# Ahsanullah University
## of Science and Technology

# Spatial Distribution of Street Crime Occurrences in Dhaka City

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***Abstract:*** *Street crime is always considered to be a major urban problem in every developing country. A fast growing megacity like Dhaka is experiencing a horrifying situation of increasing street crime. In this research a macro level analysis of street crime occurrence has been done with emphasis on spatial distribution of street crime using different attributes. For the study DCC area has been taken as the study area. For the purpose GIS application has been used to produce the Choropleth map. Three months crime data of all thana's were collected from the Dhaka Metropolitan Police to be used to conduct the research. The spatial distribution map has been produced through three attributes as crime count, crime rate and crime density. The study shows that street crime concentration is more related with the specific urban core with more people's activity and public movement.*

***Key words:*** *Spatial distribution, Crime count, Crime rate, Crime density, Urban core.*

## 1. Introduction

The quality of urban life is always considered to be an important issue in different field especially in architecture and planning, politics, sociology, geography, and economics. Different urban problems are blamed for the decline of the quality of urban life which includes the increase of criminal incidence in core urban settings (Jones & Fanek 1997). Crime is a social problem of great complexity which is present in every society and has always been an attention for urban concern. The most talked about crime problem in the society refers to the street crimes. Street crime refers to crime such as vandalism, car theft and mugging that are usually committed in outdoor ( The Collins COBUILD A. L. E. Dictionary).

To conduct the research the study area has been selected in DCC (Dhaka City Corporation) Area, which has an area of 153.84 square km and a population of about 5.33 million according to 2001 census (BBS 2007). The DCC area presently comprise of 39 Thanas (DMP, 2010).

A fast growing megacity like Dhaka is experiencing a horrifying situation of increasing street crime. The rapid mass urban transformation of Dhaka City cannot adjust with its overall development. It began with a manageable population of 2.2 million in 1975 which reached 12.5 million in 2000. The growth rate of the population during 1975-2000 was 7% (UN 2001). The growth rate of Dhaka City's population will also continue to remain high. During 2000-2015 it is expected to grow at a 3.99% annual growth rate and reach a total population of 22.8 million in 2015 (UN 2001). The high growth of population, poverty, inequality and weak governance are the reasons mentioned by some experts as root causes for this deterioration of law and order situation of Dhaka city (The Daily Star, 2006). Megacity Dhaka is a conglomeration of Dhaka City Corporation, four other municipalities (Narayanganj, Tongi, Gazipur, and Savar), several cantonments, and a large number of rural settlements, stretches of agricultural lands, wetlands, rivers, and even part of the Modhupur forest (Islam.N,1999).

Dhaka City Corporation comprises of a total 153.84 square km with total 90 wards and 731 no. of Mahalla with a literacy rate of 70.66% according to census 2001 (BBS, 2007). Figure 1 shows the DCC boundary with important locations of Dhaka city.

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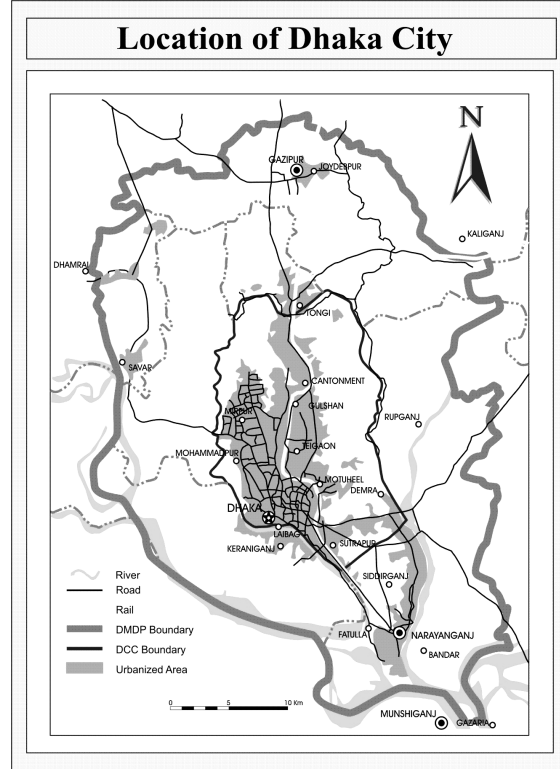
**Figure 1: Dhaka City Map**
*Source: Dhaka City Corporation*

For this purpose a study needs to be performed to understand the spatial pattern of crime distribution of Dhaka city. This research will focus on the aspects of street crime with the city's spatial character.

