

Article

Analyzing Street Crime Hotspots and Their Associated Factors in Chittagong City, Bangladesh

Mohammad Ali Haider ¹  and Pawinee Iamtrakul ^{2,*}

¹ Department of Geography and Environmental Studies, University of Chittagong, Chittagong 4331, Bangladesh; haiderges75@cu.ac.bd

² Center of Excellence in Urban Mobility Research and Innovation, Faculty of Architecture and Planning, Thammasat University, Paholyothin Street, Pathumthani 12120, Thailand

* Correspondence: pawinee@ap.tu.ac.th; Tel.: +66-2-986-9605-6; Fax: 66-2-986-8067

Abstract: Urban street crime (USC) hotspots severely affect the residential and business neighborhood (RBN) areas of any urban center. This study analyzes USC hotspots and identifies the associated risk factors of becoming a USC hotspot in the residential and business neighborhood areas of Chittagong city. Primary and secondary data sources were used, but primary data played a primary role in this study. It was found that male, married, landlord, and middle-income groups of people are more likely to be victimized than the female, unmarried, renters, rich, and no-income groups. More street crime hotspots were found in the residential than in the business neighborhood. The statistical analysis of the logistic regression model for street crime victimization, a hotspot analysis model of a contour map, and a spatial autocorrelation map identified vulnerable locations in the residential and business neighborhood areas where people are frequently victimized by street crime. Qualitative and statistical analysis results show social, economic, geographical, governance, and planning and urban design factors play a vital role in developing USC hotspots in Chittagong city. The study outcomes need to be considered for an integrated approach to monitor and reduce street crime hotspots by policymakers, urban local government, and community leaders in Chittagong city.

Keywords: Chittagong city; crime hotspots; crime victimization; residential and business neighborhoods; street crime



Citation: Haider, M.A.; Iamtrakul, P. Analyzing Street Crime Hotspots and Their Associated Factors in Chittagong City, Bangladesh. *Sustainability* **2022**, *14*, 9322. <https://doi.org/10.3390/su14159322>

Academic Editors: Lin Liu and Guangwen Song

Received: 13 May 2022

Accepted: 22 July 2022

Published: 29 July 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Crime distribution means evaluating the locations of specific crimes. The physical features of municipal spaces force people to communicate on the road and affect crime and crime patterns. Criminals commit crimes near the places they occupy most of the time, and the same principle applies to victims [1]. Crime is highly concentrated in a few small locations within towns and metropolitan areas [2]. The physical environment in the street, block, or neighborhood has an established relevance regarding expected crime rates and crime-related outcomes for the area, such as community confidence and fear of crime [3]. The rule of eighty–twenty (80/20) suggests that highlighting 20% of the most crime-prone locations can have an intense effect on approximately 80% of total crime [4,5]. Therefore, “a hotspot of crime” is a place that has a more significant number of criminal events. It can be considered an area where people face a higher risk of crime victimization. This suggests the existence of cool spots, either places or areas with less than the average amount of crime [6]. Hence, a determination of crime hotspots and cool spots was made, considering the crime occurrence rates and levels of victimization. A place where people are frequently victimized is called a hotspot, and a place where people are rarely or less regularly victimized is called a cool spot. In its most basic form, a hot spot is a location with a high crime rate. A location might be an address or can be considered in terms of the spatial location of a street corner, a business, a house, or any other area [7]. Places with few or no crimes are frequently surrounded by safe areas with few or no crimes [8]. A higher

number of criminal acts in a particular place results in a situation that may be potentially dangerous in the future [9]. In places where the method of identifying hotspots is applied, statistical significance could help to review overall crime and disorder comparatively. With advancements in crime control, the visibility across various criminal outcomes, including drug offences, disturbance offences, property crimes, and violent crimes, could be then demonstrated effectively [10].

A recent study at the Colombo Municipal Council Area found that seven wards were identified as crime hotspots. Robbery and drug arrest incidents were common around low-income residential housing areas, while property theft records were common around hospitals, cinemas, and concentrated commercial areas [11]. Vehicle thefts are often recorded near lakes, offices, and playgrounds, whereas housebreakings are recorded near housing schemes. Similarly, the Bangladeshi population in urban areas lives in the constant fear of armed robbery, illegal toll collection, kidnapping, disappearance, homicide, etc. [12]. Even though a low per capita income country, such as Bangladesh, may increase its resistance to crime, it has failed to deter crimes, punish criminals, and design the system to make this more efficient [13]. The incidence of crime is not uniformly distributed. The physical distribution of an area, people's livelihood, and social life contribute to the occurrence of crimes and are responsible for crime hotspots in the Chittagong Metropolitan Police (CMP) area [14,15]. Crime happens in areas where there are both opportunities and criminals. Most crimes occur in accessible places that are easy to move through and provide opportunities for escaping. Most criminals commit their crimes in overcrowded areas, which are frequently commercial areas with grid networks. These areas are attractive to perpetrators because they provide clearer, more direct, and predictable routes to more potential offenders, while the existence of commercial activity helps to generate more potential targets [16]. There are many types of crime in Chittagong city. The diversity and intensity of urban crime in the city are rapidly increasing and the impacts of urban crime are immense. Due to increasing street crime, city dwellers' social and economic life is hampered significantly, reducing their productivity [14,15].

Security design is very significant for sustaining communal space, specifically in urban street areas, creating a harmonious living environment, and improving relations in urban neighborhoods [14,17]. A recent study shows a very significant positive relationship between urbanization and street crimes in the residential neighborhood of Chittagong city [14,15,17]. Bangladesh is critical for the regional growth of South Asian, landlocked nations, such as Nepal and Bhutan, and sections of Southern China, Northeast India, and Myanmar. Despite its enormous potential, Chittagong has significant obstacles due to fast population growth, dispersed industrial locations, insufficient infrastructure, excessive social inequality, and crime [18]. Hence, along with the several socio-economic challenges faced by Chittagong city, USC, especially the street crime hotspots in residential and business neighborhood (RBN) areas, is a major impediment to the region's development and a severe concern for city dwellers and urban local administration.

There are various challenges in urban RBN areas in maintaining the quality of urban life; these include offering justice and long-term global security and delivering the multi-facial security framework for directing urban RBN security. Modern-day urban RBN security is creating a significant conflict between interests in citizens' security and privacy [19]. Social and personal capital (e.g., average income, level of education, occupations, and ages) affect the enhancement of the quality of urban life rather than social behavior to either positive or negative ends. Understanding physical and social disturbances in public areas is critical to comprehend urban life. Hence, the physical characteristics of RBNs and social interactions may increase the level of social capital; however, these may ultimately contribute to social decay [20].

Without a doubt, the visual symptoms of urban environmental quality deterioration subtly but forcibly show the extent of afflicted RBNs. Insiders and outsiders alike make attributions and projections due to the disorder, altering the calculations of prospective store buyers, real estate brokers, insurance agents, and investors. The disorder level shows

business people's efficacy in changing their communities and may influence their motivation to continue their engagement [21]. The theoretical model also showed that business cycles could affect the rate of criminal activity [22]. In the city of Szczecin, Poland, it was shown that land-use categories are restricted to their local surroundings with the maximum concentration. This was indicated by commercial crimes and property theft—other kinds of crime. Alcohol stores, clubs and discos, cultural facilities, municipal housing, and commercial structures are among the land-use categories that attract a considerable amount of crime in this zone. The typical areas include grandstands, cemeteries, green areas, allotment gardens, depots, and transportation bases, which can be dependent on land-use forms in deterring criminality in this zone [23]. In addition, in the case of residential neighborhoods, the literature review demonstrates that poverty in the area and associated social and economic situations are linked to various indicators of criminal exposure and offense. Specifically, many studies have shown that neighborhood poverty and its associated structural factors are inputs for predicting a variety of crime-related outcomes, including individuals' exposure to violence, victimization risk, adolescent violent crime, and aggression, arrests for violent behavior, domestic violence, incarceration, and recidivism [24].

