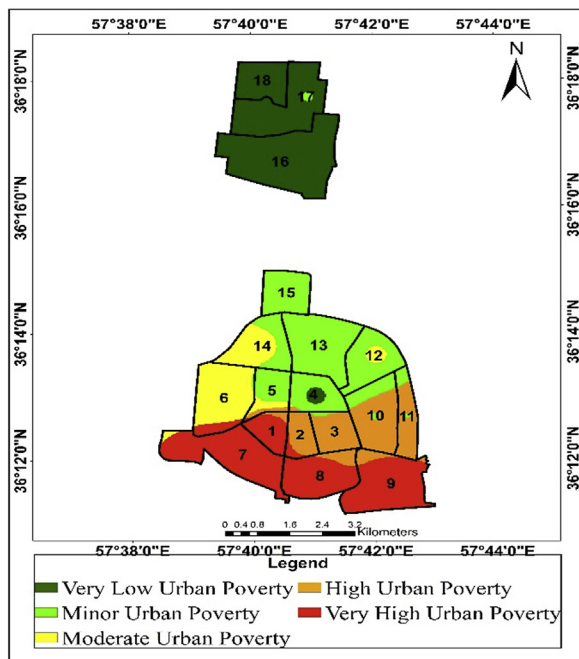


Fig. 4. Zoning urban poverty in terms of the sociocultural indicator.

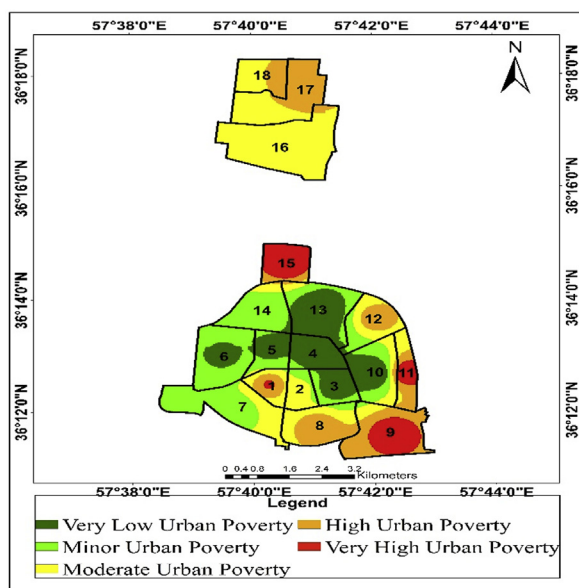


Fig. 5. Zoning urban poverty in terms of the economic indicator.

$$X_{ij} = \frac{\max(y_{ij}) - y_{ij}}{\max(y_{ij}) - \min(y_{ij})}$$

The smaller the value is, the better it is.

$$X_{ij} = \frac{|y_{ij} - y^o|}{\max\{\max(y_{ij}) - y^o, y^o - \min(y_{ij})\}}$$

The closer the value to the desired value ( $y^*$ ) is, the better it is.

The present study has positive and negative indicators. Therefore, all three relationships have been used for the normalization of the data.

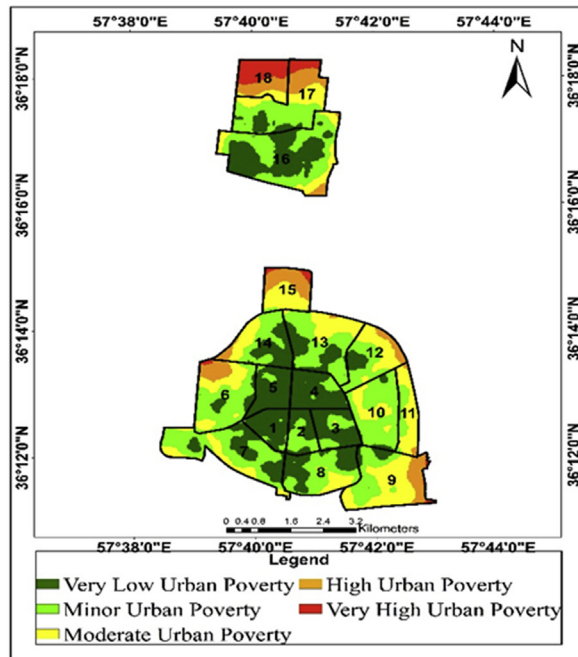


Fig. 6. Zoning urban poverty in terms of access to urban services indicator.

