Spatial Analysis of Urban Poverty in Tehran Metropolis

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Abstract: Urban poverty is one of the main concerns of the 21st century and fighting against it is at the top of the millennium development goals. This paper has been done aiming to identify and analyze spatially areas of urban poverty. It has been done with quantitative method and survey based on secondary analysis in Tehran Metropolis in a way that calculated items were categorized based on four main factors of housing including economic, social, cultural, and educational ones and 43 indexes. They were selected by using statistical blocks data of Tehran Metropolis based on population and housing census in 2011. The results indicated that four extracted factors determine 72.7 percent of distribution of the total variance including housing poverty (28.7 percent), economic poverty (18.4 percent), social poverty (14.1 percent), and educational-cultural poverty (11.5 percent) respectively. They also indicated that districts 17, 19, 18, and 16 had the highest ranks regarding all poverty factors including economic, social, cultural, and educational ones. It is recommended to prioritize poverty alleviation and empowerment in development measures. However, the results of fuzzy VIKOR showed that there were 2312 very poor blocks (38.5 percent), 2049 poor blocks (34.1 percent), 1068 average blocks (17.8 percent), 458 rich blocks (7.6 percent), and only 114 very rich blocks.

Keywords: spatial analysis, urban poverty, Tehran Metropolis
JEL Classification: I32 ,N85 ,R21 ,C63 ,P46

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1- Introducation

Urban population reached from 0.7 billion people in 1950 to 3.9 billion people in 2014. According to the UN forecast, it will be reached to 6.3 billion people by 2050. On the other hand, the increasing growth of population will be mainly devoted to developing countries. Urban areas of Asia and Africa will cover almost all the world population increase between 2015 and 2050. Another notable phenomenon in this trend is increase in the number of metropolises. According to the reports, there were only 13 metropolitan areas with more than one million people in the world in 1900 while there were more than 300 metropolitan areas with a population of more than one million people in the beginning of the 21st century (United Nation, 2014). The evidences indicate that large cities of Asia, Africa, and Latin America will be main center of demographic, economic, and environmental problems of the 21st century. These metropolises are new, complex, and amazing phenomena dealing with many big problems socially, economically, managerially, and spatially-physically based on the entity of their formation and expansion. High population, density, pollution, crowd, socio-economic inequality, unsustainable and problematic urban areas, spatial failure, concentration and persistence of urban poverty are some of the most important issues and dilemmas of these large areas. Urban poverty is a multi-dimensional problem facing people with many restrictions including limited access to occupational opportunities, lack of enjoyment of housing and appropriate services, unhealthy and violent environment, lack of social welfare services, and supportive, medical, and educational mechanisms (Duclos & Araar, 2007). Poverty and its negative consequences restrict human development and most of the poor face with maximum vulnerability degree in health field, economic turmoil, and natural illnesses. Currently, scholars, policy-makers, and urban mangers acknowledge that the root of many social problems is concentration of poverty. Thus, much attention of experimental studies has been concentrated on poor urban areas (where poverty is constantly present) (Ren, 2011). Poverty damages are extensive and long lasting. Poverty threatens cities' sustainability economically, socially, culturally, environmentally, and in security domain. Malthus implicitly state that most of the poor have behaviors that damage the environment since they are not able to think about their meals (Gray & Moseley, 2005). In developing countries, the share of the poor living in urban areas is increasing. Today, about 13 percent of urban population in developing countries lives with less than one-dollar revenue per day. One of the most obvious and sustainable features of urban poverty in developing countries is formation and extension of poor neighborhoods. Poverty ranges is spatial-physical reflection of poverty in urban areas (Bemanian, et.al, 2011). Urbanization growth does not lead to poverty spontaneously, but it is stimulating economic development. Today, no country has achieved to economic development while the majority of its population is rural; therefore, the relationship between urbanism and poverty

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is very complex and often misunderstanding (Martin, 2012). In order to realize urbanization of poverty and its analysis in the world developing metropolises, it cannot be considered as a single phenomenon; rather this issue is the result of function of fields, factors, links and various causative mechanisms causing emergence, concentration, and continuation of a different model of this phenomenon in regional, national, and international aspects in any period.

Tehran Metropolis, like many of the world developing countries, has experienced a considerable growth during last five decades; in a way that, its population reached from 2.7 million people in 1966 to 8.15 million people in 2011. In terms of extent, it increased from 4600 hectares in the second Pahlavi era to 61 thousand hectares currently. In other words, in a seventy-year period, the extent of the city has increased more than 13 times. Coincident with this rapid growth, urban poverty has revealed itself in the form of slums inside and outside the city in the margins. This paper aims to recognize the situation and model of urban poverty in Tehran Metropolis seeking to answer following questions:

- What model is spatial expansion of poverty in Tehran Metropolis look like?

- What factor explains the status of urban poverty in Tehran Metropolis?

2- Literature Review

a) Foreign Researches

Urban poverty Studies date back to almost long ago, but the modern and academic approach to this issue is not very old. Urban poverty literature, particularly urban dynamism, is almost based on primary and innovative study of Ravallion & Jalan in 2000 that classified poverty based on household's data and information into chronic and dynamic poverty (Rieger & Wagner, 201). One of the studies with this approach is Martin & Cowell (2006) entitled "dynamic and static poverty in Spain." This research studied the period during 1993 to 2000 addressing to lack of studies on poverty with a dynamic approach. They believe that most of the studies on poverty have been done with static methodology. This research has been done based on the data of European Community Household Panel (ECHP) and statistical centers of Spain and indicated that log in and out of the cycle of poverty has occurred much more than stay in poverty in Spain.

