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Analyzing the Relationship between Crime and Population Intensity (12th Municipality Area of Tehran as a Case Study)

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Abstract

Nowadays, development of civilization and increase in the civil and social abnormal behaviors such as crimes and citizens' safety are the most important criteria of space quality. It has been decreased considerably. As a result, rapid development of crimes is attended as one of the most important complex issues in many big cities such as Tehran in comparison to past 50 years. This is why that emergence of social crimes and abnormalities has been developed in such cities. It seems that along with individual, social, cultural, and economic factors, there are many spatial-physical crimes and abnormalities which pave the ground for possibility of crimes and guilty in this city. The 12th municipality area of Tehran was selected for studying. The present study was aimed to investigate spatial-physical analysis of the relationship between crime and population intensity in the 12th municipality area of Tehran. This study is a descriptive-analytical research in which some statistical spatial methods were used for recognizing spatial models of crime in the city. The methods include clustering and nearest neighbor measure. In addition, some graphic-oriented statistical methods such as Cornel intensity estimation were used for recognizing crimes focuses. The statistical population of this study includes 560 crimes which were done in the 12th municipality area of Tehran during past year. The findings revealed that spatial distribution of crimes in the 12th municipality area of Tehran is followed by cluster and concentrated model so exactly that certain areas of this area is the main focus of crime and vice versa. This means that other areas are healthy. In addition, there is a significant relationship between population intensity of the area and its rate of crime so that increase in the population intensity in the 12th municipality area of Tehran results in more rate of crime.

Keywords: Crime, Population intensity, area 12, Tehran.

Introduction

Irregular development of social crimes and abnormalities has been became to a critical problem in many cities across the world so much that social crimes not only result in many negative outcomes such as insecurity and pessimism, but also have many negative mental, physical, and financial effects on citizens life. Most importantly, crimes emergence, pursuit, and punishment of delinquents and prevention of abnormalities require comprehensive juridical and financial efforts of governments and private sectors. Generally, all of the crimes and social corruption, which are known as crime, have its own place and time conditions. In other words, all of the crimes have their own place and time conditions which differentiate them from others.

Obviously, there are some areas have more possibility and opportunity of crimes because of their environmental and physical characteristics and cultural-social and economic conditions of its citizens. Inversely, there are some other areas prevent from crime opportunities. This is why that many political and municipality officers have attended crimes and their prevention during past two decades (Taghvaei, 2010: 110). In this regard, place conditions create and facilitate such opportunities and offering some solutions for its change and transformation to preventive spaces are

the main purposes of crimes examination in different cities (Zangiabadi and Rahimi Nader, 2010: 183).

It is surprising that the amount of crimes emergence in the 12th municipality area of Tehran is more than other areas. The research and governmental statistics refer to this report. For example, Kalantari (2001) investigate the geography of crimes in different municipality areas of Tehran. The results of this study revealed that relative population intensity of the 12th municipality area of Tehran is about seven times more than other areas in this city. It seems that along with individual, social, and cultural factors in the 12th municipality area of Tehran, there are some spatial-physical disorders and abnormalities in this area which pave the ground for crime in comparison to other areas.