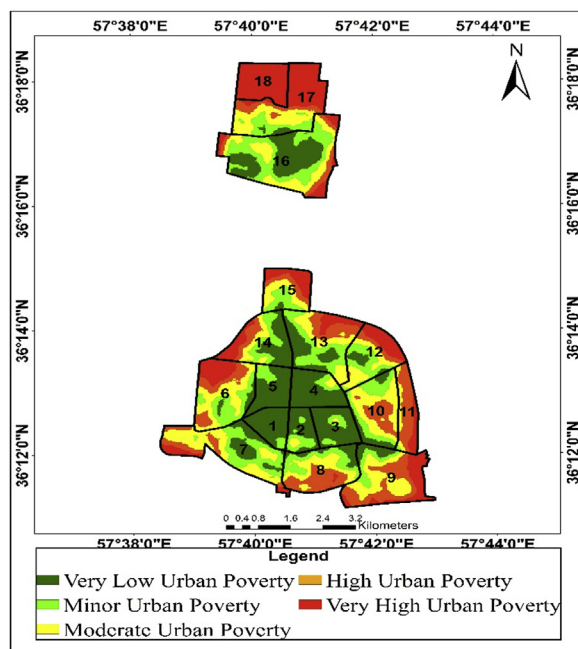


Fig. 7. The final zoning map of urban poverty in the 18 neighborhoods of Sabzevar City.

*Defining reference target series*

After creating Grey Relations, all functional values will be between Zeros to 1. The comparative series of option *i* is closer to the reference series, the more desirable it will be. For calculation of the reference target series, the number one is subtracted from each element of the matrix.

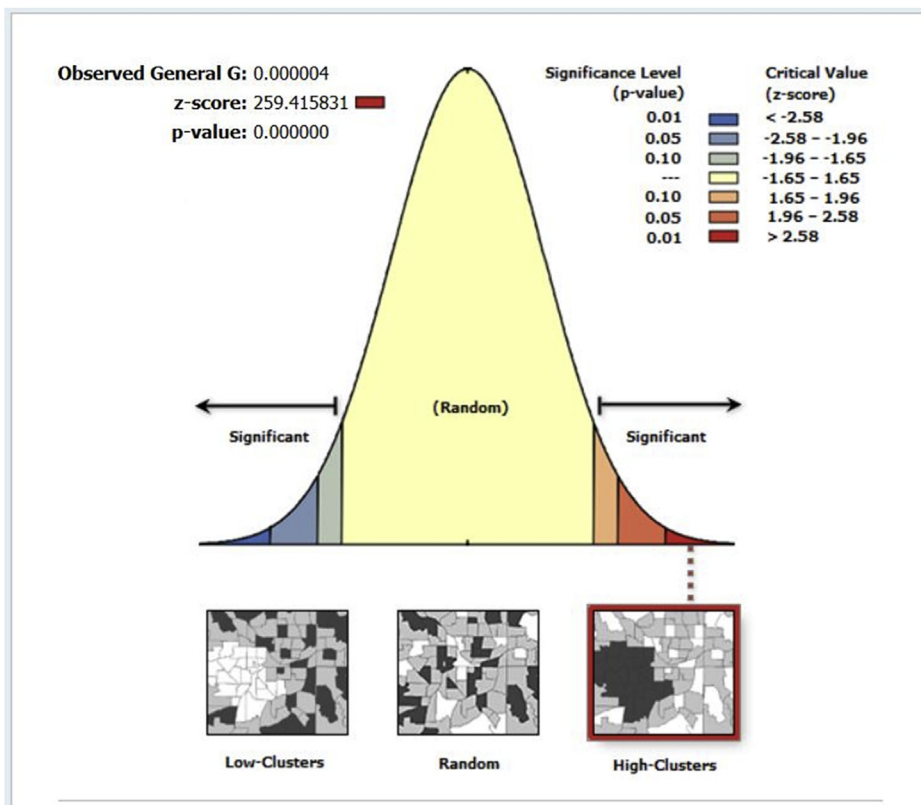


Fig. 8. Analysis of the urban poverty pattern via the spatial autocorrelation test in the study areaSource: research findings (2018).