Studies have found that, on treatment days, the hotspots had lower crime harm index scores from serious violence than on control days as well as fewer incidents across all public crimes against personal victims. Statistically significant differences in lower prevalence counts and harm of both non-domestic violent crime and robbery and other non-domestic crimes against personal victims were also found. Bland et al. (2019) found in their study no evidence of either displacement of serious crime in a 100 m buffer zone or any evidence of residual deterrence on no-patrol days following patrol days [25]. The literature has revealed that hotspot policing is an effective crime prevention strategy and focusing police efforts on high-activity crime places does not inevitably lead to crime displacement; rather, crime control benefits may diffuse into the areas immediately surrounding the targeted locations [26]. Furthermore, RBN environments could be designed or altered to reduce the potential for crime. At the same time, there are the fear of crime without resorting to fortress construction and the subsequent deterioration in the quality of urban life [27].

Thus, this research selects Chittagong city as a target area of study, as it is one of the oldest and most commercial capital cities of Bangladesh. Street crime is a critical issue in the city. Social and economic life have been impacted due to street crime in the city; especially in residential and business neighborhood (RBN) areas, people are suffering [14,15,17]. Therefore, this study attempts to identify USC hotspots in the RBN areas and the factors that are associated with are becoming crime hotspots in Chittagong city.

2. Background and Study Area

The quality of the urban environment has become an indispensable element to be considered in the public health discourse regarding safety and security concerns [28]. Hence, many questions and debates arise concerning the quality of the urban environment. USC and street crime hotspots are some of them. Criminologists, sociologists, architects, geographers, and others have long been interested in the geographic distribution and drivers of urban crime. Criminologists and sociologists present that crime stems from social stress and conflict and that crime rates in urban neighborhoods are heavily influenced by demographic and socioeconomic factors that geographers consider to be related to its spatial analysis. Social disorganization focuses mainly on the neighborhood or community level, but it is also concerned with individuals as social networks and organization among residents are important [29]. A crime analyst determines the possibility of threshold analysis, of unconscious and geographic proximity with the identification of hotspot patterns. Based on these factors, experts have identified several types of crime patterns, for example, Chainey and Ratcliffe mention three types of crime patterns (i. uniform, ii. random, and iii. clustered) [6]. There might be a link between urban crime hotspots and the built environment [30]. In urban areas, crime intersects with social, economic, and

demographic variables [29]. Local increases in crime are impacted by concentrations of individuals, particularly prospective victims and stolen property, as well as the communities of potential perpetrators [23]. Brantingham et al. opined that crime is not random. The time and geographical features of physical crime show distinct patterns [1]. Along with urban design data characteristics, they predict the occurrence of violent crime variations [31]. Crime patterns are distributed by comparing them in a specific geometric shape on a map to prevent crime and save people from physical assault through responsibilities' actions [32]. Community policing necessitates relatively simple mechanisms for cops on the beat to input the location and features of a reported crime, as well as communities developing the skills to map their areas [33]. John et al. applied popular techniques for crime hotspot mapping that were merely treated as point events and points aggregated to census blocks to demonstrate the geographical area [8]. Asl et al. used techniques to identify the spatial distribution pattern of crime, such as graphics-based statistical models [34]. The crime statistics in the Chittagong Metropolitan Police (CMP) area reveal a considerable variation but almost equal population density in each police station. Figure 1 displays the individual police administrative area of CMP.

The phrase “residential neighborhood” is commonly used by architects and urban planners. Neighborhoods are characterized, at various levels, based on their size, cohesiveness, and common services. In terms of services, four tiers of neighborhoods might be recognized, with each unit consisting of four or five lower-level units that are physically nearby. Residential neighborhoods are the smallest units with common identities, which are typically conveyed via names. Residential neighborhoods tend to be homogenous in terms of community design, population, and socio-economic position. The components of street patterns, lot size, landscape patterns, ethnicity, economic level, and education level are comparable. The smallest unit arranged around children-related amenities can be diverse (e.g., a nursery, play lot, parent education space, social room, or convenience stores). It serves a population of around 1200 people. A neighborhood is frequently built around an elementary school that includes playgrounds, community centers, social rooms, and stores. It is necessary to provide for the size of a population of 5000 people. A high school is surrounded by playfields, auditoriums, gymnasiums, social and recreational facilities, adult education institutions, retail malls, and health centers in a district. This level of the neighborhood is expected to have a population of 25,000 people, which will certainly have a junior college with social facilities (e.g., a cultural center, social and recreational facilities, a municipal administrative center, or hospitals). The population at this level is 75,000 people [35]. There are various challenges in an urban residential neighborhood to maintain the quality of urban life. Ensuring justice and long-term global security, a multi-facial security framework directs urban residential neighborhood security. The security of modern-day urban residential neighborhoods generates a large gap between individuals' security and privacy. Because of the sheer magnitude of insecurity in poor neighborhoods or slums, it has become routinized or normalized into the practical reality of daily living in many circumstances. Fear and insecurity saturate people's lives, having major consequences on trust, well-being, and social capital among groups and individuals [19].

In the business neighborhoods, the size and tenant mix of business communities might vary, but they usually fit under a retail hierarchy employed by the shopping center sector. The features of classic forms of shopping malls or retail concentrate from the urban land institute's development-oriented perspective. A “convenient shopping center” is generally centered by a convenience grocery store, pharmacy, or restaurant. Hair salons, medical/dental offices, phone sales, dry cleaners, video rental, and insurance/real estate agencies are considered other typical tenants. The typical size of the convenience shopping center is 20,000 square feet with ten businesses largely supplying day-to-day requirements [36]. The term “business neighborhood district” refers to commercial districts of a city where retail products and services are accessible to meet the requirements of the neighborhood and the community as a whole. Larger shopping malls, specialty shopping centers, and other retail outlets that serve the community at large are examples of typical

land uses. Residential land uses may be suitable, especially in the context of mixed-use development. It combines modest, single-tenant, and multi-tenant business buildings, retail complexes, vehicle services, sales, and fast-food restaurants [37]. Commercial neighborhood areas include where residents may easily obtain everyday products and services. Grocery shops, banks, dry cleaners, and restaurants are examples of common applications. It is congruent with the general plan's neighborhood commercial land-use category. In this context, understanding physical and sociological disturbances in public areas is critical to comprehend urban commercial districts. Visual symptoms of degradation, without a doubt, subtly but forcibly convey signals about impacted commercial areas. Insiders and outsiders alike make attributions and projections as a result of the disorder, altering the calculations of prospective store buyers, real estate brokers, insurance agents, and investors. The disorder level shows business people's efficacy in changing their communities and may influence their motivation to continue their engagement [21]. The theoretical model also showed business cycles could affect the rate of criminal activity [22]. Therefore, business neighborhood environments could be built or remodeled to limit the potential for crime. At the same time, the fear of crime without resorting to the construction of fortresses consequently deteriorates the quality of urban life [27].

