

## Abstract

**Objective:** This study examines the social and cultural structure of drug offenses in Ahwaz municipal areas using GIS. **Method:** The population of the study consisted of drug offenders in Correction and Rehabilitation Center of Ahwaz in 2013. Statistical tests and graphs, including Mean Center test, Standard Deviation Ellipse, Kernel Density Estimation were used in this study. **Results:** The most important centers of drug crime are in the same border with informal settlement areas, such as Kut Abdullah, Lashkar Abad, and Khashayar (urban areas 5 and 6 of Ahwaz city). In addition, there is a direct relationship between illiteracy rate & population density and crime rate.

**Discussion and Conclusion:** Spatial analysis of geographic crime and punishment can act as a means for security and safety policy making in the fight against drugs.

**Keywords:** Geographic Information System, Social Pathology, Areas of High Crime, Drugs

# Study of Social and Cultural Characteristics of Drug Offenders in Ahwaz Municipal Areas Using Geographic Information System (GIS)

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## Introduction

Identifying Spatial and geographical factors of crime and attempting to remove or diminish these factors can be one of the most effective ways to increase the safety and prevent the occurrence of abnormalities since these abnormalities in any way are constrained in a setting and include time and place where these two factors distinguish the criminal behavior. The structural patterns of individual differences along with spatial structure of one's life are effective in the incidence of criminal behavior. Some urban areas due to the poor condition of the cultural, social and physical characteristics are susceptible to some particular abnormalities. On the other hand, studies have shown that criminals often commit crimes to their logical choices and are looking for the easiest, least risky and the most appropriate spatial and temporal opportunities and conditions for committing crimes (Kalantari, 2001). Due to the location, as the immediate cause of the crime, compared to individual or structural factors, more practical strategies for crime prevention should be provided. The spatial analysis to identify patterns of criminal behavior and crime in cities end up in anomalies of urban abnormalities by creating resistant spaces to urban crime and by fixing urban malformations (Harris et al., 2012; Hiropoulos & Porter, 2014; Kim, Chun & Gould, 2013). Therefore, spatial survey has a place of great importance in the study of crime and increases the significance of the issue and the need to examine it much further. Crime plots have been so successful that are widely accepted by other groups of municipal police. Police in major cities around the world have been at the forefront of using crime plots (Short, 2009). City as a complex reality, in different dimensions with features and capabilities, has numerous problems and complexities. Crime is among the problems most cities today are suffering. The problem is that humans with all their initiatives and progress have yet failed to reduce amounts and types of drug use. What is certain is that urban crime rates are linked to the size and degree of development of the city and increase in parallel with urban population. In addition, crime rates are related to the geographical location of cities. Crime rates are also linked to busy cities. Due to the location of industrial and economic cities, the busier and more crowded these cities are, the more the diversity and abundance of these crimes will be. Research on the impact of housing, neighborhood and city on youth social abnormalities, confirms that the young offenders and their incompatibility is a function of location and is affected by the geographical environment of their residence as well as their activities. Among urban crimes, dealing, trafficking of drug and substance abuse are considered as the most important and most complex problems in many cities in the country. Drug addiction and abuse apart from the impact it has on health and social issues that affect communities, creates networks of organized crime, which organize many other crimes in the city. Gradually, drug trafficking will be only part of their illegal activities which sometimes plays an actively damaging role, though as hidden elements, in the

economic, social and cultural structure of the city. Estimates based on UN report show that 1.5 to 2 percent (about 3.1 million) of the population in Iran have a serious problem with drug abuse. Among the cities in Iran, Ahvaz suffers a relatively high rate in the field of urban crime for several reasons, including industrial centers, immigration, the widespread suburban life, and cultural heterogeneity among the various ethnic groups. Adolescents are more vulnerable to crime than other groups, especially in drug-related offenses (Abbasi Varaki, 2010). Considering the above-mentioned points, this study attempts to investigate the crime rates of drug trafficking and abuse (juvenile offenders in relation to drugs) in high crime areas of Ahvaz using GIS software. This method can be used to adopt policies and measures for the control of juvenile delinquency in the city. More importantly, by creating fundamental changes in the factors causing or facilitating opportunities for crime, architectural design and robust physical space from criminologists' point of view, the possibility of preventing many urban crimes can be provided.