He et.al. (2008) in a research entitled "concentration and distribution of poverty in social groups of China's cities" indicated that there is more and severe poverty than formal statistics of this country in some of social groups including workers, unemployed, and rural immigrants. They also suggested identifying and supporting these classes of the society by social security network.

Ren's research is one of the other studies in this field in 2011 entitled "Modeling poverty dynamics in moderate-poverty neighborhoods: a multi-level approach". This research has been done at the Ohio State University for metropolitan areas of the United States during 1990 to 2000. The transitional process of average neighborhoods to poverty cycle has been studied. He concluded that the transitional process of

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neighborhoods with classic model of life cycle can be explained in the U.S. metropolitan areas. Theoretical principle of this study is that households and neighborhoods' economic power declines during the time. Those households living currently in average poverty have the potential to change into quite poor households with high poverty degree in the future. Thus, the best way to fight against poverty is to discover the models of poverty changes from relatively poor families to the quite poor households. Meanwhile, we should collect enough evidences to prove this claim that relatively poor neighborhoods are the main source of quite poor ones in the future; therefore, this study improves our knowledge of poverty sequence mechanism.

b) Iranian Researches

In Iran, urban poverty phenomenon has been less considered as an independent issue, and it has been investigated in the form of studies on marginalization and informal settlement. Informal settlement that is spatial manifestation of poverty, particularly after Islamic Revolution, has been considered by geographers. One of the studies on urban poverty in Iran is the work of Khameneh and Mohammadi (2005). In this paper, the concept of urban poverty has been explained first; then, its aspects and indicators were introduced by using documentary study method.

Zibayi and Shooshtaryian (2007) in a research entitled "studying poverty dynamism in Iran studied the role of determining factors of poverty on hazard rate out of poverty and back into it by using Logit and SPELL.

Bemaniyan et.al. (2011) did a research aiming to identify the effectiveness of multi-dimensionally economic, social, physical, and environmental components in expansion of urban poverty ranges in the city of Kashmar by using Delphi and AHP. The results indicated that the two environmental and physical components have had the correlation with formation and expansion of poverty ranges.

Roostayi et.al. (2012) studied spread of poverty comparative model in the city of Kermanshah during 1996-2006 aiming to recognize spatial distribution of urban poverty in the city of Kermanshah based on statistical data and by using factor analysis.

Eskandari Sani (2015) in a research proposed the hypothesis that spatial organization of the poor in Tehran Metropolis moves toward convergence and concentration, and development of local communities, with enablement approach, leads to escape spatial trap of poverty. In order to prove the second hypothesis, the researcher collected and analyzed data by using questionnaire and statistical techniques in Nemat Abad neighborhood in Tehran district 19. Finally, both hypotheses were confirmed.

3- Theoretical Principles

Urban poverty has been the subject matter of sociologists, economists, and policy-makers more than a century. Due to increasing and regrettable concentration of poverty in cities, the debate over the causes, consequences and ways of combating it, particularly in recent decades, has been considered greatly (Curley, 2005). Even though scientists and policy-makers disagree about the

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reasons of urban poverty concentration, they agree about its results. The book of "the truly disadvantaged" was published in 1987 by Wilson leading to boom researches and activities about the impacts of urban poverty concentration (Kaplan et.al, 2012). In this regard, there are different theories and views about urban poverty. The following are the most important ones.

Urban Ecological View

One of the most influential theories related to urban poverty, particularly about neighborhood changes, is urban ecology theory founded in the beginning of the 20th century in the U.S. This theory that looks at city as a human ecology and at poor neighborhoods as transitional areas was proposed by Chicago School theorists (Curley, 2005). Proposing classical model of invasion, sequence and succession, urban ecologists believe that urban neighborhoods, like other ecological systems, are conflict of social groups (Ren, 2011).

Economic View

Since human behavior is not like plants and animals, other models have used economic views to explain sequence influx of succession. However, in terms of entity, this view, like ecological theories, is deterministic. Urban economists prefer to justify neighborhoods and areas' changes via supply and demand, and features of housing market. Theorists of this view consider racial factors as an institutional force that concentrates on poverty, and they believe that discriminations that are imposed by residents, owners, governmental officials, and real estate brokers restrict credit and market rationality in many cases and these discriminations play a fundamental role on dynamism process of neighborhoods (Massey & Denton 1993; Massey & Eggers, 1990).

Culture of Poverty

One of the other influential theories in this field is Oscar Lewis' poverty culture theory that has created an explosion in the field of urban poverty studies in 1960s. He stated that lack of economic opportunity leads to create structural defects causing changes in community's culture. These changes are followed by cultural reactions that are internalized by inheritance and generation and they are transmitted to the future (Kaplan et.al, 2012). This theory was seriously criticized by researchers like Wilson. Critics believe that Louis has diverted public's mind from attention to structural factors of poverty by proposing culture of poverty concept (Curley, 2005).

Critical Paradigm

Critical paradigm is rooted in Marx's studies and it was developed by Frankfort School scholars. Critical theory is different from conventional flows of urban theories, like inherited approaches of Chicago urban sociology school or other Neo-liberal approaches. Critical Urban Theory not only confirms and acknowledges condition of cities, as explanation of supra-historical rules, social organization and bureaucratic rationality confirms political and ideological relations and interfaces and as a result flexible features of cities that it constantly reconstructs itself. Concisely, critical theory includes critique of ideology, power, inequality, injustice, and exploitation inside and between cities. However, critique in critical theory is not merely descriptive, but it includes theoretical and

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social dimensions that are the heritage of social philosophy of enlightenment and post-enlightenment eras (Brenner, 2009).