The distribution of crime varies in different areas of a city based on distribution of population, public activity and above all land use pattern. The recorded street crimes of different thanas of DCC area also varied from one another according to area coverage, development pattern, population density, land use etc. The spatial distribution of crime data was necessary to study the spatial relationship between crime and other demographic and socio economic factors.

Different crimes have different distribution patterns, however in this research only street crime is considered. For distribution of street crime, one limitation was that the crime data available for the study from the Dhaka metropolitan police was only for three months (Jan-Mar, 2009). Another problem was that the thana boundary was not always fixed due to frequent changes due to establishment of new thanas from the existing thana area. The collected thana wise crime data provided by the DMP headquarter needed to be organized and classified. And the area and population were organised from the ward and thana wise statistical data of BBS (2001) along with thana wise street crime data.
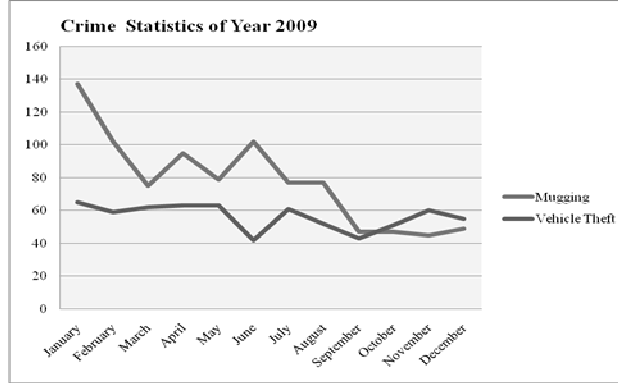
## 2. Distribution of Street crime in Dhaka city in a whole Year (2009)

A time line distribution of two types of Street crime the whole year (2009) according to different months is prepared from the street crime data (mugging and vehicle theft) obtained from the DMP website. Table 1 shows the recorded street crime data for the whole year and Figure 2 shows the time-line distribution of street crimes in DCC area for the year 2009.

**Table 1: Recorded Street crime data for the year 2009 in DCC area**

| Street Crime Data (Jan - Dec,2009) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | March | April | May | June | July | Aug | Sept | Oct | Nov | Dec |
| **Mugging** | 137 | 102 | 75 | 95 | 79 | 102 | 77 | 77 | 47 | 47 | 45 | 49 |
| **Vehicle Theft** | 65 | 59 | 62 | 63 | 63 | 42 | 61 | 52 | 43 | 51 | 60 | 55 |

*Source: Prepared from the published data of DMP website*

**Figure 2: Time line Distribution of Street Crime in DCC area in the Year 2009**
*Source: Prepared from the published data of DMP website*

From the distribution of street crime over the year it is found that vehicle theft was almost static throughout the year 2009, with a slight lower magnitude in the month of June and September. But a huge fluctuation was seen in case of mugging as it is decrease almost gradually from January 2009 to December 2009. It was a known factor that the actual crime incidences of mugging are much higher than the recorded mugging data in all thana. But in case of vehicle theft the recorded crime occurrences are quite similar with the actual crime occurrences as those are related with their property and which are almost always reported to the police.

The time line distribution of street crime varied with different factors. Mostly it depends on the current economic conditions of the country. There are many floating criminals related mainly with the occurrences of muggings and are vulnerable due to their poor economic conditions and tend to commit crimes.

There is another factor for decreasing the mugging crime data as may be the improvement of law and order situations of Dhaka in the particular time period. The crime prevention initiatives or reinforced security system taken by the law enforcement authority have an impact on committing crime in the variation of time line distribution of street crime.

## 3. Different attributes for spatial analysis of street crime

### 3.1 Crime Rate

Different literature and law enforcements have commonly used official crime rates to measure the frequency of crime at different geographic scales (Zhang, H. And Peterson, M.P.,2002). Crime rate is defined as the number of incidents committed in a given area standardized by the population, expressed by per thousand populations. Crime rate of different Thanas were calculated from the recorded street crime data of each Thana provided by the DMP and the census demographic data of each Thana obtained from the census report 2001 of Bangladesh (BBS, 2007). Crime rate is better measurable than crime count when comparing the variation of crime in different space. Population standardized crime rate can provide a reasonable pattern of spatial distribution of crime as the thana features differed from each other's by area, land use pattern, population density etc.