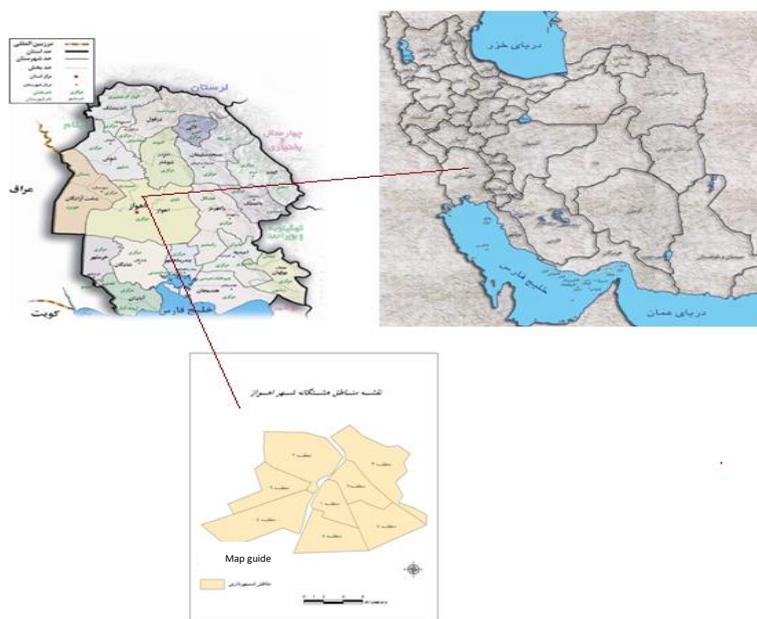
Location and modern style and scientific study of crime began in the first half of the nineteenth century as it enjoyed the social ecology theory. Quetelet and Guerry were the pioneers of this theory. Then, other thinkers and advocates of Chicago School of Social Ecology such as Shaw and McKay followed the idea in the early twentieth century. Especially from the 1960s onwards, an increasing interest in studying the environment in contrast to the impact of environmental conditions on the prevention of delinquency and crime took place. Jacobs was one of the proponents of this idea. In his famous book "The Life and Death of America's great cities," which was published in 1961, Jacobs studied urban design and its impact in reducing crime, as well as the impact of natural and ordinary people's care in crime prevention (Kalantari, 2001). The term "hot spots" was first used by Sherman, Kartin, & Berger in 1969 for the spatial analysis of crime. It represents a place or geographic range in which the crime rate is very high. This place could be part of a city, a neighborhood, a few adjacent blocks and even a house or residential complex. Some define crime hotspots as small places with a predictably high crime rates, at least within a one-year period of time (Taylor, 1998). The theoretical roots of crime prevention through environmental design and management perspective have been adopted from rational choice theory (Rostami, Tabrizi & Madanipour, 2006). Crime is a function of the environment and provides opportunities and rewards are not just caused by the defects in the values, beliefs and socialization of delinquents (Thangavelu, Sathyaraj & Balasubramanian, 2013; Mohammad Nasl & Ashraghi, 2009). Crime Reduction Center of the England Ministry described hot spots as follows: A geographical area where crime is higher than average or the area where the crime rate is more concentrated than crime distribution in the entire region. According to this definition hotspots are definite areas that contain a large share of total crimes in the entire area under investigation (Kalantari & Tavakoli, 2007). By considering the above definitions, it can be inferred that