Theory of Political Economy

Political economy concentrates on mutual relationship between politics and economics. Based on Todaro' theory (1989) the concept of political economy is determined with emphasizing on the role of power, particularly a part of power that is involved in economic decision-making (Elhadary & Samat, 2012). The perspective of urban political economy was proposed in the beginning of 1970s as a critique to ecology view. In this view, urban researchers have paid attention to distribution of wealth and power and they believe that the best urban land and the most access to municipal services are belonged to the rich. In their opinion, determining factors of city structure are to follow material benefits of the rich and government's political action. This approach emphasizes on the role of capitalism, international economy discipline, wealth and power accumulation and concentration, relationships between social classes, and the government's role. The common point of all political economy theorists is that they all emphasize on the role of human action and particularly the role of economic elite and political strongmen. Political economy emphasizes that analysis of urban issues requires that the researcher connects cities' events to economic and political changes in the world and analyze the city in the framework of these changes. Thus, this theory has been selected as the theoretical guide of this researcher indicated in figure1 (Sharepoor, 2012).

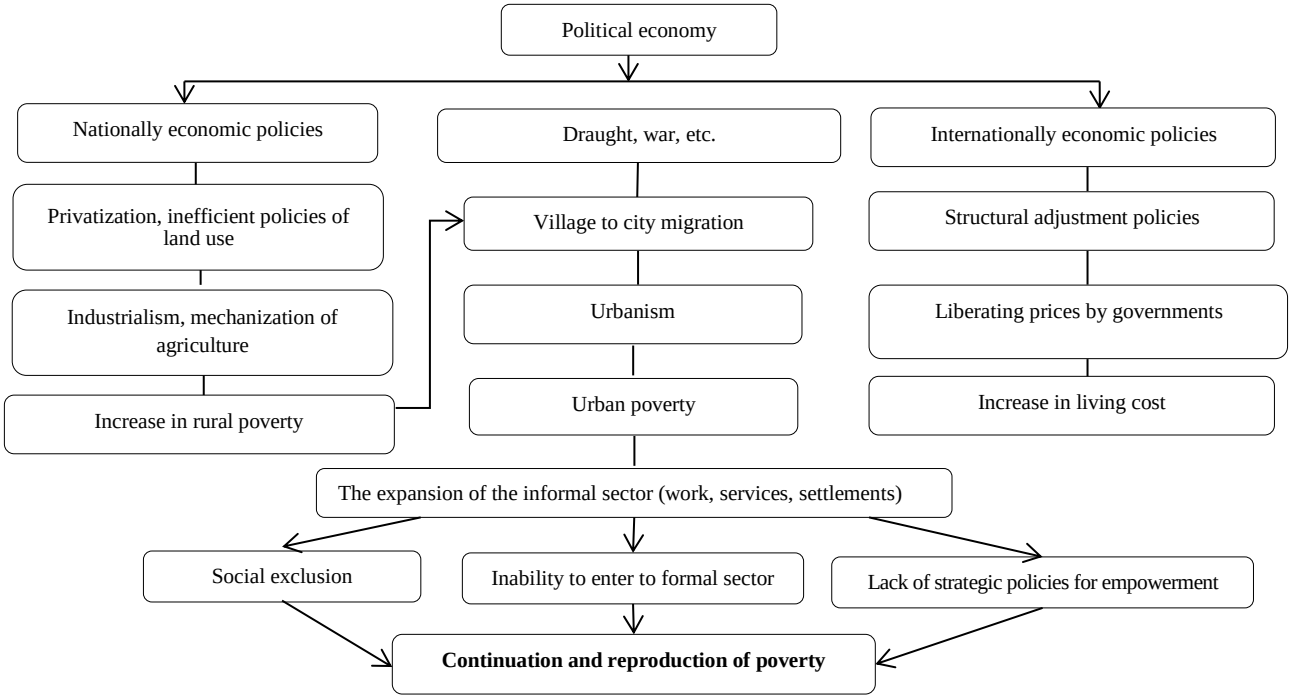

Figure1. Conceptual model of the research; the process of formation, continuation, and reproduction of urban poverty from perspective of political economy

Reference: (Researchers' findings)

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4- Research Methodology

In terms of purpose, this research is fundamental. In terms of time and subject feature, it is descriptive-analytical. Based on data entity, it is survey, and data collection method is documentary and secondary analysis. In this research, calculated items were classified based on four main criteria of housing including economic, social, cultural, and educational ones and 43 indicators. Statistical population is Tehran Metropolis examined by using statistical blocks data and urban development plans in 2011. VIKOR Multiple Criteria Decision Making (MCDM) was used for ranking urban areas of Tehran in terms of multi-dimensional urban poverty in ArcGIS. However, in order to show the weight of each index, first, a questionnaire was prepared, then, after inserting the indicators, it was given to 15 experts who were selected purposefully and it was weighted based on the views of experts. In order to draw map, ArcGIS, and to analyze questionnaire weights, mathematical models of decision-making (Fuzzy) were used respectively. In addition, Moran II spatial autocorrelation analysis method was used to study spatial distribution of poverty variable. Studied area of this research is Tehran Metropolis (22 districts) that its population was 8184051 people according to the general population and housing census in 2011, and its area was 750 square kilometers with density of 193 people per hectare (Iran's Statistical Center, 2011).