### 3.2 Crime Density

In this study, crime density was calculated by dividing the police recorded crime count of each thana by area of each thana in square kilometres. According to study, crime density focuses on the locations of incidents rather than criminals or the victim's locations, which are of the major concerns of the public and law enforcements. Calculating the density of crime in thana is technically efficient (Zhang, H. and Peterson, M.P., 2002).

## 4. Methodology

The distribution of street crime in study areas (DCC area) is represented by the choropleth map using ArcView software of GIS. To show the spatial distribution of street crimes three attributes are used. There are (i) recorded crime count of each thana, (ii) crime rate (crime per thousand population), and (iii) crime density (crime per square kilometre).

The digitized GIS map of Thana boundary is used as base map to produce the spatial distribution of street crime data in the DCC area. Figure 3 shows DCC map with thana boundary in different colours.

Then inputs of the attributes of organised recorded street crime data has been used in each thana properties to produce the choropleth map of crime count data of each Thana. These maps show the crime coverage of each thana.

The calculated crime rate (crime per thousand population), and crime density (crime per square kilometre) were used to produce the choropleth map for crime rate and crime dense area. Table 2 shows the recorded and calculated crime data of each thana of DCC area with thana area and population.
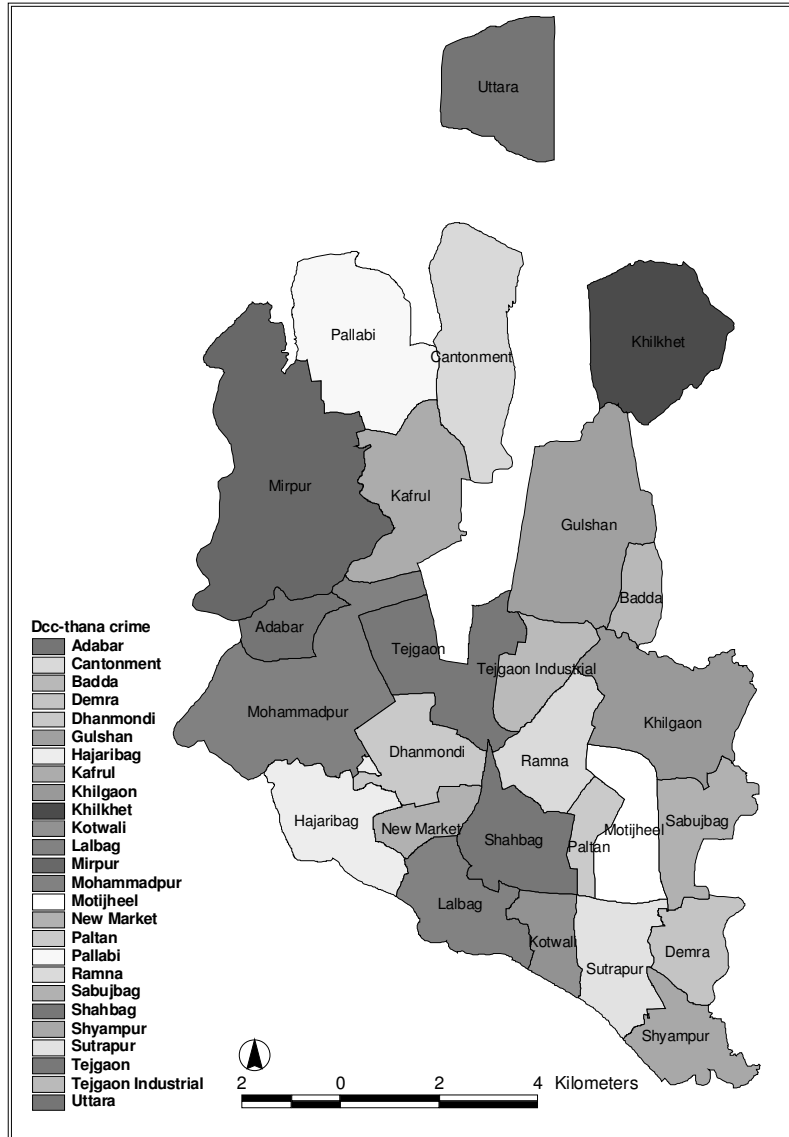


**Figure 3: DCC map with Different Thana Boundary**
*Source: Prepared by the Author from the Spatial Data provided by DCC*