geographical analysis of hot spots includes display, identification and delimitation of areas of concentration and centralization of delinquency in urban areas, and thereby through identifying this concentration, appropriate strategies and policies to eliminate or reduce the impact of these factors will be provided to prevent the occurrence of abnormalities over these areas in the future. Since crime is under the influence of land use and spatial patterns of distribution of physical characteristics or demographics, it contributes to formation of hotspots. Another important aspect of this analysis is that it can help to change this situation and characteristics, by revitalizing and redesigning necessary spaces and also creating some obstacles and conditions deterrent to crime. In addition, an increase in the level of social security in the use of conserved features and benefits occurs and it will be easier for the community to seek health in the future (Kalantari and Tavakoli, 2007). The history of urban hotspots analysis as a scientific approach dates back to the 1980s and is one of the concepts that has found great importance among analysts of urban crime importance in the last 15 years. This analysis has been proposed as a valid breakthrough today to deal with social deviance and crime prevention. It appears that the initial idea of urban crime analysis has been formed as a result of pin Maps manually prepared at the police departments about 200 years ago. The geographical distribution of crime is a function of spatial conditions for the crime location, time, motivation, and ability of the delinquent and criminal purposes. So showing criminal incidents on a map of cities with color signs could lead to the conclusion that the distribution and density of delinquency is concentrated in a specific area and sometimes small-section of the city. In the past 30 years people like Brantingham in 1975 and 1981, Crow in 1975, Abeyie & Harries in 1980 and Parish in 1989 conducted research and raised the so-called term hot spots for the first time. Among the leading research in the field of urban crime is the one done by New York City Police Department which is a systematic approach in crime analysis and strategic planning used to reduce delinquency (Bratton & Knobler, 1998). In addition, the research in this field has been conducted with the support of the National Institute of Justice, United States of America. Among prestigious research institutions in the field of identifying and analyzing range of crime is the delinquency reduction center affiliated to Britain. One of the studies of this research center was in Corydon located in South East London in 1990. The results show that 18% of robberies carried out in this area are concentrated in only .6 percent of total sector. (US-HSO, 2003). Today, maps related to crimes have become a very important tool for police. Keith Harries (1999) classified today's broad tools on the maps related to crimes. In this category of crime maps, spatial visualization indicates that they are indispensable tools for officers, inspectors, police officers, policy makers and community organizers. Nowadays, Geographical Information System (GIS) has resulted in identification of hotspots and has enabled police forces to effectively use crime map while it is occurring. In Iran, Kalantari, et al. (2010) studied the influence of land use in the formation

of hot spots as well as drug trafficking and abuse in the city of Qazvin, using GIS. Their findings indicate the formation of these hotspots in the neighborhood Hadi-Abad, Nawab and Omri neighborhoods. Besides, issues related to the geography of crime and the relationship between the crime and the place has been of interest to researchers in the country over the past few years. Studies show how the attention to the subject has been increasing in the scientific literature (Rostami & Veisi, 2012). In the article appearing under the heading of crime modeling using GIS in the city of Kermanshah using vehicle theft data in the city of Kermanshah in 22 months from April the first 2011 until January the 30th 2012; spatial analysis and modeling of the crime was done by the use of the four common methods for Spatial Studies: statistical block aggregate methods, kernel, Thiessen polygons, animation and three-dimensional. Based on the finding of this study, the three neighborhoods of downtown, Maskan, and Bist-o-do Bahman had the highest rate of these crimes (Alavi and colleagues, 2011). In another article entitled as determining the optimum spatial-position for police centers of Tehran using GIS, Tehranpars area used spatial analysis of police centers. The results showed that the spatial position-location of these centers is not suitable. Tehran Pars district police centers are vulnerable in times of crisis, and they need to be replaced and a change in the spatial position-location of these centers over the area under study will be necessary.

### **Method**

Khuzestan province is strategically located in southwestern Islamic Republic of Iran. It shares border with Iraq by the West, from the north with the province of Chaharmahal & Bakhtiari, East with Kohkiloueh, and to the south with the Persian Gulf waters. Ahvaz, the capital city of Khuzestan province, is the largest city in Khuzestan with the geographical location of 30 degrees 54 minutes north latitude and 48 degrees 31 degrees 7 minutes and 2 minutes to 48 degrees 41 minutes east longitude . Ahvaz with an area of 9.8135 square kilometers is the largest city of the province, which occupies up to 78.12 percent of the province's area. The city with a population of 1338126 people, accounted for 31 percent of the province's population.



**Figure 1: The geographic area (city Ahvaz in Khuzestan province), source: [www.ncc.org.ir](http://www.ncc.org.ir)**

In the present study, statistical and graphical models based on GIS were used to identify and understand patterns of crime. The statistical tests used were Pearson correlation test, Mean Center, and Standard Deviation Ellipse, and among the graphically based methods, kernel density estimation methods were used. In this study, point data related to crimes for events within the legal jurisdiction of Ahvaz was used. Kernel density estimation method is the most appropriate method to portray delinquency data in a consistent way. This method is among methods of interpolation and smoothing ones for continuous levels, which sums up the number of spots within the search radius and provides a smooth and continuous surface that represents the volume or density of mass distribution in the area under study (Eck et al., 2009). The study sample was drug-related offenses committed by children and teenagers under 18 years whose criminal filing related to criminal events were sent to prison and were imprisoned in 2013. In this investigation, a census method was used and all criminal incidents related to drugs have been studied over one year.