GRA

The proximity of each  $X_{ij}$  to the corresponding  $X_{oj}$  is measured using the GRA coefficient. GRA coefficient is calculated as follows:

$$\gamma(X_{oi}, X_{ij}) = \frac{\Delta m_i + \zeta \Delta_{max}}{\Delta_{ij} + \zeta \Delta_{max}} \dots m, j = n \tag{Equation 2}$$

where, coefficient of determination  $\zeta$  is given as 0.4.

GRA scores

After calculating all GRA coefficients, the GRA scores are calculated via the following equation:

$$\Gamma(X_{oi}, X_{ij}) = \sum w_j Y(X_{oj}, X_{ij}) \tag{Equation 3}$$

This equation shows the degree of correlation between the reference series and the comparative series (see Table 6). In these calculations,  $w$  is the weight of the indicators previously calculated by the ANP. The weight of each indicator is multiplied by each elements of the matrix related to that indicator. According to the equations and final weights of decision-making indicators, the weights of each of the districts (neighborhood) are presented in Table (7).

Based on the principle of the GRA, the score less than the GRA coefficient shows more urban poverty among the 18 urban districts. Therefore, districts 1 and 2, including the southern Kashfi St., Northern Asrar St., and Imam Khomeini Blvd., are considered at a higher level than other districts in terms of urban poverty.

**Table 6**  
 Weight of the three main research indicators.

Main criteria	Economic	Sociocultural	Access to urban services
Weight	0.46	0.28	0.25

**Table 7**  
Weight and score of the 18 districts (neighborhoods) of Sabzevar City via the GRA.

Source: research findings (2018)

District	Score	Weight
1	0.45	1
2	0.45	1
3	0.46	2
4	0.47	3
5	0.50	6
6	0.53	9
7	0.54	10
8	0.53	9
9	0.51	7
10	0.58	12
11	0.57	11
12	0.48	4
13	0.52	8
14	0.49	5
15	0.53	9
16	0.54	10
17	0.48	4
18	0.0	0

### Spatial analysis

#### Spatial autocorrelation test

According to the spatial autocorrelation test, the Moran's index is 0.0984183, and since its value is positive above zero and close to one, it can be concluded that the pattern of indicators in the study area has spatial autocorrelation and cluster pattern. Given the fact that the Z-index is 281.284483, and the P-value is zero, the correlation and clustering of the data pattern or urban poverty indicators in the study area can be confirmed.

#### G-test

Analyzing distribution pattern of quality of life in the study area using G-test shows that, since the standard value  $Z < 1.96$  and  $P\text{-value} = 1\%$  is higher than 1.96 and is located in the red zone in the distribution sequence (Fig. 9), distribution of urban poverty in the study area has a high concentration of cluster pattern in such a way that  $p\text{-value} = 0$  shows a high concentration of cluster pattern. The G-statistic is also very close to zero.

### Conclusion

The issue of poverty and its measurement in the texts of the development economy has so special status that it has become more significant in recent decades in the economic policies of the countries in the world, especially in developing countries. But urban poverty is a multi-dimensional phenomenon that has faced planners and policy makers with many challenges. The most common way to measure poverty is using income or based on household consumption and households' purchasing power. But the issue of urban poverty goes beyond measuring inhabitants' income, involving a lack of human, sociocultural, and financial capital. In the present study, in order to analyze the data, first the ANP was used. Moreover, the GRA was used to rank the urban poverty indicators in the districts of the study area. Finally, spatial statistics tests (spatial autocorrelation and G-test) were employed to determine the distribution pattern of urban poverty indicators in the study area. In the ANP, poverty zoning has been conducted with three main economic, sociocultural, and access to urban services indicators, for each of which several criteria have been measured. In addition, 20 specialist experts in the field were involved in weighting the indicators.