Haider, M.A. et al. (2020) found that a high population density does not play a vital role in more crime occurring in contrast with spatial and temporal dimensions. Table 1 shows the police station-based year-wise crime record in CMP areas from 2001 to 2017. Figure 2 provides evidence that PS1 recorded the highest (20.04%) number of crimes, and PS12 the lowest (4.38%) number of crimes in CMP during 2001–2017 [14].

Table 1. Crime records in Chittagong Metropolitan Police areas during 2001–2017.

Year	PS ₁	PS ₂	PS ₃	PS ₄	PS ₅	PS ₆	PS ₇	PS ₈	PS ₉	PS ₁₀	PS ₁₁	PS ₁₂	Total	%	Rank
2001	775	443	220	192	208	259	271	292	138	371	125	126	3420	4.85	13
2002	692	497	246	181	289	270	353	242	210	351	127	184	3642	5.16	12
2003	610	350	254	205	217	206	285	234	123	235	138	103	2960	4.19	15
2004	620	425	291	240	200	215	249	223	147	192	108	152	3062	4.34	14
2005	506	365	211	187	191	161	190	154	141	228	100	93	2527	3.58	17
2006	461	339	182	180	190	192	248	182	156	310	159	71	2670	3.78	16
2007	715	518	254	228	325	273	313	268	149	372	159	116	3690	5.23	11
2008	766	513	340	326	317	325	378	438	293	304	166	123	4289	6.08	7
2009	656	489	296	233	321	328	465	276	210	225	148	109	3756	5.32	10
2010	719	455	308	309	386	387	440	291	190	273	137	135	4030	5.71	8
2011	707	543	299	266	349	413	343	310	157	316	162	164	4029	5.71	9
2012	802	565	326	333	332	401	446	393	170	429	228	180	4605	6.52	5
2013	994	338	257	403	289	363	246	397	158	316	308	222	4291	6.08	6
2014	1289	374	285	521	294	391	266	558	271	364	364	252	5229	7.41	3
2015	963	329	350	486	448	396	293	506	278	255	372	192	4868	6.90	4
2016	1392	503	326	587	535	557	374	728	285	299	536	369	6491	9.20	2
2017	1478	617	319	509	507	488	311	828	371	363	735	492	7018	9.94	1
Total	14,145	7663	4764	5386	5398	5625	5471	6320	3447	5203	4072	3083	70,577	100.00	
Rank	1	2	9	7	6	4	5	3	11	8	10	12			

Source: [38]. Note: PS₁ = Kotowali Police Station; PS₂ = Double Mouring Police Station; PS₃ = Panchlaish Police Station; PS₄ = Bakalia Police Station; PS₅ = Chandgaon Police Station; PS₆ = Baijid Police Station; PS₇ = Khulshi Police Station; PS₈ = Pahartali Police Station; PS₉ = Haliashahar Police Station; PS₁₀ = Bandar Police Station; PS₁₁ = Patenga Police Station; PS₁₂ = Karnafuli Police Station.

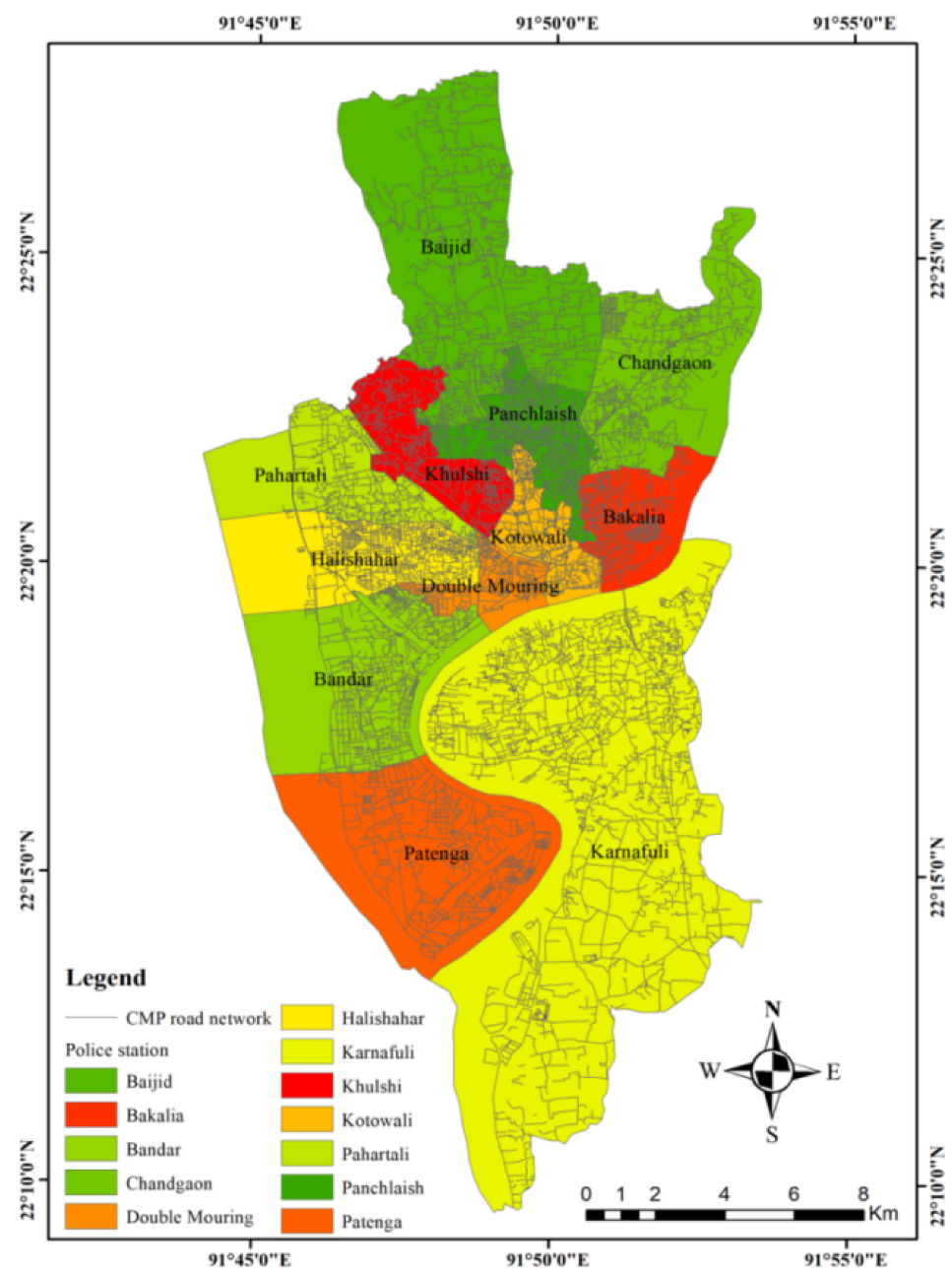


Figure 1. Individual police administrative area of CMP.