**Table 2: DCC – Thana wise Crime Database**

| Thana Name | Area Thana | Population Thana | Total Street Crime | Crime Rate (Crime/Thousand Population) | Density of Crime (Crime/sq. km) |
|---|---|---|---|---|---|
| | Sq.Km | | Jan-Mar, 2009 | (3 months data) | (3 months data) |
| Adabar | 1.66 | 78006 | 16 | 0.21 | 9.61 |
| Airport | 4.47 | 5079 | 17 | 3.35 | 3.80 |
| Badda | 3.89 | 70708 | 34 | 0.48 | 8.74 |
| Cantonment | 10.45 | 117464 | 13 | 0.11 | 1.24 |
| Dakshinkhan | 10.84 | 170760 | 8 | 0.05 | 0.74 |
| Demra | 39.69 | 427972 | 3 | 0.01 | 0.08 |
| Dhanmondi | 4.54 | 190441 | 75 | 0.39 | 16.52 |
| Gulshan | 10.30 | 190590 | 152 | 0.80 | 14.76 |
| Hajaribag | 5.90 | 127370 | 6 | 0.05 | 1.02 |
| Kafrul | 8.86 | 289986 | 26 | 0.09 | 2.94 |
| Khilgaon | 7.58 | 336895 | 72 | 0.21 | 9.50 |
| Khilkheth | 8.51 | 87355 | 16 | 0.18 | 1.88 |
| Kotwali | 1.93 | 253558 | 30 | 0.12 | 15.53 |
| Lalbag | 3.95 | 344598 | 8 | 0.02 | 2.03 |
| Mirpur | 14.22 | 551167 | 66 | 0.12 | 4.64 |
| Mohammadpur | 10.48 | 378052 | 98 | 0.26 | 9.35 |
| Motijheel | 3.57 | 220964 | 57 | 0.26 | 15.96 |
| New Market | 1.70 | 62078 | 13 | 0.21 | 7.66 |
| Pallabi | 17.97 | 431257 | 44 | 0.10 | 2.45 |
| Paltan | 1.38 | 48664 | 41 | 0.84 | 29.77 |
| Ramna | 3.43 | 181471 | 46 | 0.25 | 13.39 |
| Shabujbag | 3.79 | 206689 | 58 | 0.28 | 15.32 |
| Shahbagh | 4.42 | 77423 | 54 | 0.70 | 12.22 |
| Shyampur | 3.30 | 228359 | 28 | 0.12 | 8.47 |
| Sutrapur | 3.99 | 352420 | 12 | 0.03 | 3.01 |
| Tejgaon | 6.05 | 188452 | 86 | 0.46 | 14.22 |
| Tejgaon-Industrial | 2.85 | 113657 | 42 | 0.37 | 14.73 |
| Uttara | 5.98 | 66636 | 61 | 0.92 | 10.20 |
| Uttarkhan | 20.34 | 52014 | 2 | 0.04 | 0.10 |

*Source : Census data from BBS 2001*
*Crime Data from DMP Headquarter*

Choropleth maps are used for showing crime rates based on area or on population. However care was taken while calculating the crime rates for specific thana where, the residential population is very less or zero, because less developed area has got less density of population. In such situation the crime rate will increase or will be infinite. These areas are properly cared to prevent false impression.

Monochromic colours are used to show gradual change of street crime of different thanas of DCC in different spatial distribution maps produced from the attributes like crime count, crime rate and crime density.

## 5. Distribution of Street crime in DCC area according to the recorded Crime Count

According to the recorded street crime the maximum crime recorded in the Gulshan Thana (152), then subsequently in Mohammadpur (98), Tejgaon (86), Dhanmondi (75) etc. and then the minimum in Demra (3), Hazaribag (6), Lalbag (8), Sutrapur (12) etc.

From the spatial point of view it is found that number of maximum street crimes have been recorded in the core parts of the city which are developed and has more people's activity and minimum in the underdeveloped area of the city which has low activity of people. But the crime count distribution has a problem as the area of different thana varied with each

other according to different boundary size and the thana boundary has continuously changed over the time. Another problem in the crime count distribution was that it could not reveal the actual picture in the mixed character development in the developed or fringe area which area not still developed.

But it can measure the coverage of incidental crime in each thana. It has been found that variation of population density, land use pattern and development pattern affects proper measure for control in the crime rate and crime density.