5- Research Findings

In order to study the distribution of urban poverty, 43 indicators of four components of housing including economic, social, cultural, and educational ones were selected according to table1 and the map was prepared in GIS. Map1 represents a selection of these maps. Related data to these indicators were based on statistical block data of the last formal census in Iran in 2011. Table 1 that is obtained from Principal Component Analysis (PCA) to measure distribution of variables shows that there is a relationship and correlation between variables and low variance between components confirms this fact.

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Table1. Analysis of urban poverty factors based on Principal Component Analysis (PCA)

Variables	Primary	Extracted
Density of person in residential unit	1	0.712
Density of household in residential unit	1	0.702
Number of people in room	1	0.676
Number of rooms in residential unit	1	0.624
Room occupied by households	1	0.665
Percentage of residential units with landline phone	1	0.532
Percentage of residential units with piped water	1	0.478
Percentage of residential units with piped gas	1	0.780
Percentage of residential units with central heating	1	0.745
Percent of residential units with central heating and cooling system	1	0.714
Percent of residential units with all facilities	1	0.598
Percent of residential units with piped water and bathroom	1	0.714
Total percentage of rooms, halls, living rooms, non-open kitchen etc. available for household	1	0.589
Percent of typical residential units with one household	1	0.654
Percentage of area of residential unit	1	0.712
Average area of floor area	1	0.702
Percentage of typical residential units based on building structures	1	0.676
Rate of entered immigrants (in each 1000 people)	1	0.693
Total marital status (divorced)	1	0.702
Rate of total participation	1	0.710
Rate of men's participation	1	0.847
Rate of women's participation	1	0.756
Rate of total employment	1	0.789
Rate of total unemployment	1	0.740
Rate of men's employment	1	0.812
Rate of men's unemployment	1	0.789
Rate of women's employment	1	0.847
Rate of women's unemployment	1	0.714
Percentage of household's type-typical resident	1	0.624
Household's size	1	0.665
Percentage of households with disabled member	1	0.693
Percentage of typically resident household based on having automobile	1	0.702
Percentage of typically resident households based on having P.C.	1	0.710
Percentage of students-inside the country	1	0.847
Percentage of men's illiteracy	1	0.756
Percent of population illiteracy	1	0.789
Percent of women's illiteracy	1	0.740
Ration of population dependency	1	0.812
Ration of young population	1	0.798
Ratio of old population	1	0.874
Gender ratio	1	0.714

Reference: (Researchers' findings)

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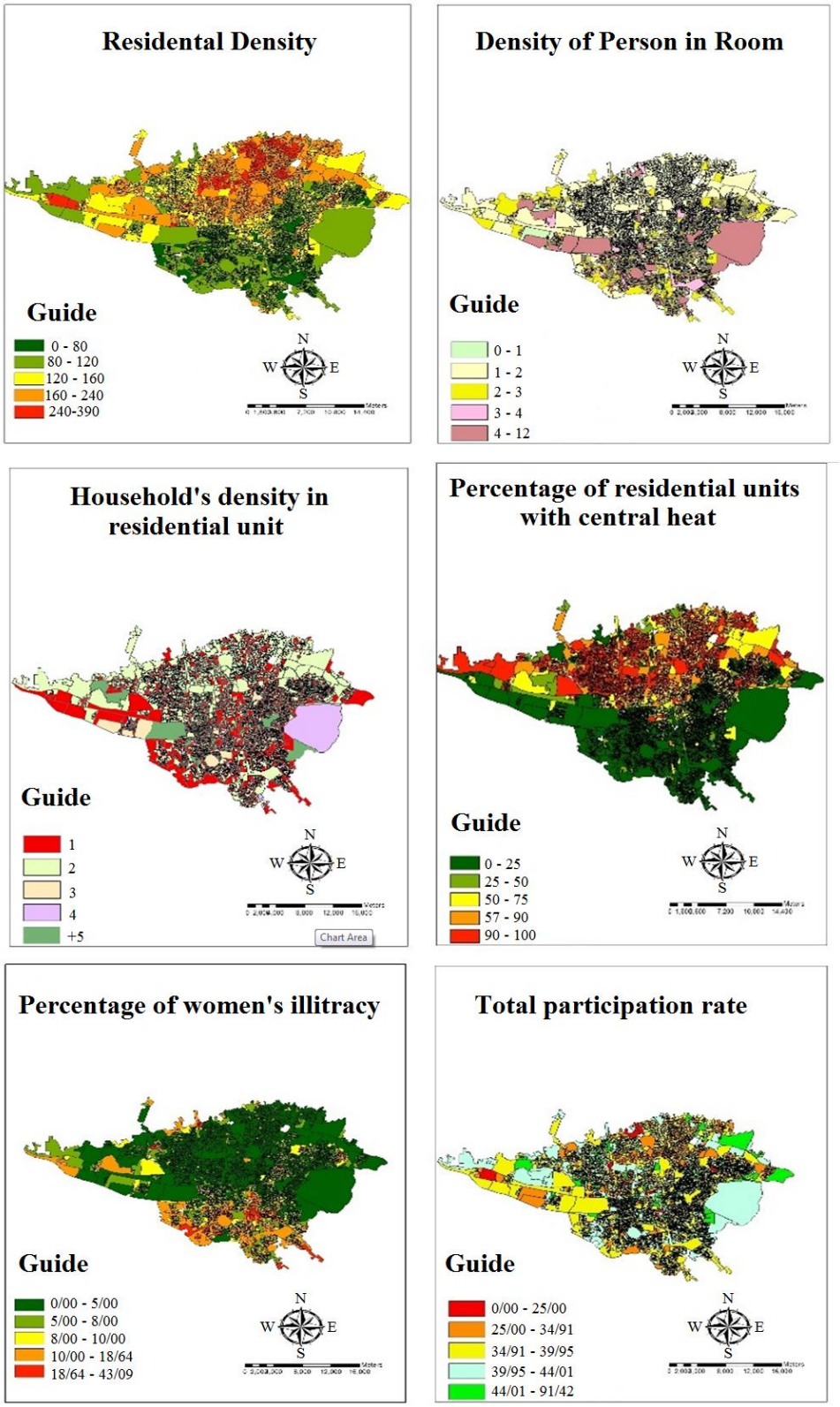