The street crime hotspot problem is a burning issue in the RBN areas in Chittagong city. Based on the investigation of spatial and socio-economic variables, USC hotspots have considerable impacts on the socio-economic environment and livelihoods of city dwellers. The rising criminal record trend is one of the critical obstacles to ensure sustainable urban development and quality of life. In addition, crime assessment based on crime per block and density of crime per population helps to determine the crime trend as well as locating a good place for a new police station or direct police patrols, or community participation for social surveillance or community policing as well as modifying the urban neighborhood design to the hotspots to reduce crime [39]. Therefore, this study attempts to identify USC hotspots in the RBN areas and the factors that are associated with areas becoming crime hotspots in Chittagong city.

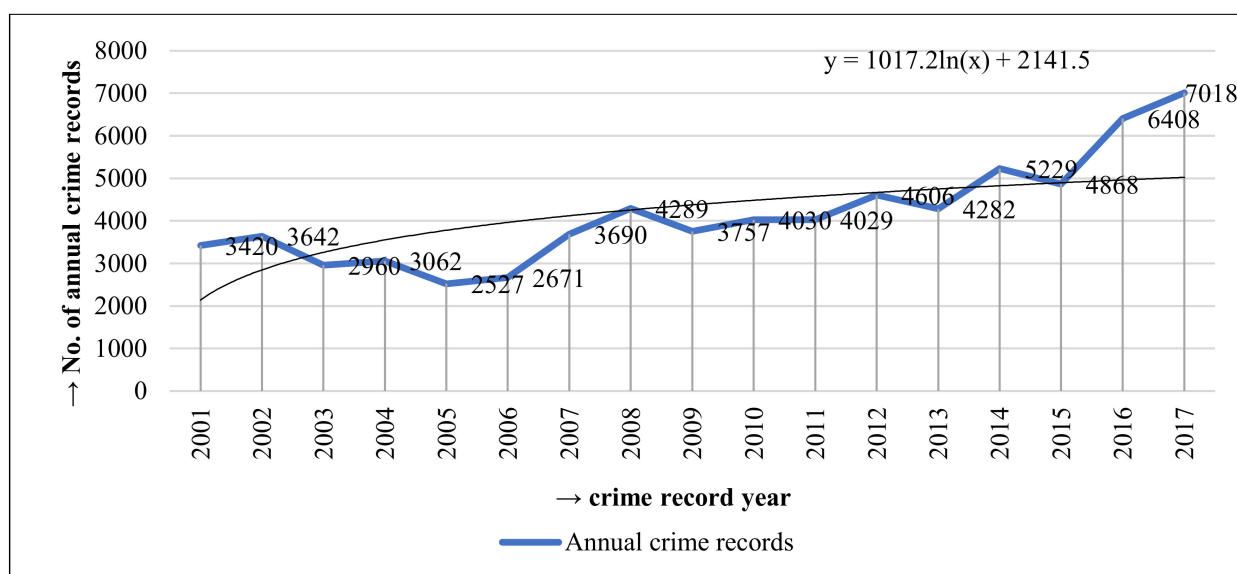


Figure 2. Annual crime record trend in CMP (2001–2017) by Haider (2015) and CMP (2018).

3. Methods

This study used a mixed research approach of qualitative, quantitative, and spatial analysis. This study identified the major crime hotspots and their sphere of influence in the RBN areas. Then, the next step was to examine the critical factors associated with becoming street crime hotspots that favored the offenders committing street crimes. Qualitative and quantitative methodologies were applied concurrently, with qualitative investigations receiving preference. Primary data were collected from household head (HHH) respondents' in-person interviews, key informant (KI) interviews (academicians, community leaders, political activists, public representatives, religious leaders, etc.), and small group discussions (SGD). An in-depth interview was also conducted in street crime hotspots with residents, CMP police officers, and urban planners for data triangulation. All types of respondents were randomly selected purposively and statistically representative. The framework of the study is presented in Figure 3.

The study area as shown in Figure 4 is usually considered Chittagong City Corporation (CCC), but the metropolitan area is different compared to the CCC. All Chittagong Metropolitan Police (CMP) stations were selected to cover all city areas. The CMP area consists of sixteen police stations and part of the Hathazari Police Station (police station locally named Thana). The research was performed in Chittagong City Metropolitan Police (CCMP) regions among its twelve police stations, although four new police stations were established lately in 2013. Their data were not shown individually in this study because there is no soft copy of the new sixteen Thana's base map and there was no available enough statistical data on these four newly created police stations. The primary data (see Table 2) collection tools were a structured questionnaire and a checklist.

Primary data were normalized with the application of weighted average index (WAI) methods. It used a 5-point Likert scale and was normalized with the 1st rank weight of 1.00 to the 5th rank of 0.2. The score of different scales was determined by using the following equation (Equation (1)). Table 3 shows the advantages and disadvantages of the methods used to study street crime hotspots in Chittagong city [6,40].

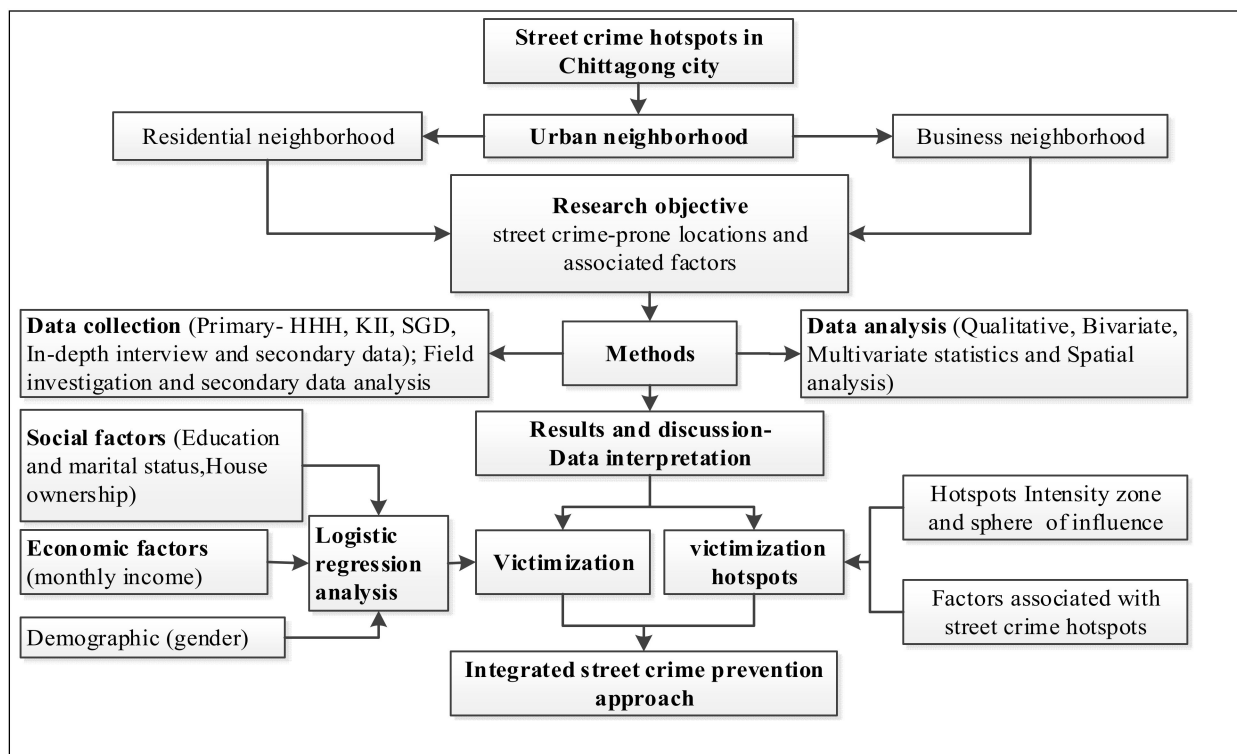


Figure 3. The framework of this study.