The GRA was used for the ranking of areas of urban poverty in terms of the three main economic, sociocultural and access to urban services indicators. The spatial statistics tests (spatial autocorrelation and G-test) were employed for the spatial and final analysis of the ANP. The results of the integration of the three economic, sociocultural, and access to urban services indicators showed that the highest urban poverty was observed in neighborhoods 17 and 18, and in part in neighborhoods 6, 14, 15, 13, 12, 11, and 9, where are among the marginal neighborhoods of the city. The lowest urban poverty levels are in neighborhoods 1, 2, 3, 4, 5 and partly in neighborhoods 13, 14 and 16, which are part of the city's central neighborhoods, mostly including government employees, the salaried, and those with high-paying jobs. Comparing different types of urban textures via the Integrated Zoning Map of Poverty in Sabzevar City shows that urban poverty zones correspond to the areas of unofficial settlements and extension villages, and the economic poverty in the southern regions of the city is higher than other urban areas.

According to the principles of Grey Relational Analysis (GRA), neighborhoods 1 and 2, which includes Southern Kashifi St., Northern Asrar St., and Imam Khomeini Blvd., is considered to be at a higher level than other areas in terms of poor urban poverty. The results of spatial statistics tests (spatial autocorrelation test and G-test) indicate the correlation and clustering of the data model

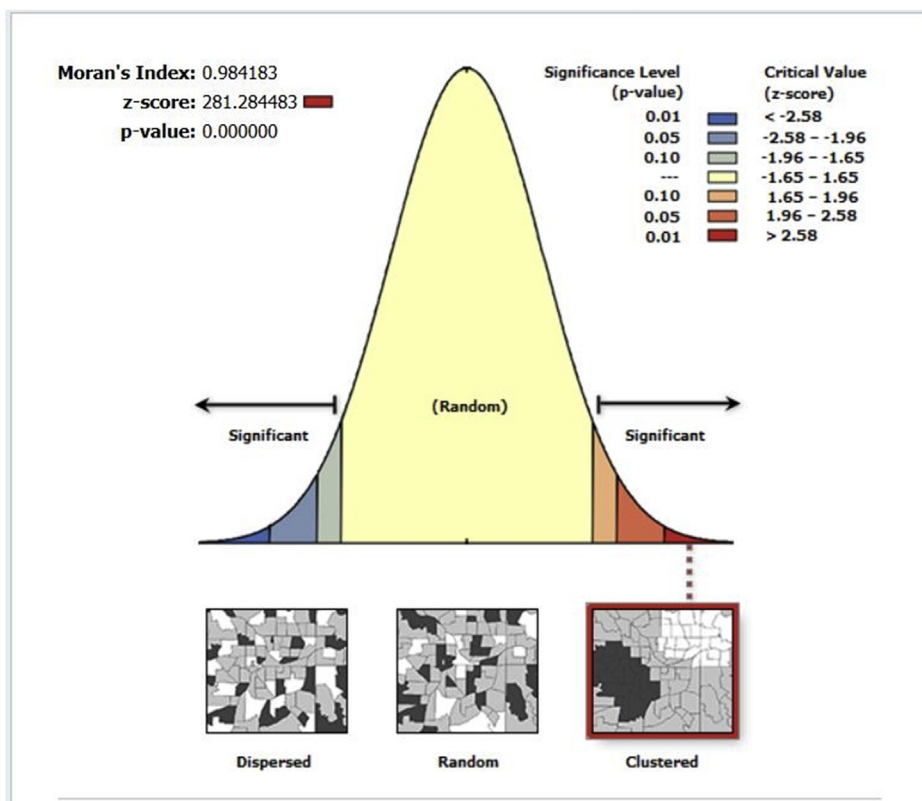


Fig. 9. Analyzing the urban poverty pattern in the study area via the G-testSource: research findings (2018).

or urban poverty indicators of the study area.

### Suggestions for further research

Finally, it can be stated that the findings of the above research process can be the basis for the planning and presentation of the strategies of thematic projects in the field of urban poverty, and on the other hand, the process of conducting this research can be a criterion for the operation of similar projects at the nationwide level.

The results of this research and implementation of the elimination of inequalities in urban neighborhoods will increase the level of residents' satisfaction with their living environment, and can be considered in order to achieve the goals of the 1404 National Perspective Program, Sustainable Development, and Healthy Justice-Oriented and City.

Therefore, with regard to the heterogeneity of the 18 districts of Sabzevar City in terms of the investigated indicators, marginal neighborhoods should be placed in the first priority of planning and social justice for alleviating urban poverty.

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