Review of literature

The first studies of crimes in cities in its scientific method was started by different authors and scientists based on the social ecology thoughts from first half of 19th century and was followed by many researchers and authors of Chicago ecology school in the beginning of 20th century. In addition, its development was become rapid from 1990s to now. Indeed, rapid development of cities and irregular increase of crime in the cities are the main factors which necessitate attention to spatial study of civil crimes (Parhiz, 2010). Jikobz (1961) in his valuable book of life and death of USA big cities indicate that there is a significant relationship between crime and physical environment which could be measured and control. In addition, in his book, Jikobz criticizes modern cities based on the performance differentiation and localization and offer some empirical suggestions. He refers to the busy streets and indicates that providing security and safety is the main instrument of space utilization. He also believes that it results in reinforcement of social communications. Location of windows and balconies toward streets and public spaces is one of the main solutions in monitoring spaces. As a result, many people can screen activities and thereby crimes will be decreased (Rezazade and Kheybar, 2010). With respect to this fact that place, human, activity, and time are the main constructive parts of space and their role in crime emergence, it is possible to prevent crimes emergence through selecting place, human, activity, and time properly (Zangiabadi and Rahimi Nader, 2010: 180). In addition, many changes have been adopted in attitude and policies of preventive policies for preventing civil crimes. Based on such an attitude, it is necessary to focus on the place of crimes emergence in its prevention. As a result, crimes opportunities will be eliminated from geographical places and it will be possible to minimize crimes rate (Weisburd, 2004: 62). The study of crimes and its location was started by Brantingham and Brontinghom for exploring delinquents' counteractions and social and physical locations in 1993. According to Brantingham and Brontinghom (1993), people's counteractions and movement in civil perspectives could be found in both space and time. On the other hand, there are factors in crimes emergence in a space including law, delinquent, goal, and place (Chung, 2005: 10). Environmental Criminology refers to the study of crime, delinquency, and boredom so that it is resulted from especial places and also from methods in which people and organizations form their activities through space and place factors (Bottoms and Wiles, 1997: 305). Crime prevention through environmental design (CPTED) refers to designing and managing physical environment in order to decrease crimes and delinquencies opportunities. Furthermore, such an attitude is formed based on the hypothesis in which delinquents and guilty start a rational decision making process before crime emergence. Indeed, theories of the CPTED are methodological suggestions in redesigning and re-planning of environment in which architectures and urban engineers decrease opportunities of crimes and delinquency and also improve quality of life (Atlas, 1999: 11). In other words, the purpose is to prevent crimes through environmental designing, specification and variation of environmental and

physical conditions which pave the ground for crimes emergence (Robinson, 1996: 1). Generally, CPTED focuses on the backgrounds of crimes emergence and techniques which decrease environmental vulnerability (Salehi, 2009: 128-129). Such an approach is under evaluation and modification and is established based on four key strategies. These include territory ownership, natural monitoring, activities support, and accessibilities control (Cozens, 2002: 132). It is should be noted that geographical distribution of crimes could be influenced by many factors such as location and time of crime, delinquent of crime, and its victim. The results of different studies revealed that some areas of cities have more crimes possibility and opportunities because of its especial physical structure and social, cultural, and economic characteristics of its citizens and users. On the other hand, there are many other areas in which the minimum level crimes can be observed (Kalantari et al., 2009: 79-80). It has been proved in global studies that delinquents consider different conditions of crime such as its place and time. This is why criminologists could be persuaded that spatial distribution of crimes in different areas is not random. As a result, recognizing places of crimes emergence and their causes is very important (Taghvaei, 2010: 110). Undoubtedly, crimes emergence is not distributed randomly across the city. So, focuses of crimes has been attended by many government and private officers during past years (Nasar and Fisher, 1993; Lupton, 1999: 1–15).

The concept of crimes hotspot was used by Gartin and Berger (1969) for analyzing geography of crimes for the first time. The concept refers to a place or geographical area in which the rate of crimes is high. This area can be a part of a city, a street, a sector, or even a home. On the other hand, others define crimes hotspot as small areas with many crimes emergence in a given year (Kalantari et al., 2010: 44). Also Clark refers to crimes hotspot as a area in which police calling is more than other areas (Felson and Clark, 1999: 15).

Research methodology

The present study is a descriptive-analytical research from research methodology perspective and is a practical one from purpose view. In order to recognize and understand place models of civil crimes in the 12th municipality of Tehran, different graphic-based statistical models were used in the GIS. For this purpose, data of crimes was collected in a point events method and then its crimes maps were developed in the first step. In the second step, statistical test was used for defining overall and public models of crimes in the area. In order to recognize crimes hotspot, the Moran test method was used form clustering methods. In addition, some graphic-oriented statistical methods such as Cornel intensity estimation were used for recognizing crimes focuses.