Map1. Zoning map of Tehran Metropolis based on numbers of urban poverty indicators
Reference: (researchers' findings)

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Table2. Statistic of Kasier-Meyer-Olkin Measure of Sampling (KMO) and the results of Bartlett's test of in identifying poor areas

Adequacy values of sampling Kasier-Meyer-Olkin (KMO)	0.813	
Bartlett's test of sphericity	Chi-square	78.19
	Degree of freedom	138
	Significance level	0.000

Reference: (Researchers' findings)

Given table2, since values of KMO statistic is 0.813, data are appropriate for performing factor analysis. However, the results of Bartlett's test are significant i.e. H0 is confirmed and there is a significant correlation between variables.

Table3. Total squares of final rotated loads and total squares of extracted loads of certain values of the initial factors

Factors	Initial Certain Values			Total Squares of Extracted Loads			Total Squares of Rotated Loads		
	Total	Percentage of Variance	Cumulative Variance	Total	Percentage of Variance	Cumulative Variance	Total	Percentage of Variance	Cumulative Variance
Housing	3.94	30.7	30.7	3.94	30.7	30.7	48.3	28.7	28.7
Economic	2.67	20.4	51.1	2.67	20.4	51.1	54.2	18.4	47.1
Social	1.45	14.18	65.28	1.45	14.18	65.28	37.1	14.1	61.2
Educational-Cultural	1.34	11.98	77.26	1.34	11.98	77.26	22.1	11.5	72.7

Reference: (Researchers' findings)

In order to analyze data, four types of total factors were selected by factor analysis. The findings of table3, considering research content to estimate structural validity of the questionnaire were obtained by using factor analysis of significance level of Bartlett's test (sig=0.001) and Kasier-Meyer-Olkin test (KMO=0.84) and indicated that exploratory factor analysis is possible for intended items. Four extracted factors are respectively housing poverty (28.7 percent), economic poverty (18.4 percent), social poverty (14.1 percent), and educational-cultural poverty (11.5 percent). Totally, these factors illustrate 72.7 percent of distribution of total variance (table4).

Table4. Factor analysis of urban poverty factors

Row	Factors	Special values	Percentage of variance	Percentage of cumulative variance
1	Housing poverty	3.887	28.7	**28.7**
2	Economic poverty	2.548	18.4	**47.1**
3	Social poverty	1.232	14.1	**61.2**
4	Educational-cultural poverty	1.141	11.5	**72.7**

Reference: (Researchers' findings)

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Table5. Matrix of standardized factor scores of poor areas

Rank	Total scores	Educational-cultural poverty	Social poverty	Economic poverty	Housing poverty	District
2	96.92	96.80	95.21	98.11	97.58	1
4	95.06	94.74	93.26	96.10	96.11	2
1	97.17	96.97	95.25	98.28	98.20	3
5	92.83	92.42	92.44	93.20	93.25	4
3	96.55	95.75	95.30	97.61	97.53	5
6	92.34	92.07	90.22	93.59	93.46	6
7	91.54	91.26	90.42	92.07	92.43	7
8	87.85	87.83	87.44	88.15	88.38	8
15	74.93	75.40	75.65	74.04	74.62	9
13	80.41	80.39	80.57	80.19	80.49	10
9	83.87	83.67	83.48	83.89	84.43	11
16	73.11	73.60	74.75	72.14	71.97	12
12	82.29	81.34	81.41	83.02	83.38	13
11	82.75	82.21	82.73	83.07	83.00	14
17	71.72	72.41	73.79	70.52	70.15	15
19	66.52	70.80	67.87	63.80	63.62	16
22	53.23	54.58	55.92	51.18	51.22	17
20	59.49	59.88	61.30	58.52	58.26	18
21	59.35	59.99	61.86	57.83	57.73	19
18	69.11	69.60	70.75	68.14	67.97	20
14	78.90	78.66	78.43	79.21	79.30	21
10	83.81	82.08	82.31	84.26	84.04	22

Reference: (Researchers' findings)

As it has been represented in table5, districts 17, 19, 18, and 16 are the highest ranks among Tehran districts in all factors including housing, economic, social, and cultural-educational poverty.

Implementation of VIKOR model in GIS

First, information layers of criteria were inserted in GIS, and then the criteria were normalized. Normalization means eliminating measurement units of criteria functions in order that all criteria are dimensionless. Through simple normalization, normalized value is determined i.e. dividing the value of the criterion function to its maximum value. After normalizing layers, the weight of indicators was obtained by fuzzy system.