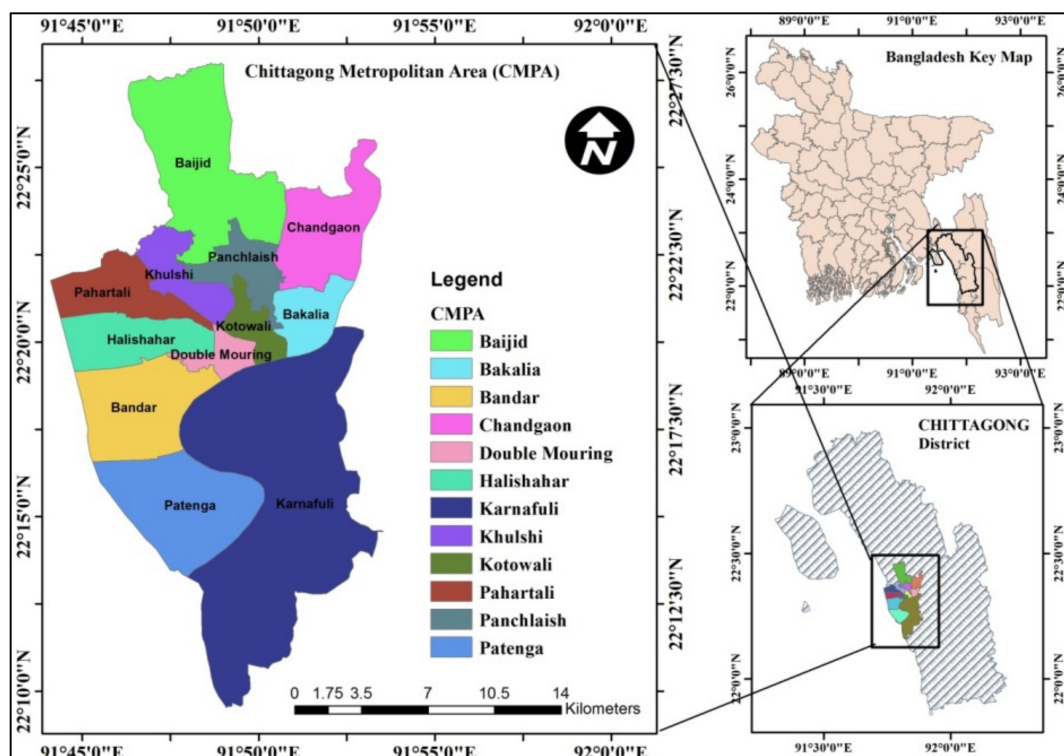


Figure 4. Location of the study area.

$$WAI = \{1st\ rank(1.00) + 2nd\ rank(0.8) + 3rd\ rank\ (0.6) + 4th\ rank\ (0.4) + 5th\ rank\ (0.2)\} / \sum ith\ rank \quad (1)$$

Table 2. Data collection sample size.

Types of Primary Data Collection	Sample Size	Techniques of Data Collection	Tools
Household questionnaire survey	424	Face-to-face interview	Questionnaire
Key informants interview	60	Face-to-face interview	Checklist
Small group discussion	15	Discussion	Checklist
Police officer in-depth interview	40	In-person interview	Checklist
In-depth interview at crime hotspots	126	In-person interview	Checklist
CDA planners' in-depth interview	10	In-person interview	Checklist

Note: CDA—Chittagong Development Authority (the legal planning and design approval authority of the city).

Table 3. Advantages and disadvantages of the methods used to study street crime hotspots and related factors.

Methods	Advantage	Disadvantages
Weighted average index (WAI)	<ul style="list-style-type: none"> - WAI technique allows a dataset to be corrected so that results more accurately represent the studied population. - It diminishes the effects of challenges during data collection or inherent biases of the survey mode being used. - It ensures the views of hard-to-reach demographic groups are still considered at an equal proportion to the population in the final data. 	<ul style="list-style-type: none"> - WAI technique can over-represent the views of one or several people, which may not be an accurate reflection of their entire demographic group. - It can inadvertently introduce additional biases into the dataset. - It can make the findings more variable as it increases the standard deviation of answers (check).
Point maps of crime hotspots	<ul style="list-style-type: none"> - It is a very simple digital way to carry out a familiar and traditional method of crime mapping; placing pins representing crime events onto a wall map. 	<ul style="list-style-type: none"> - It is complicated to identify the location, relative scale, size, and shape of hotspots when crime data are presented as points.
Quadrat/Grid thematic mapping	<ul style="list-style-type: none"> - Quadrat/Grid thematic mapping technique helps to overcome the problems of varying sizes and shapes of geographical areas. - It uses a uniform grid, where each cell (a quadrat) is of the same size and shape. 	<ul style="list-style-type: none"> - Choosing an initial grid cell size is difficult. - A coarse series of grid cells may hide some of the spatial patterning detail within the cell and inappropriate class boundaries as the thematic map can produce unhelpful or misleading results.
Kernel Density Estimation (KDE)	<ul style="list-style-type: none"> - Kernel density estimation is a technique for generalizing incident locations to an entire area. - It provides density estimates for all parts of a region. - It displays information in either surface maps or contour maps that show the intensity at all locations. - It is appropriate for individual point locations. 	<ul style="list-style-type: none"> - It is unclear how the variations in parameter settings used in the interpolation process affect the predictive accuracy of KDE hotspot maps. - Users rely on an application's default setting, which lacks scientific justification. If the default setting in ArcGIS is not modified by the user, for example, the search radius in KDE is calculated as the shortest of the width or height of the study area (e.g., a bounding rectangle that encompasses all crime incident locations), divided by 30. The software manufacturer offers no justification or rationale for this calculation.

The weighted average index (WAI) data were analyzed through various GIS techniques (point pattern, quadrat pattern, kernel density estimation, contour model, and spatial autocorrelation model) and represented in the map to show the spatial variation of USC hotspots and their associated factors in the RBN areas in Chittagong city. Qualitative techniques helped to understand the magnitude of crime problems, and factors of creating crime hotspots and expressed with qualitative statements displaying the spatial variation of the various types of maps. Assessing the extent of the relationship between street crime victimization and socio-demographic factors of the respondents, bivariate and multivariate regression analyses were also conducted. Furthermore, GIS techniques were used to show the USC hotspots. Street crime hotspots in the RBN areas were analyzed with the application of grid thematic mapping (quadrat method) kernel density estimation (KDE) technique to demonstrate the most concentration of crime hotspots. Models of contour map and spatial autocorrelation map of street crime hotspots in CMP areas were prepared by using the WAI values for the street crime hotspots in the RBN areas in Chittagong city.