Discussion and findings

This region has 1600 Hectares scope (2.3% of Tehran scope) and covers about three-quarters of Tehran Naseri (ancient center of Tehran). This region is limited to Enghelab Street from north region, 17 Shahrivar Street to east region, to Hafez and Vahdate Eslami Street from west region, and to Shosh from south region. The population size of this region is 248048. Regardless of several characteristics such as antiquity and ancient value, being at central area of city, and being at trade center of the city such Tehran Ancient Bazar, this region has several problems and difficulties such as inappropriate population growth in comparison to other regions and other cities. The region experienced a continuous population aversion trend and an immigration of poor population to this area (Bavand consulting engineers, 2004: 2).

Moran test

Moran test has been used for measuring spatial-auto-correlation of social abnormalities in the 12th municipality region in the city of Tehran. Finally, the scattering pattern of social abnormalities has been defined. The Moran statistic was 0.34 and its Z-value was 15.86 for social abnormalities in this region. With respect to the positive Moran value and higher level of Z, scattering pattern of social abnormalities has been measured and was showed in table 1. In other words, it can be said that social abnormalities has a cluster distribution in this area. This has been showed in figure 2. On the other hand, scattering pattern of social abnormalities refer to cluster distribution of social crimes in this region.

Table 1: Social abnormalities in the 12th municipality region

Social abnormalities	Frequency	%
Robbery	381	68
Mischief and blackmail	91	16.3
Drug-related offenses	88	15.7
Total	560	100

Table 2: Scattering pattern of social abnormalities through Moran index

Moran index	0.34
Z	15.86
Confidence level	99
scattering pattern	Cluster

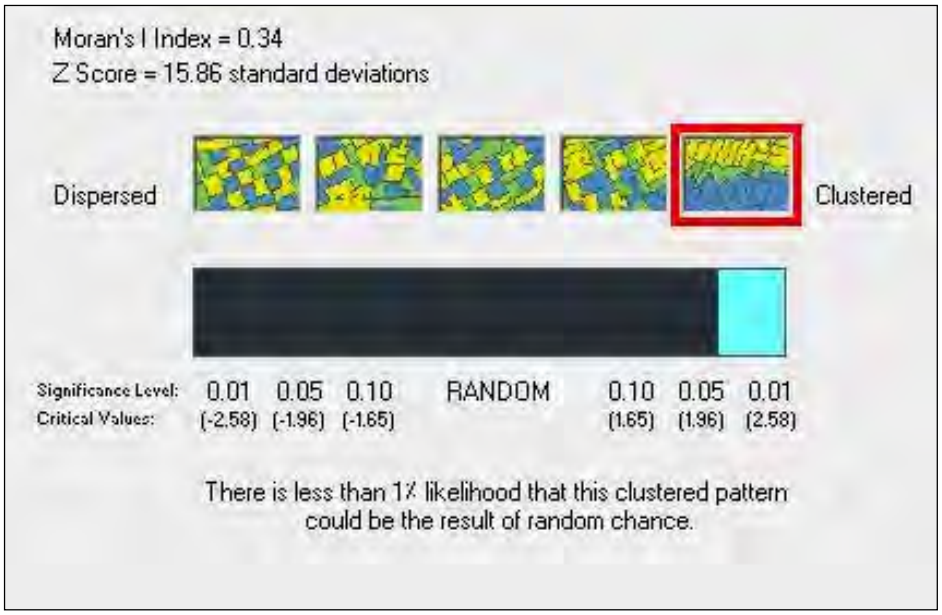

Figure 1: Scattering pattern of social abnormalities through Moran index

Kernel Density Estimation Test

The results of the past test were repeated in this study after studying spatial scattering of crimes in the 12th municipality of Tehran. The results showed that the studied crimes pattern is

cluster. In other words, some area this region has higher levels of crimes and some others have lower levels.