## Results

Crime includes anti-social behavior and a variety of activities and actions. Judicial systems and law societies of the world have various classifications for crimes according to the type and quality of the offenses, the penalties, and the

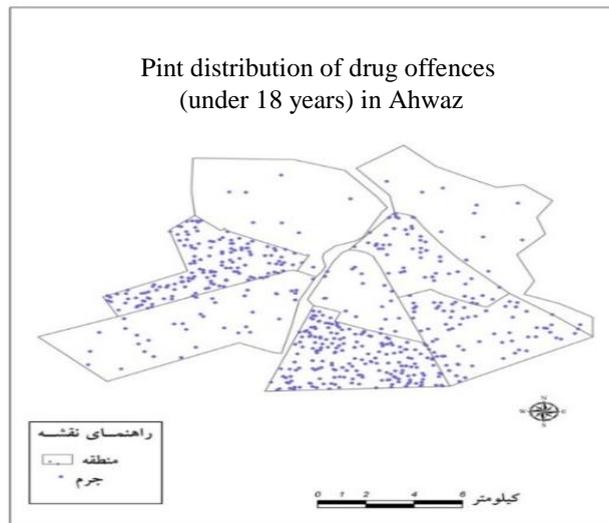
intensity of its social effects. Type and percentage of crimes are presented in the table below.

**Table: type and amount of crimes committed by persons less than 18 years of age in the city of Ahvaz in 2013**

<i>No.</i>	<i>Type of crime</i>	<i>frequency</i>
1	Robbery	45%
2	Against person and property	0.27%
3	Acts incompatible with chastity	0.7%
4	Drugs	0.7%
5	Others	0.14%

Source: Bureau of Statistics and Computers Department of Khuzestan Prisons

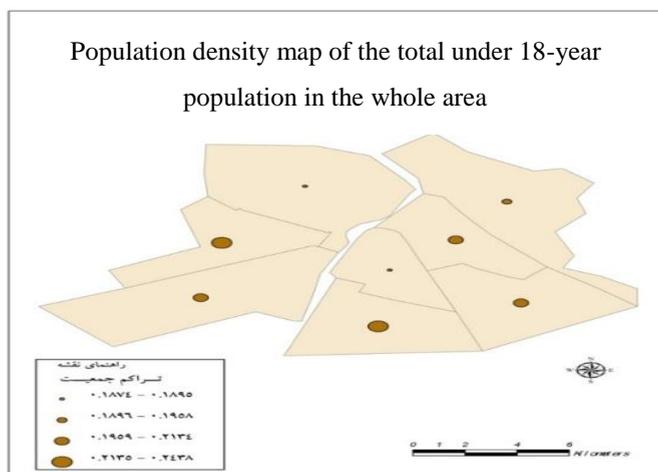
To analyze the spatial and geographical offenses committed, the place where the crime was committed was saved as single points in the spatial database and using analytical models (statistical and graphical) spatial pattern of these crimes in the city was extracted, and accordingly the formation of hot spots associated with the drug were measured. In this study, in addition to location, population density and literacy variables were (separately) considered. Figure2 shows the distribution point for drug crime offenders less than 18 years of Ahvaz (in different regions) in 2013. As the map shows, the distribution of crime is more in south and west south than other areas of the city.



**Figure 2: Distribution Point of drug crimes offenders less than 18 years (Ahvaz -2013)**

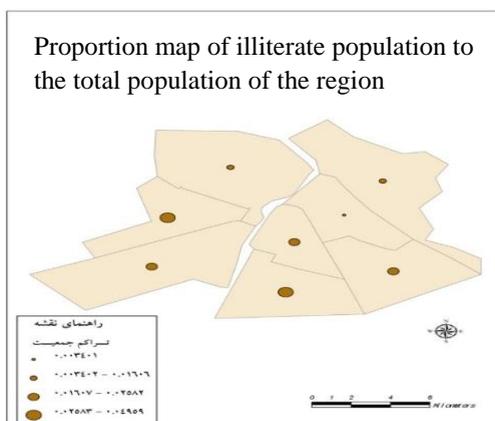
One of the variables that has a direct relationship with crime is the offender's age. In this study, subjects were persons less than 18 years old. This means that all sample members were homogeneous in terms of age, but what can be

considered is the proportion of all persons less than 18 to the total population within the areas. As it can be seen, this proportion is greater in areas 5 and 6, which are areas of inappropriate social, cultural and spatial structures. By analyzing the rest of findings, we can observe that areas 5 and 6 are considered to be endangered hotspots.