To determine and measure multi-dimensional urban poverty of Tehran Metropolis, (unlike previous studies that considered economic-revenue dimension and one-dimensional of this issue), this issue was addressed by examining resources systematically and experts' view in various disciplines emphasizing on urban attitude. According to general population and housing census in 2011, Tehran Metropolis has 6001 areas and 22 districts. According to these data, analyses were changed into 4 factors and

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43 indicators. In order to determine the weight of each indicator, fuzzy process was used. To rank Tehran districts, in terms of multi-dimensional urban poverty in ArcGIS, VIKOR fuzzy MCDM was used. Thus, by forming primary matrix that has 6001 blocks and 43 indicators, and in the next step, matrix of 22 districts and four factors, spatial analysis of urban poverty was addressed. In the first step, in order to compare different scales of measurement (for various indicators) normalization should be used. In this research, fuzzy normalization method was used (table6). This method is as follows for each index of (x_{ij}) with positive and negative aspect:

$$n_{ij} = \frac{xij - \min(x_{ij})}{\max(x_{ij}) - \min(x_{ij})}$$

$$n_{ij} = \frac{\max(x_{ij}) - x_{ij}}{\max(x_{ij}) - \min(x_{ij})}$$

Table6. Weighting to indicators based on fuzzy weights according to experts

Household density in residential unit	Person density in residential unit	Person density in room	Room density in residential unit	Rooms occupied by household	Rate of entered immigrants (in 1000 people)	Marital Status (without spouse because of divorce) Total	Rate of total participation	Rate of men's participation
0.02271	0.02259	0.03308	0.02232	0.02284	0.02115	0.02269	0.02264	0.02288
Rate of women's participation	Total rate of employment	Total rate of unemployment	Rate of men's employment	Rate of men's unemployment	Rate of women's employment	Rate of women's unemployment	Percentage of household based on residential place quality-ownership of land and building	Percentage of residential units with landline phone
0.03422	0.02422	0.0341	0.241	0.02202	0.2073	0.03221	0.02244	0.01183
Percentage of residential units with piped water	Percentage of residential units with piped gas	Percentage of residential units with central heat system	Percentage of residential units with heating and cooling system	Percentage of residential units with all facilities and equipment	Percentage of residential units piped water and bathroom	Person in residential unit	Total percent of rooms, halls, living rooms, and kitchen available for household	Total residential units based on household living in it
0.01255	0.1136	0.1136	0.02197	0.02135	0.02271	0.02135	0.01856	0.01915
Percent of residential unit with a household in it	Percentage of ordinary residential unit with an area of 50 meter squares and less	Average of building area	Percent of ordinary residential units based on its structure	Percent of type of ordinary resident household	Household's size	Percentage of households with disabled member	Percentage of ordinary resident households based on having automobile	Percentage of ordinary resident households based on having P.C.
0.02115	0.03365	0.02373	0.02373	0.02373	0.02323	0.02249	0.02249	0.02249
Percentage of Ph.D. students inside the country	Illiteracy percent of men	Illiteracy percent of population	Percent of women's literacy	Ratio of population dependency	Ratio of young population	Ratio of aging population	Gender ratio	Total
0.02333	0.02333	0.03333	0.02333	0.03192	0.01344	0.02217	0.01333	1

Reference: (Researchers' findings)

In the next step, zoning map of poverty was drawn for all indicators in GIS and 43 maps were obtained regarding the indicators and categorized into four factors considering factor analysis. Finally, the maps were put together by using obtained weights of analysis method, and final map of spatial analysis

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of urban poverty in Tehran was prepared. In the first step of VIKOR method, the highest value of f_i^* and the lowest value of $-f_i$ of criteria functions are determined for all layers.

In this step, given that standardized layers are in the range of the highest value i.e. one (maximum utility) and low value i.e. zero (minimum utility), thus, f_i^* is equal to one for all layers and $-f_i$ will be equal to zero for all layers.

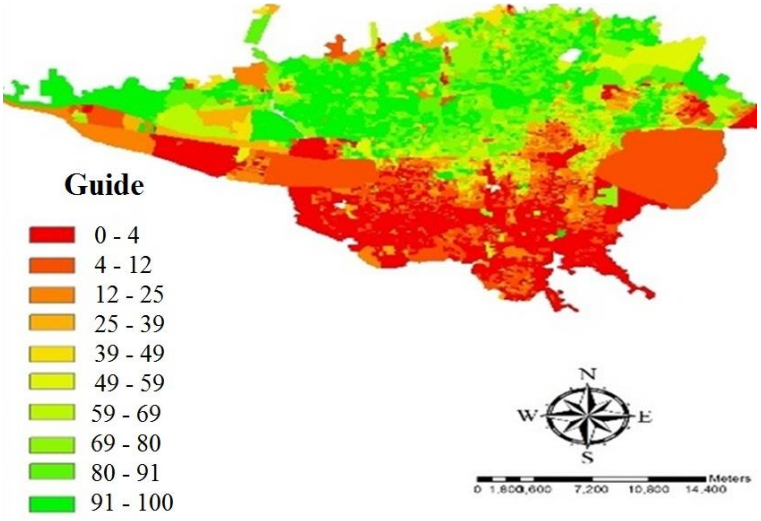
In the next step, the distance of each alternative of ideal solution for all indicators was calculated, then, their sum is calculated for final value considering function (a) for positive ideal and function (b) for negative ideal (maps 2 and 3).