Investigation of Kernel scattering figure showed that 12th municipality region is a crime hotspot in the northwest of 12th municipality region. This region starts from Ferdosi Street and includes Ferdosi, Manochehri, Hafez, Jomhori, Esteghlal, Lalezare No, Saadi, Emam Khomeyni, Bab Homayon, Khayam, and Sore Esrafil Streets.

Based on the results of this study, the second crimes hotspot is the northeast area of 12th municipality region. These include Emam Hoseyn Sq., Chobi bridge, Mazandaran Street, Namjo Street, Sina Sq., mojahedine Eslam triode, Mojahedine Eslam Street, Shohada Sq., and 17 Shahrivar Street.

The third crimes hotspot is the southwest area of the 12th municipality region in the city of Tehran. These include Mohamadie Sq., Molavi Street, and Molavi crossroad. Examination of crime hotspot indicated that the main center of gravity is central, northwest and northeast area.

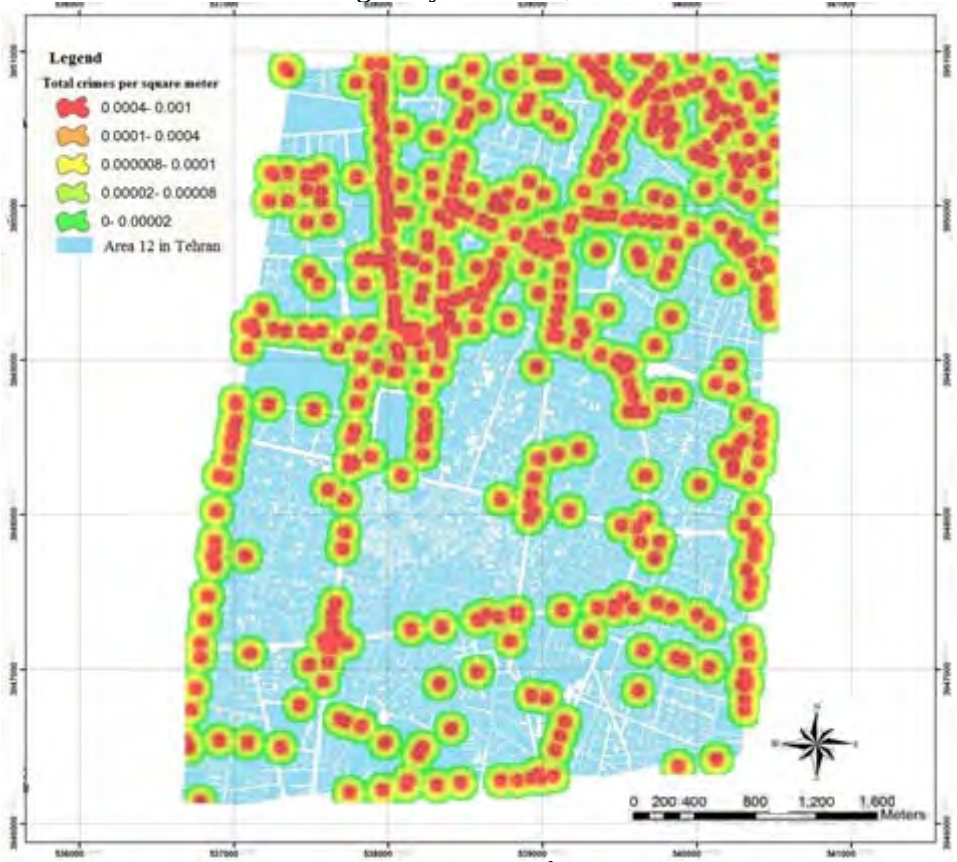

Figure 2: Spatial pattern of crime hotspots in the 12th municipality region through Kernel test