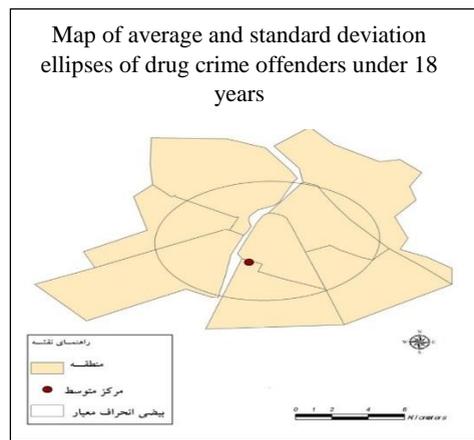
**Figure 3: Population density map of the total under 18-year population in the whole area**

Another variable, which can influence crime rates, is the level of literacy. The figure 4 shows the proportion of areas of illiterate population to total population where areas 5, 6 and 8 have a larger proportion than those of other areas, and are accordingly considered as hotspots.



**Figure 4: Proportion map of illiterate population to the total population of the region**

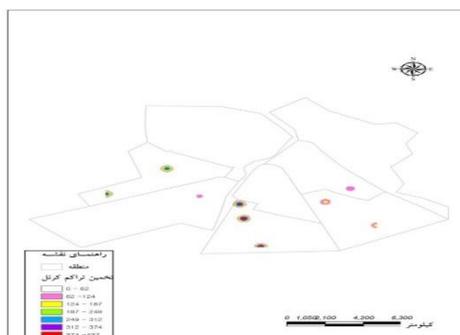
Pearson correlation test was performed to analyze the level of literacy of the population under 18 years of age and the frequency of drug-related crimes among delinquent teenagers over the area. Results indicated that there was a significant relationship between level of literacy and frequency of crimes over the areas ( $r=.5$ ,  $P<.001$ ). This significant relationship was also true between population density and frequency of crimes ( $r=.6$ ,  $P<.001$ ). To measure the spatial distribution and center of gravity of the offenses under investigation, statistical models of based graphics including mean center test and standard deviation ellipse were used. Figure 5 shows the mean center and oval shaped standard deviation of drug crimes (offenders under 18 years).



**Figure 5: Map of average and standard deviation ellipses of drug crime offenders under 18 years**

The mean center measures average central place for all places where delinquency occurs. Standard deviation ellipse specifies dispersion, direction and position of the crime using standard deviation of crime spatial distance to mean center. According to figure5, mean center is located at geometric center of the city near the southern area 5 (area Kut Abdullah & Akharasfalt). This area of the city is not a good condition in terms of architecture and urbanism, and cultural and social structure but is potentially a suitable area for drug-related offences. Standard deviation ellipse on the crime has been drawn from the East to both the West and South. The city extends from Region 8 to Region 5 and 6, which include Sepidar and Saddastgah in Region 8 and Akharasphalt & Kut Abdollah in south, and Khashayar, Kiyan & Alavi in Region 6. The most convenient way to portray delinquency data for continuous level is Kernel density method. This method provides a continuous level for the changes in the density of crime spots over the area. Figure 6 illustrates the density estimated by the kernel density estimation method. According to the map of crime density in zones 5 and 6, there have been around 400 counts of crimes estimated per square

kilometer while vast areas of the region are estimated to range up to about 62 counts of crimes.



**Figure 6: kernel density map of drug crime in Ahwaz**

## Conclusion

Identification and analysis of crime hotspots help understand the spatial and temporal factors and social conditions that lead to their formation. This method also specifies areas where the probability of corruption in the future is high (Kalantari & Tavakoli, 2007). The results indicate that spatial patterns of drug crime offenders under 18 years in Ahwaz are affected by population density, socio-economic characteristics, poverty and cultural diversity, unemployment, lack of perfect places for adolescents to spend their leisure time in , low education level of parents, lack of adequate legal control structure, and unsuitable residential neighborhoods. In line with this study, Zangiabadi (2010) arrived at nearly similar conclusions in his spatial analysis of crime in the city of Karaj. The results showed that the population density, cultural dislocation, poverty, and irregular migration are among the causes of crime in Karaj. In this study, Kiyani area, Kantex, Kooye Alavi, Shelang-Abad and Nehzat-Abad in the 6th district in West Ahwaz and Kut Abdullah, Akhar Asphalt, Kantex and Khorroosi in the area 5 located in the south area have been identified as hot spots since people living in these areas are mainly facing the above problems more than other regions. Besides, the center of gravity of these hotspots is in Akhar Asphalt. Most of the above areas are adjacent to slums or neighborhoods with informal settlements.

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