Function (a) =

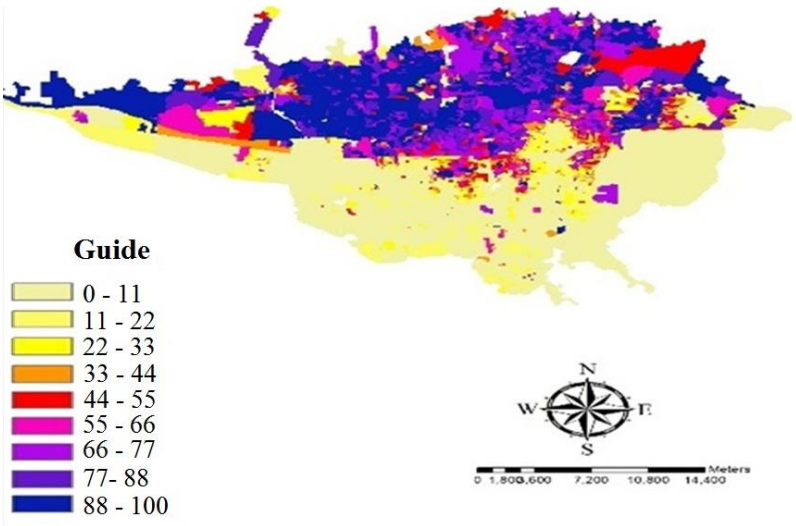
$$S_J = \left(\sum_{i=1}^{n} wi\,(f_i^* - f_{ij}) / (f_i^* - f^-) \right)$$

Function (b) =

$$R_J = \max \left(wi\,(f_i^* - f_{ij}) / (f_i^* - f^-) \right)$$



Map2. Calculating the distance of positive ideal (Sj) (the best combination)
Reference: (Researchers' findings)



Map3. Calculating the distance of negative ideal (Rj) (the worst combination)
Reference: (Researchers' findings)

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In the following, in order to achieve to place utility for spatial analysis of poverty, Qi coefficient was calculated according to the following function (table7):

$$\left((S_j - S^*)/(S^- - S^*)\right) + (1 - V)\left(\frac{R_j - R^*}{R^- - R^*}\right)$$

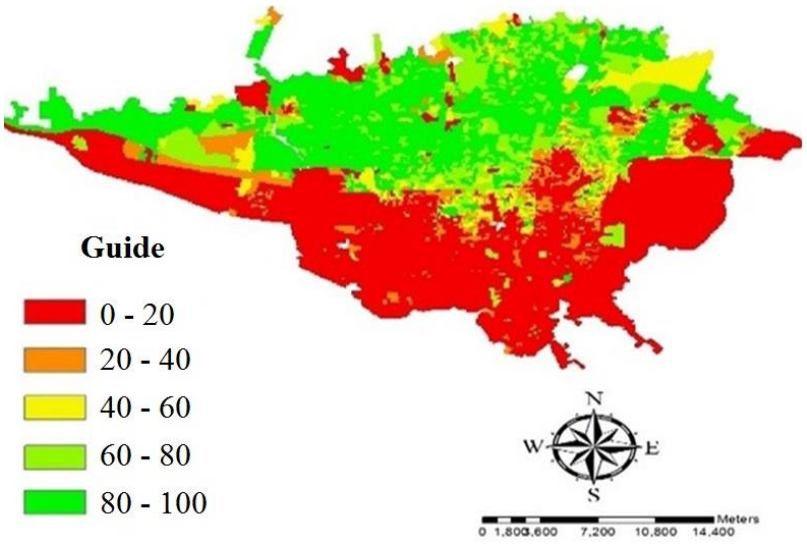
$$S^- = \max\ S_j \qquad S^* = \min\ S_j$$

$$R^- = \max\ R_j \qquad R^* = \min\ R_j$$

Table7. Positive ideal coefficient (S) and negative ideal (R)

S^*	4.31
S^-	1
R^*	11.11
R^-	1

Reference: (Researchers' findings)



Map4. Zoning of poverty of Tehran Metropolis
Reference: (Researchers' findings)

After the analyses in the form of VIKOR fuzzy technique, Qi coefficient was calculated for spatial ranking in the studied area in a range between zero and one. Interpretation of mentioned coefficient in MCDM analysis is so that as Pixel place unit is more, it has more utility regarding poverty analysis and as its value reduces its place utility decreases. For final analysis, the average value of pixels composing the block was considered as a final value of that block and proposed blocks were presented for each area as map4. Considering fuzzy VIKOR model, the results indicated that among 6001 blocks of Tehran Metropolis, 2312 blocks were very poor (38.5 percent), 2049 blocks were poor (34.1 percent), 1068 blocks were average (17.8 percent), 458 blocks were rich (7.6 percent), and only 114 blocks were very rich (1.9 percent) as it has been represented in map5.