Analyzing the relationship between crime and population intensity

The results of analyzing the relationship between crimes and population intensity in the 12th municipality of Tehran were presented in this part of paper. This area is limited to Hafez Street and Vahdate Eslami Street from west area; it is limited to Imam Hoseyn and 17 Shahrivar Streets from east area; it is limited to Shosh and Street from west area; and it is limited to Enghelab Street from north area. The area consists of 247500 persons (based on the reports of 2011). Based on the related reports, 3.17% of the populations of Tehran city live at this area. On the other hand, this area of city

has 1601.7 Hectares spaces which are about 2.7% of total space of the city. Examination of population intensity of this area revealed that about 154.5 persons live in every Hectare. However, relative intensity of population in the city of Tehran is about 131.6 persons in Tehran city. As a result, relative population intensity of the area is more than average of average population intensity in the city of Tehran.

There are many non-resident populations in the 12th municipality of Tehran who enter the area for occupation in days. Because of lack of sound statistics of frequency, gender, age, and other characteristics of non-resident populations of this area, it is hard to analyze the population intensity. Indeed, this area of city has about 3.17% of overall population of the city, 2.7% of total space of this city, and 9.32% of crimes emergence of the city's total crimes. This shows that crimes emergence rate of this area is more than average rate of city. In order to examine the relationship between crimes emergence and intensity of population, the statistics were collected from 6 selective points of the area. Based on the results of table 1, both areas of 1 and 6 are the main areas of crimes emergence such as narcotic and robbery, and iniquity.

Table 3: The results of comparison of space, population, relative population intensity, and ratio of crimes to level unit in the 12th municipality of Tehran

Area	Population	Number of population	Relative population	Space (Hectares)	Relative space	Frequency of crimes	%crimes	Ratio of crimes emergence to space (very person in Hectares)
1	40000	16.6	110.4	362.06	22.6	206	36.7	0.56
2	26500	10.7	106.8	248.3	15.4	61	10.8	0.24
3	36000	14.5	137.9	261.9	16.3	73	13.03	0.27
4	35000	14.1	135.6	258.1	16.1	46	8.2	0.17
5	69500	28.08	306.1	227.1	14.1	62	11.07	0.27
6	40500	16.3	165.9	244.1	15.2	112	20	0.45
the 12th municipality of Tehran	247500	100	154.5	1601.7	100	560	100	0.34

The first point of the 12th municipality of Tehran has inappropriate conditions from crimes emergence perspective. Examination of statistics of space, population, relative population intensity, and its comparison with frequency, relative crimes emergence, and ratio of crimes to space revealed that the conditions of this area is very inappropriate. The above-mentioned point has about 362.06 Hectares space and only 22.61% of total space of the area. Based on the reports, 16.16% of area populations are located in this point and it is the main interests of the area. It is should be noted that only 22.61% of total space of the area is allocated to the point and 36.7% of crimes is done by citizens of this point. This is 206 crimes of 560 ones. The ratio of crimes to space is about 56% which refers to high level of crimes emergence. The bag stealing frequency is 124 which are 60.19% of total bag stealing of the area. Also there are about 23 types of other crimes in this area which is about 11.16% of total these types of crimes in the area.