The crime distribution may help the law enforcement authority to identify propensity of crimes in various areas.

Figure 4 shows the spatial distribution of recorded street crimes of DCC Area in each thana.
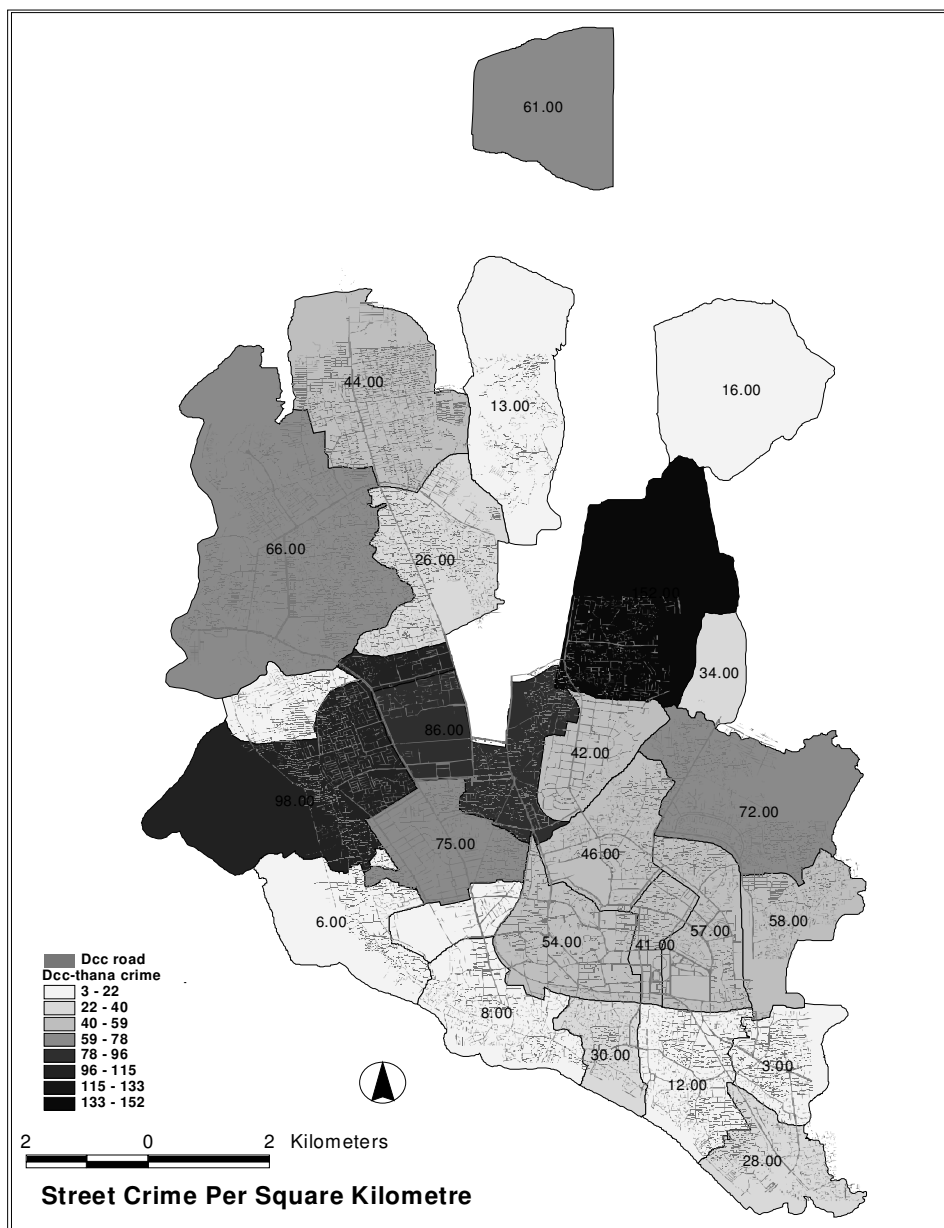


**Figure 4: Spatial Distribution of Street Crimes in the Thanas of DCC area according to Crime Count**

## 6. Distribution of Street crime in DCC area according to Crime Rate

Distribution of street crime in DCC area based on crime per thousand population shows  high concentration of crime in Uttara, Paltan, Gulshan, Shahbag Thana, and low rate in the underdeveloped area like Demra, Lalbag, Sutrapur, Hazaribag and medium in Sabujbag, Mohammadpur and Motijheel.