4. Results

4.1. Urban Street Crime Victimization

To understand the street crime hotspot pattern in Chittagong city (CC), at the very beginning, the study investigated USC victimization in the residential and business neighborhood (RBN) areas. The study found that 32.78% of household head respondents were street crime victimized in their residential neighborhood (RN) and all types of respondents together experienced 31.11% of victimization in their RN urban street. In the business neighborhood (BN), it was found that 20.52% of household heads and all types of respondents together experienced 19.85% of victimization in their BN urban street in CC. Table 4 displays the victimization of USC in RBN areas of the study area.

Table 4. Victimization of urban street crime in residential and business neighborhood areas in Chittagong city.

Victimization of urban street crime	Residential Neighborhood													
	HHH		KI		IDH		IDP		IUP		SGD		Total (N = 675)	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Yes	139	32.78	20	33.33	42	33.33	2	5.00	4	40.00	3	20.00	210	31.11
No	285	67.22	40	66.67	84	66.67	38	95.00	6	60.00	12	80.00	465	68.89
Victimization of urban street crime	Business Neighborhood													
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Yes	87	20.52	15	25.00	22	17.46	2	5.00	4	40.00	4	26.67	134	19.85
No	337	79.48	45	75.00	104	82.54	38	95.00	6	60.00	11	73.33	541	80.15

Note: *f*—frequency; HHH—Household head; KI—Key informant; IDH—In-depth interview with a resident in crime hotspots; IDP—In-depth interview with a police officer; IUP—In-depth interview with an urban planner; SGD—Small group discussion.

A bivariate (χ^2) test was conducted to determine the spatial relationship between police stations and crime victimization. The χ^2 test results are shown in Table 5.

The χ^2 test results show that the street crime victimization of the household head respondents in CC had a significant variation. It indicates that street crime occurrence in CC is not evenly distributed. According to the victims' statements, 94 street crime hotspots were identified in the residential neighborhood areas and 76 locations were identified in the business neighborhood areas in Chittagong city. A point pattern map and a contour map were prepared based on the frequency of street crime victimization of HHH respondents in each location in RBN areas in Chittagong city (CC). Figure 5 displays the USC victimization locations in RBN areas in Chittagong city.

Table 5. Chi-squares tests (victim of street crime according to household head respondents).

Analysis	RN			BN		
	Value	df	Asymptotic Significance (2-Sided)	Value	df	Asymptotic Significance (2-Sided)
Pearson's Chi-Squares	53.132a	11	0.000	23.511a	11	0.015
Likelihood Ratio	56.064	11	0.000	22.885	11	0.018
Linear-by-Linear Association	14.548	1	0.000	0.876	1	0.349
N of Valid Cases	424			424		
a. 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 6.88.				a. 2 cells (8.3%) have an expected count of less than 5. The minimum expected count is 4.31.		

4.2. Street Crime Hotspots in Residential and Business Neighborhood Areas in Chittagong City

Location plays a significant role in street crime occurrence. The setting of locational characteristics always varies. As a result, USC could be high or low in a residential neighborhood area. Based on the experiences of the respondents, they were requested to mention the top five crime-prone locations in their residential neighborhood (RN) areas and rank their discussion. Sequentially, the most crime-prone location has the first rank position, and the least crime-prone location has the fifth rank position. According to the respondents' perception of street crime hotspots in their RN, around 461 street crime-prone locations were identified in Chittagong city. A kernel density estimation (KDE) (a popular spatial analysis technique in GIS) map was prepared based on the weighted average index (WAI) (see Equation (1)) of each crime-prone location. Figure 6 shows the (a) point pattern and (b) kernel density estimation of street crime hotspots in RN areas in Chittagong city.

The formation of business neighborhood features always differs. As a result, USC could differ significantly. In the same way, as a port city and commercial capital of Bangladesh, street crime in Chittagong city varies based on locational characteristics. The respondents identified the top five crime-prone locations in their business neighborhood areas and then ranked them from their discussion. Around 411 street crime-prone locations were identified in Chittagong city. A kernel density estimation (KDE) map was prepared based on the weighted average index (WAI) (see Equation (1)) of each crime-prone location in BN areas of Chittagong city. Figure 7 demonstrates the (a) point pattern and (b) kernel density estimation of street crime hotspots in business neighborhood areas in Chittagong city.

4.3. Factors Associated with Areas Becoming Street Crime Hotspots in Residential and Business Neighborhood Areas in Chittagong City

The factors associated with areas becoming USC hotspots in RBN areas are diverse. The study identified some of the dominant causes of areas becoming crime hotspots in RN areas in Chittagong city. Based on the weighted average index (WAI), significant causes of becoming a crime hotspot include the lack of police patrolling, corruption of police, inactiveness of the police force, very far distance from the police station, escaping or hiding opportunity in the nearest slum, the residence of poor people/slum people, lack of street light, escaping or hiding opportunity in the mass gathering, the narrow width of the streets, local political patronization, poor or worse condition of the street, transport nodes (bus terminal/railway station), traffic congestion, and escaping or hiding opportunity in the nearest forest or hill.