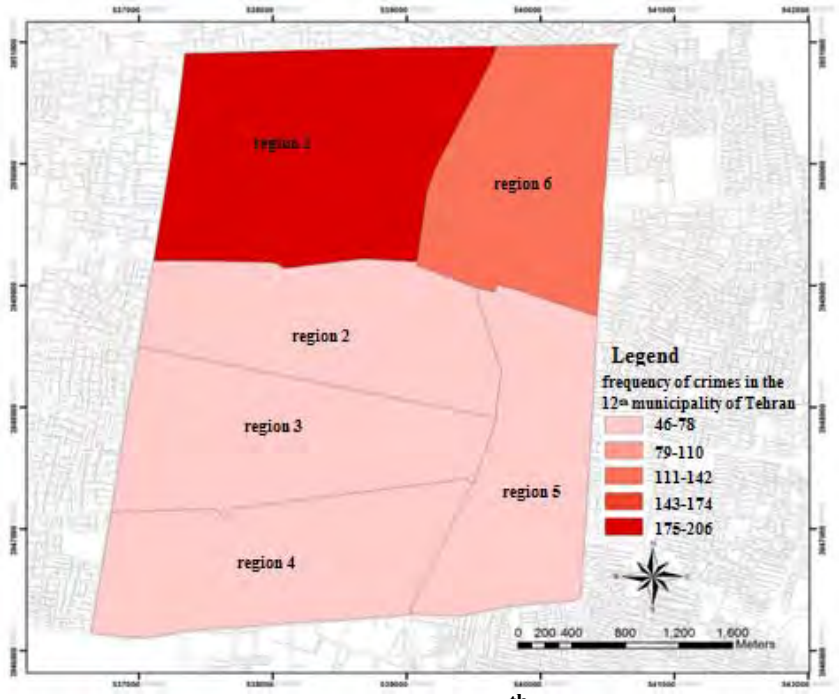

Figure 3: frequency of crimes in the 12th municipality of Tehran

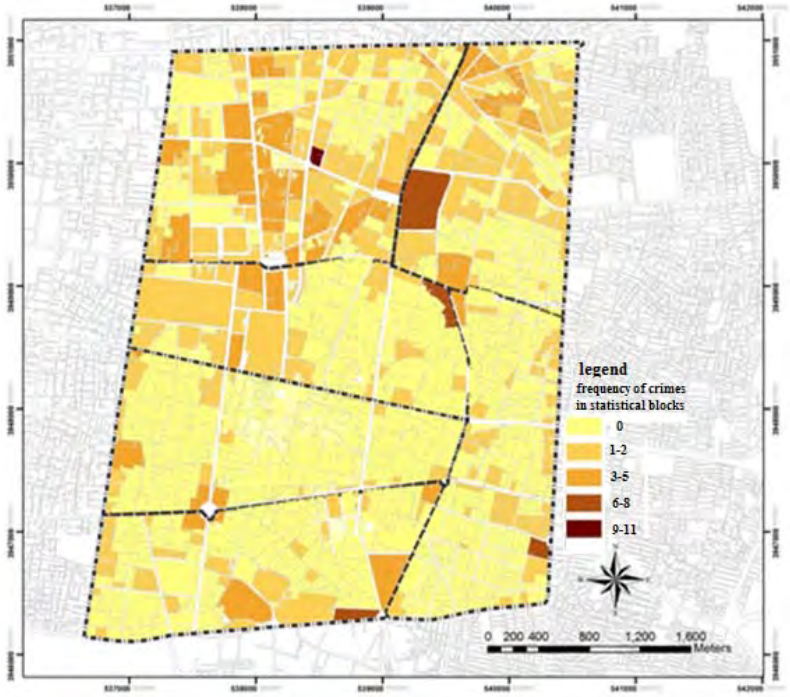

Figure 4: Frequency of crimes in statistical blocks of the 12th municipality of Tehran

On the other hand, the sixth point of the 12th municipality of Tehran is the second-ranked point of this area in terms of crimes. As indicated in table 1, this point has 244.11 Hectares space which is about 15.2% of total space of the area. This point consists of 40500 persons which is about 16.36% of total population of the area. Relative intensity of population of this point is 165.9 per

every Hectare. In other words, population insanity of this point is more than average population insanity of Tehran. It is should be noted that the ratio of crimes emergence to Hectares of this point is 112 crimes which is about 20% of total crimes of the area. The ratio of crimes emergence to space is 0.45 per every Hectare. However, total ratio of crimes emergence to space is 0.34. This means that ratio of crimes emergence to space of this point is more than average ratio of crimes emergence to space. The bag stealing frequency is 46 which are 41.07% of total bag stealing of the area. Also there are about 44 types of other crimes in this area which is about 39.28% of total these types of crimes in the area. On the other hand, examination of crimes emergence frequency of both points of 1 and 6 of the area is more than other points.