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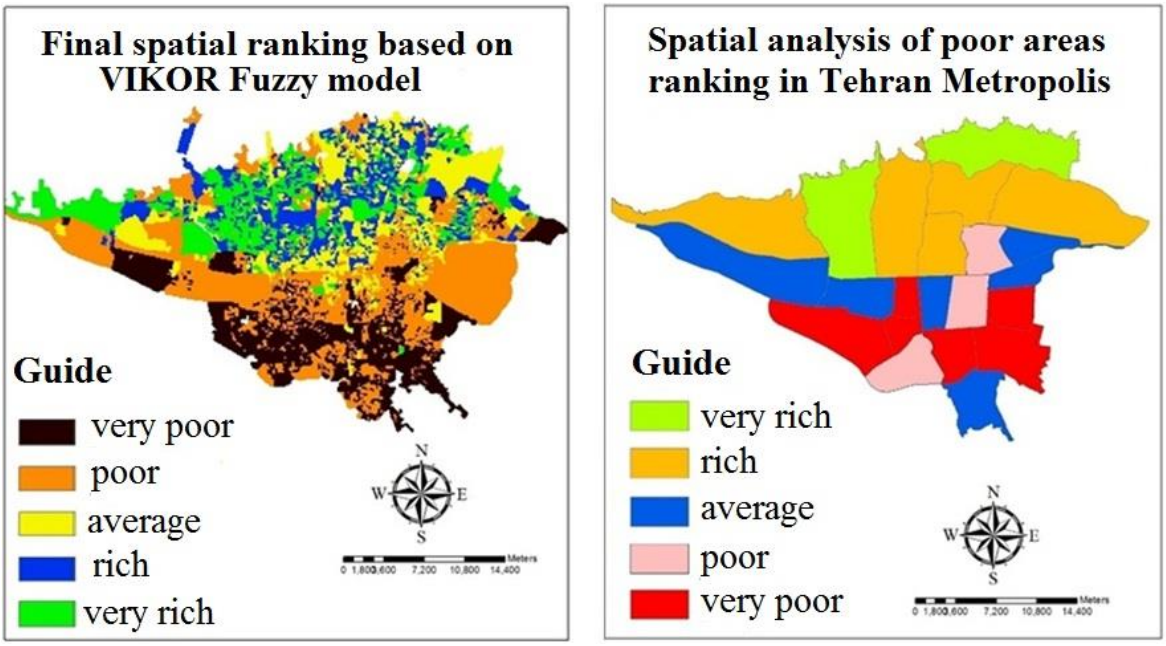
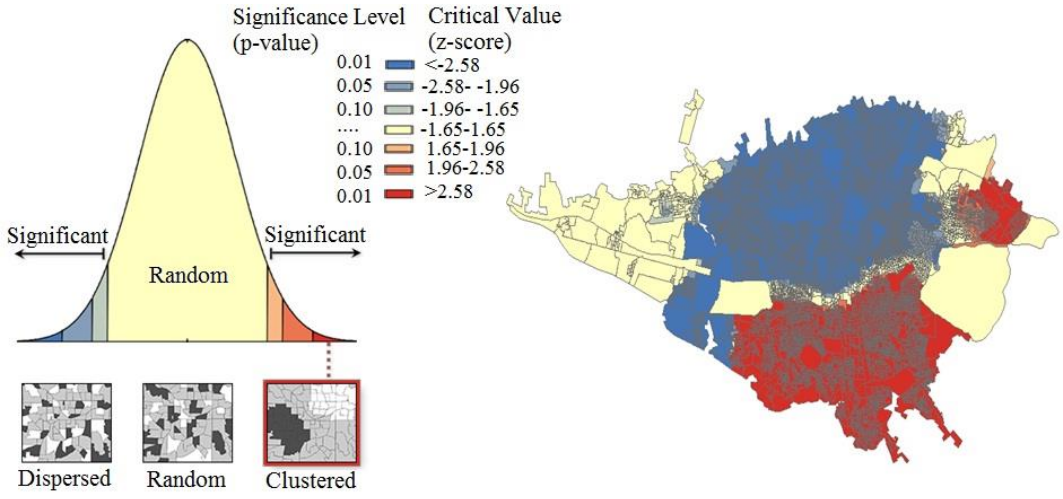


Map5. Spatial analysis of poor areas ranking of Tehran Metropolis

Reference: (Researchers findings)

To represent spatial model of poverty variable in Tehran Metropolis, Moran auto-correlation test was used. The results of this test indicate that the model of poverty distribution in Tehran Metropolis is cluster as it can be seen in map5.



Map6. Output of Moran auto-correlation analysis

Reference: (Researchers' findings)

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As map6 represents, poverty in Tehran Metropolis follows cluster model mainly concentrated in the southern half of the city.

6- Conclusion

In the third millennium, poverty and unbalanced distribution of revenue and wealth is one of the most important human problems challenging many national governments and international organizations. Millennium Development Goals (MDGs), agreed by the world leaders in 2000, were eradication of poverty and hunger, public access to primary education, reduction of child mortality, improving mothers in reproductive health framework, fighting against AIDS and access to sustainable environment that has put poverty reduction in its agenda. Poverty reduction, as the first goal of MDGs, is the world biggest problem. In this paper, the situation of urban poverty distribution in Tehran Metropolis has been addressed by using statistical data and quantitative models. Four factors including housing, economic, social, and educational-cultural poverty were examined to explain poverty status in the form of 43 indicators. Given factor analysis model, housing poverty (28.7 percent), economic poverty (18.4 percent), social poverty (14.1 percent) and educational-cultural poverty (11.5 percent), determined totally 72.7 percent distribution of total variance of urban poverty. Districts 17, 19, 18, and 16 have the highest rate of poverty among Tehran Metropolis districts considering all factors including housing, economic, social, cultural-educational poverty. However, considering fuzzy VIKOR model, research results indicated that among 6001 blocks of Tehran Metropolis, 2312 blocks were very poor (38.5 percent), 2049 blocks were poor (34.1 percent), 1068 blocks were average (17.8 percent), 458 blocks were rich (7.6 percent), and only 114 blocks were very rich (1.9 percent). In addition, Moran spatial autocorrelation analysis showed cluster distribution of poverty in Tehran Metropolis. In this regard and given the obtained results, research questions can be answered in a way spatial model of poverty in Tehran Metropolis has been cluster. Factor analysis and application of fuzzy VILOR method indicate that housing factor determines poverty in Tehran Metropolis more than any other factors.

Therefore, given research findings, strategic recommendations are as follows:

- Central and local government should support those districts that are in worse condition in terms of poverty and put them in the priority of their agenda for enablement measures.

- Considering significant relationship between housing status and urban poverty in Tehran Metropolis, renovation and rehabilitation of urban problematic areas should be put on agenda.

- A comparative study should be done for different periods in Tehran Metropolis in order to specify poor areas and its change during the time.

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