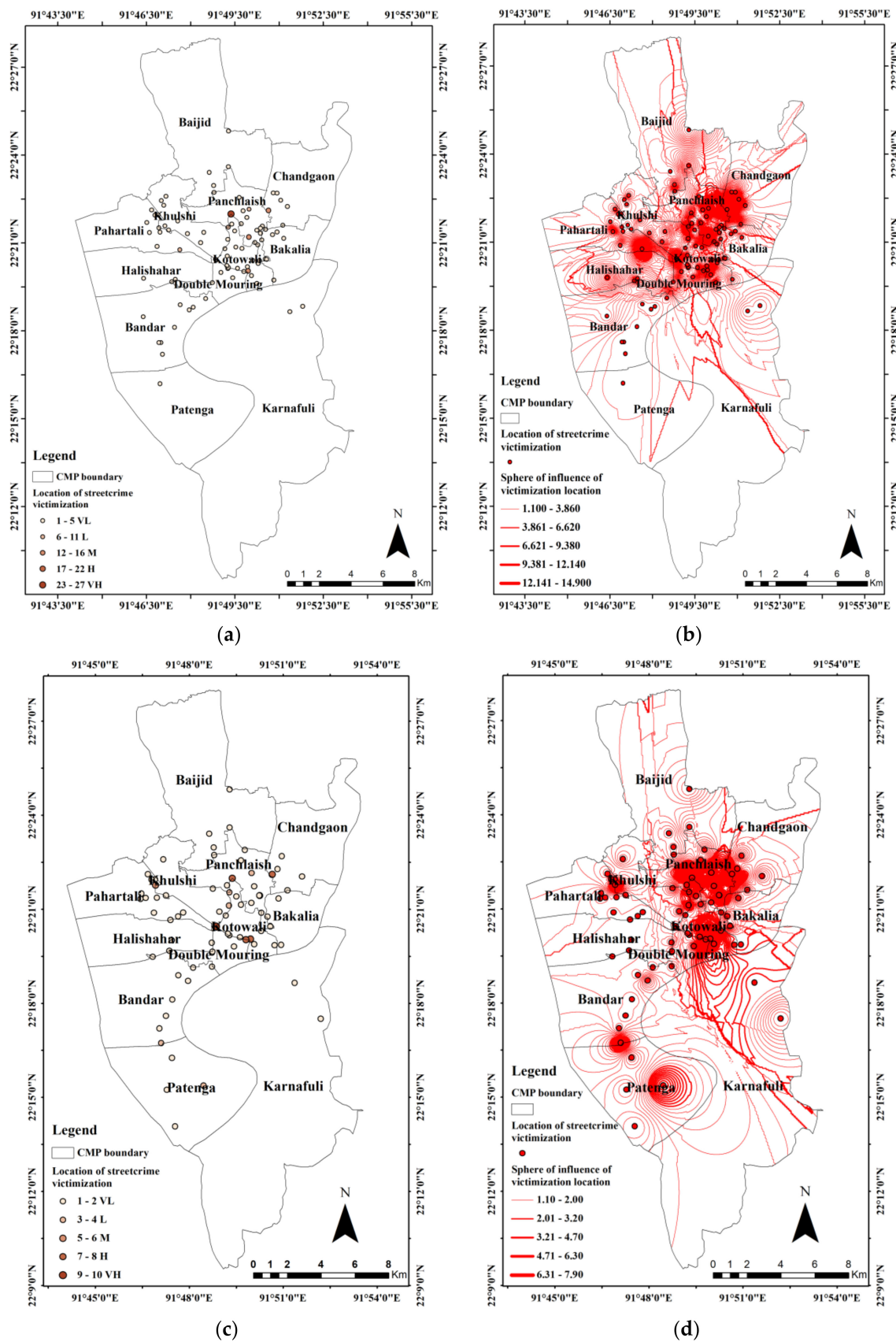


Figure 5. Urban street crime victimization locations in RN and BN in Chittagong city. (a) Point patterns of the level of street crime victimization locations in residential neighborhood (RN) areas in CC. (b) Analysis of the sphere of influence of street crime victimization locations in RN areas in CC.

(c) Point patterns of the level of street crime victimization locations in business neighborhood (BN) areas. (d) Analysis of the sphere of influence of street crime victimization locations in BN areas.

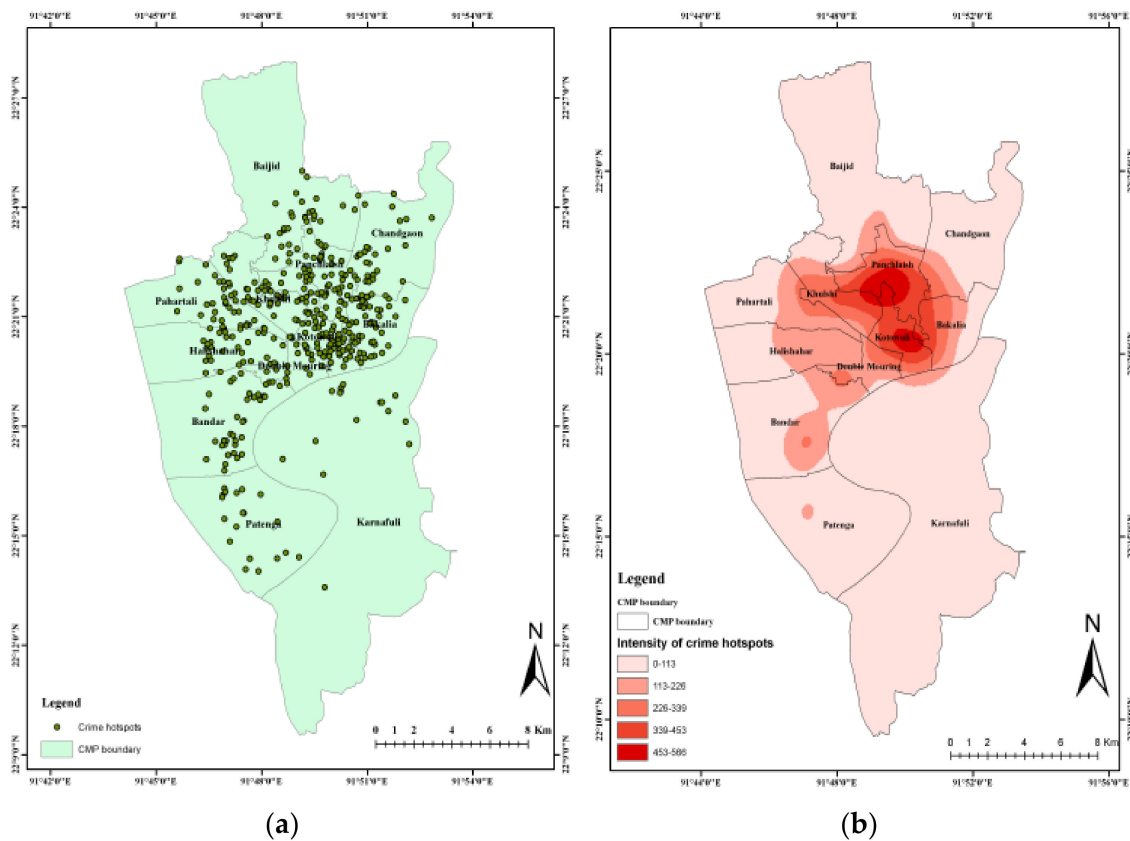


Figure 6. Urban street crime hotspots and their pattern in RN of Chittagong metropolitan area. (a) Point patterns of the majority of street crime locations in RN areas. (b) Kernel density estimation of the majority of street crime locations in RN areas.

Diversified economic activities make business neighborhood have individuality. Business areas turn into the busiest place at a certain period in the day due to people's daily activities. Therefore, perpetrators try to obtain benefit of this time. The large number of money transactions and the availability of precious goods attract the perpetrators and ultimately, due to some other reasons, it becomes a crime hotspot. Based on the weighted average index (WAI), the major causes of becoming a crime hotspot in BN areas are corruption, inactivity, lack of patrolling of police, very far distance from the police station, escaping opportunities in the nearest slum, vast people's gathering/busy place, drug addiction, fun and curiosity, ethical decadence, bad company, abuse of ICT, lack of parental care, traffic jam, lack of street lighting, and narrow and bad condition of or zigzag street. More broadly, the major factors of becoming a street crime hotspot in residential neighborhood areas can be categorized into five groups, including (i) social, (ii) economic, (iii) physical/geographical, (iv) governance/administrative, and (v) planning and design. The critical issues of each category are in bold in Table 6 and should be considered in street crime hotspot prevention.