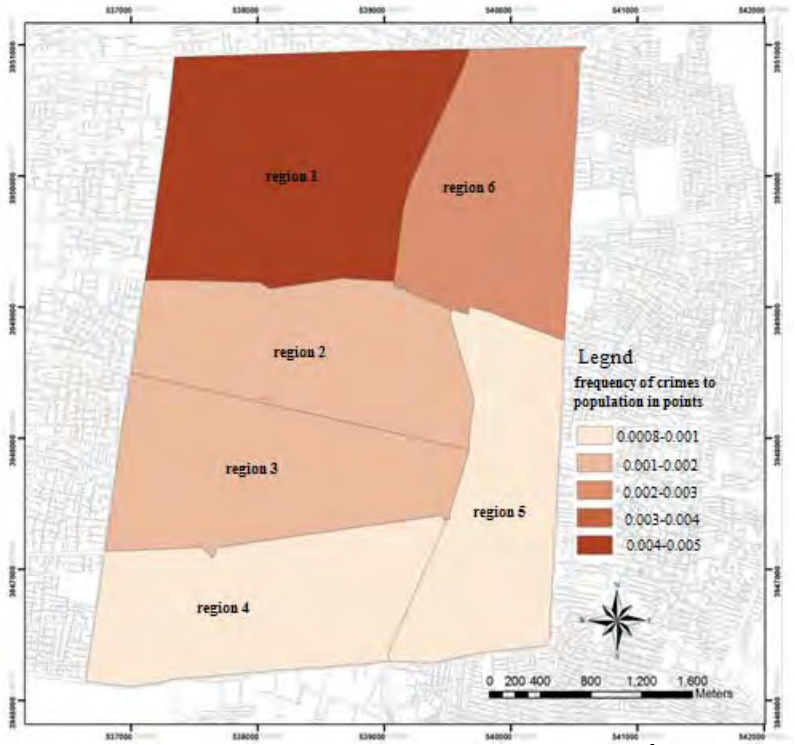

Figure 5: Frequency of crimes to population in points of the 12th municipality of Tehran

The high-intensity population areas and location of crimes focuses of 12th municipality of Tehran have been presented in the figures of 2 and 5. The figures show that there is a significant relationship between population intensity and crimes emergence. It seems that increase in population intensity of 12th municipality area of Tehran results in more crimes emergence. In other words, 12th municipality of Tehran has higher levels of relative population intensity in comparison to other urban areas. In addition, frequency of crimes emergence is very high in this area so much that increase in the relative population intensity results in more crimes emergence. Also it should be noted that this area of city attracts many populations to itself in days. The people who refer to this area have different motivations such as purchase, official works, cultural and social activities and so on.

Conclusion

The results of this study revealed that relative population intensity of 12th municipality area of Tehran is 154.5 persons per every Hectare. However, relative population intensity of Tehran is

131.6 persons per every Hectare. It can be said that relative population intensity of 12th municipality area of Tehran is more than average of relative population intensity in the city of Tehran. This is why that crimes emergence rate of this area is more than other areas. In order to investigate the relationship between crimes emergence and population intensity, six points of the area were selected as sample. Two points have 110.4 persons in Hectare in terms of relative population intensity. In other words, 36.7% of the crimes emergence can be shown in these points. It can be said that there is a significant relationship between population intensity and crimes emergence and formation of crimes focus. Based on this finding of our study, increase in the population of this area results in more crimes emergence in comparison to other areas. In this regard, crimes emergence is high in this area of city and it can be increased as a result of higher levels of population intensity. Based on the conclusion of past analyses, it can be said that physical factors and demographic, social, cultural, official, and economic characteristics of this area are the main effective factors on crimes emergence. On the other hand, higher levels of population intensity on days are other effective factor in this regard.

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