Crime rate in Uttara is high as it has low population density but covers large area with medium crime count. It is a planned residential area which is almost detached from the main core of the city and exists as an independent core for Dhaka city in the northern part.

Paltan Thana covers small area which is basically commercial area where public activity is high but population is low, naturally the crime rate appears higher. It happened so because it is mainly commercial area with less residential use. So the permanent population with the residential activity is low but population is higher in the office hour with commercial activity.

Gulshan Thana which was developed as a residential area for higher income group attained mixed-character with increase of commercial activities. It is a high activity space of DCC area and turned to  a attractive area for the criminals, as money transaction is higher for its diversified land use like posh residential area, position of giant corporate houses, financial institutes, diplomatic zones etc. The reported street crimes are also higher in this Thana.

Shahbag is a new thana with high street crime rate and it is also a high activity space which constitutes of major functional space of Dhaka city like Dhaka University, different important health institutes, Ramna park, Shishu Park, Sohrowardy Uddyan, High Court etc. Though it is high activity space of people but it has less population density because of low residential area.

Low crime rated area like Demra, Lalbag, Sutrapur, Hazaribag etc. are area for lower or lower middle income groups. Some of these areas are in underdeveloped situation and lack proper infrastructure services. So these areas are less preferred by the  for committing crimes.

Other medium crime rated area like Sabujbag, Motijheel thana with small area and high population are mainly commercial areas with more public activities. Another Thana is Mohammadpur which is near the core of the city.

Figure 5 shows the spatial distribution of street crime per thousand population of each Thana of DCC Area.
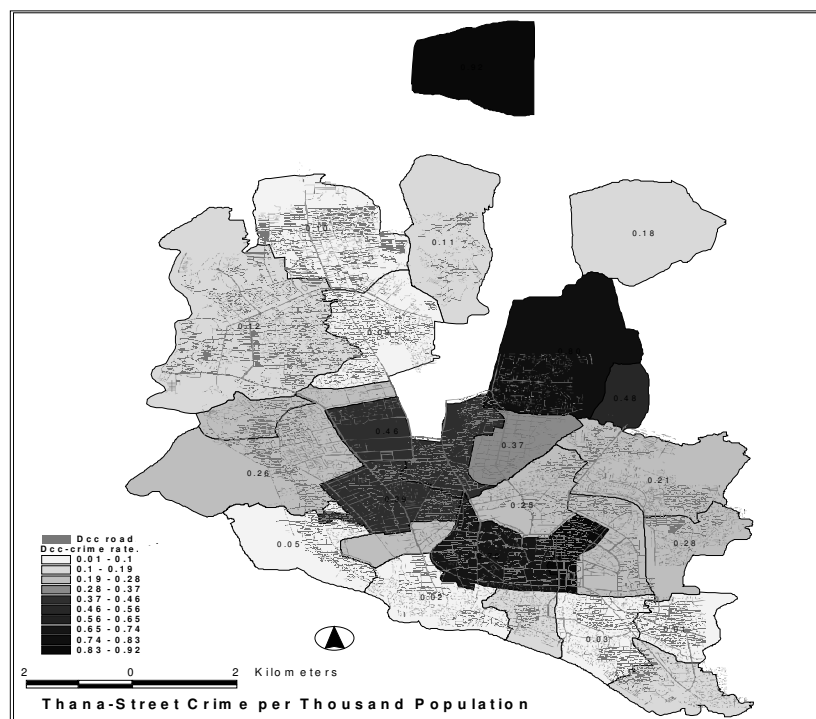


**Figure 5: Spatial Distribution of Street crimes in the Thanas of DCC area according to Crime Rate**

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## 7. Distribution of Street crime in DCC area according to Crime Density

Crime Density is measured by number of street crimes that occur per square kilometre in each Thana. So it can measure the density of street crimes that occurred for each thana. It covers the dense crime prone location of small area with relatively higher crime count like Paltan, Dhanmondi, Motijheel, Kotwali, Gulshan etc. and low dense in Demra, Hazaribag, Cantonment, Khilkhet etc.

The dense crime prone areas situated near the core of the city have high activity of people. From the analysis of street crime distribution according to crime rate it is found that the density is higher in the most commercially developed area with huge monetary transaction of high movement of people, but it is less with low population with residential activity like Paltan, Motijheel, Sabujbag, Tejgaon Industrial Thana etc. Higher density is also found in the previous residentially planned area like Dhanmondi and Gulshan which eventually attained the character of mixed used area in spite of residential use.

Some medium dense crime prone areas are found near the high dense crime prone area like Tejgaon, Ramna, Shahbag, Adabar Thana etc.

And it is seen that the low dense areas of crime are located near the outskirt or fringe area of DCC. The low dense crime prone area is found as almost pure residential area with low commercial activity and also related with the area of lower income group activity. But Cantonment Thana is found exception because of higher security.

So it is found that crime density is mainly related with the land use character of a city and is higher is the commercially developed area with core urban activity.

Figure 6 shows the spatial distribution of street crime per square kilometre of each Thana of DCC Area.
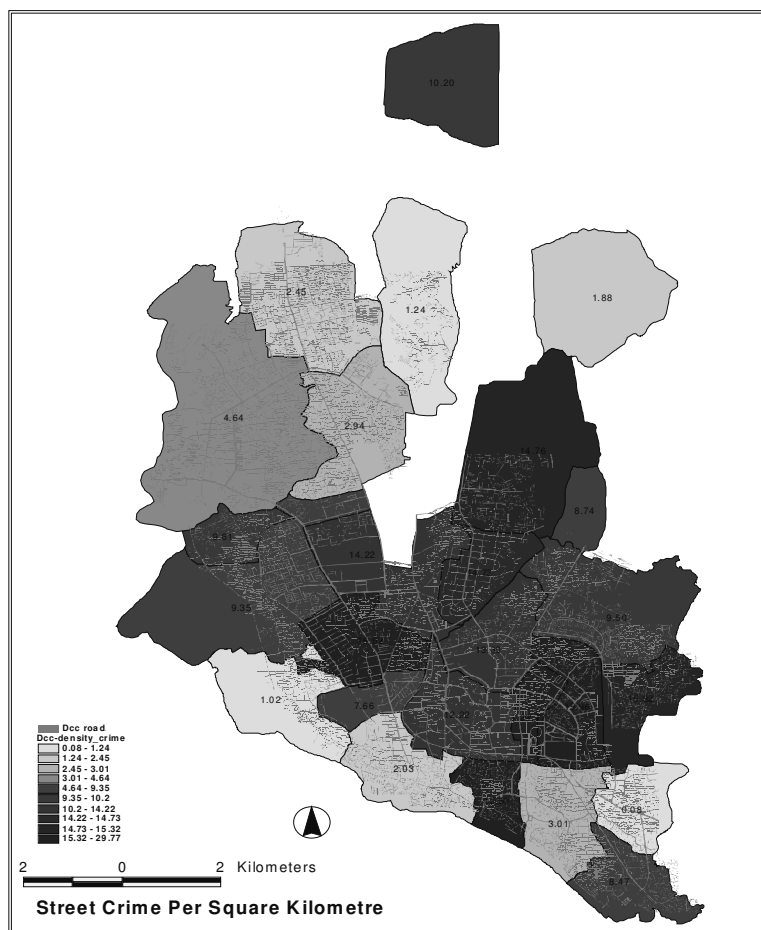


**Figure 6: Spatial Distribution of Street Crime in the Thanas of DCC area according to Crime Density**

## 8. Findings from the Spatial Distribution of Street Crime

It has been found from the spatial distribution of street crime in DCC area that vulnerability of crime occurrence is concentrated in the core area of Dhaka city, where urban activity is high because of higher public movement. The public movement is always higher in the commercially developed urban core area where money transaction is also higher. From the various distribution of Street Crime it is seen that crime prone areas are located in the core area or near the core area of the city which always have high public activity because of mixed or commercial land use. The urban core of Dhaka city is always an important factor for Bangladesh as majority of the country's investment, commerce, manufacturing, constructions, development etc. emerged from here. As criminal occurrence is related with the potential targets for exploiting by the criminals so these areas are favourable places for the criminals to commit crime as they find proper victims in these areas.

And the low crime prone areas are located outside the core area of the city which has low movement of people from outside area and not properly developed and which also has inadequate infrastructural facilities. The residents of these areas belong to basically low or lower middle income group.

So from almost all aspects of spatial distribution of street crime it is found that occurrence of street crime is mainly concentrated with the city's central activity which is also related with the economic viability of urban activity. It is also found that there exists a strong relationship between street crime occurrence and land use activity and also area of affluent group of people.

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