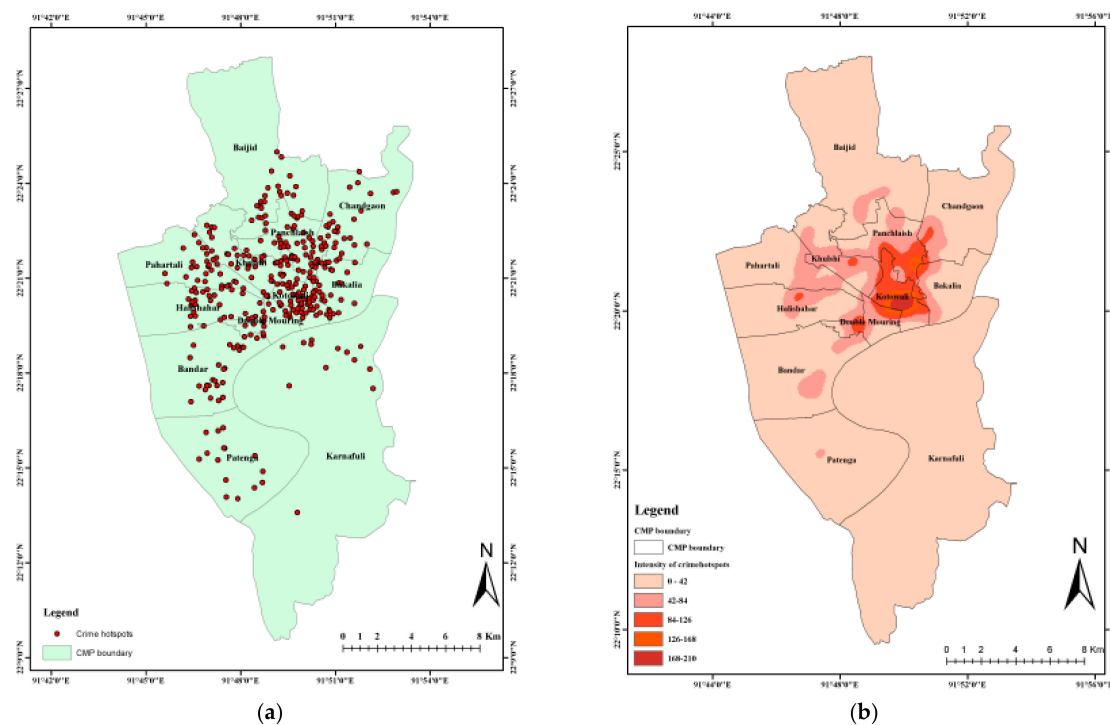


Figure 7. Urban street crime hotspots and their pattern in BN of Chittagong city. (a) Point patterns of the majority of street crime locations in BN areas. (b) Kernel density estimation of the majority of street crime locations in BN areas.

Table 6. Associated factors of street crime hotspots in RN and BN in Chittagong city.

Factors	Variables	RN (%)	BN (%)
Social factors	Poverty and living in a slum *	18.87	9.60
	Illiteracy and lack of awareness	3.98	2.36
	Drug addiction	3.72	3.80
	Lack of parental care	0.77	0.72
	Abuse of ICT and bad accompany	0.64	0.54
Economic factors	Vast number of people gatherings and busy commercial places *	22.85	30.98
	Depression and unemployment	2.31	1.63
	Commercial and bazar area	1.28	2.17
Geographical factors	Narrow, bad condition, and zigzag street *	8.22	5.98
	Hiding opportunity in the mass gathering, hill, forest, and local neighborhood	2.18	6.70
Governance factors	Corruption, inactiveness of the police force, and lack of security *	6.93	8.70
	Misuse of political power and political patronization	2.44	2.90
	Local influence and political leader's patronization	1.28	1.09
Planning and design factors	Far from the police station	0.39	0.72
	Lack of street lighting *	8.60	5.98
	Congested area and unplanned settlement	5.26	3.44
	Quite a road and fewer people	5.26	3.08
	Traffic congestion *	4.36	8.88

* Note: dominant issue in each associated factor of street crime hotspots in RN and BN in Chittagong city.

5. Discussion

5.1. Urban Street Crime Victimization

A multivariate logistic regression analysis was conducted to determine the level of association between urban street crime (USC) victimization and household head respondents' sex, educational qualification, house ownership, marital status, and monthly income in residential and business neighborhood (RBN) areas in Chittagong city (CC). The odds ratios of 0.511 and 0.775 for females suggest that males have 49% ($1 - 0.511$) and 22.5% ($1 - 0.775$) more chances of USC victimization in their RBN areas. The level of educational qualification was observed to have a significant association with USC victimization in RBN areas. The odds ratios of 0.716 and 0.97 for house renters imply that house owners were 29% ($1 - 0.716$) and 3% ($1 - 0.97$) more likely victims of USC, respectively. Marital status was observed to have a significant association with USC victimization in RBN areas in CC. Married people have a 30% ($1 - 0.709$) more chance of victimization in residential neighborhoods and 3% ($1 - 0.97$) more chance in business neighborhood areas in Chittagong city. The monthly income level was observed to have a significant association with USC victimization in RBN areas in Chittagong city. The regression models indicate that economically poor and rich people are not affected by street crime victimization. The reasons behind this are that the poor do not have cash or valuable assets and the rich have measures to protect themselves. Table 7 shows the logistic regression estimates and relative odds of street crime victimization among the selected household heads in RBN areas in Chittagong city.

5.2. Street Crime Hotspots in Residential and Business Neighborhood Areas in Chittagong City

The topmost five crime-prone locations in the RBN areas were identified and ranked sequentially such that the most crime-prone location is the first and the least crime-prone location is the fifth. Five classes of street crime hotspots were established in RBN areas sequentially, based on the street crime hotspots' weighted average index (WAI), and the classes were represented in five levels as very high (VH), high (H), moderate (M), low (L), and very low (VL) (Figure 7a).

The models of street crime hotspot vulnerability map and contour map in RBN areas were prepared to demonstrate the sphere of influence of each crime hotspot (Figure 8). Based on the frequency of victimization and citizens' perception of victimization, the analysis results show some crime hotspots are highly vulnerable and some are not too extreme. This analysis helped to understand the point-based street crime concentration and spheres of influence of individual street crime hotspots.

Similarly, based on the frequency of victimization and citizens' perception of victimization, street crime hotspots in RBN areas were analyzed using grid thematic mapping (quadrat method), as shown in Figure 9. The model of the quadrat pattern map was prepared to demonstrate the USC hotspots in RBN areas in Chittagong city. In addition, the kernel density estimation (KDE) technique was used to illustrate the highest concentration of crime hotspots, as shown in Figure 10. Along with this, the model of spatial autocorrelation analysis results demonstrates the street crime intensity zones (Figure 11). These zones of USC hotspots helped to identify which areas are most crime-prone and which areas are less. Hence, USC hotspot analysis models in RBN areas indicate the spatial distribution of street crimes' impact intensity in Chittagong city.

Table 7. Logistic regression estimates and relative odds of street crime victimization among the selected household heads in residential and business neighborhood areas in Chittagong city.

Categorical Variables ^a	Residential Neighborhood						Business Neighborhood					
	Variables in the Equation						Variables in the Equation					
	B	S.E.	Wald	df	Sig.	Exp(B)	B	S.E.	Wald	df	Sig.	Exp(B)
Sex (female)	−0.672	0.259	6.717	1	0.010	0.511	−0.254	0.313	0.660	1	0.417	0.775
Illiterate			3.115	5	0.682				13.005	5	0.023	
Primary	0.045	0.523	0.007	1	0.932	1.046	−0.049	0.656	0.006	1	0.940	0.952
Lower secondary	−0.679	0.526	1.668	1	0.196	0.507	−0.825	0.629	1.718	1	0.190	0.438
Secondary	−0.340	0.499	0.462	1	0.497	0.712	−1.06	0.597	3.159	1	0.076	0.346
Higher Secondary	−0.415	0.506	0.673	1	0.412	0.660	−0.937	0.614	2.329	1	0.127	0.392
Graduate and above	−0.224	0.474	0.224	1	0.636	0.799	−0.028	0.599	0.002	1	0.963	0.973
House Ownership (rental)	−0.334	0.237	1.989	1	0.158	0.716	−0.031	0.273	0.013	1	0.910	0.970
Marital Status (unmarried)	−0.343	0.261	1.725	1	0.189	0.709	−0.028	0.309	0.008	1	0.928	0.972
* Monthly income (in BDT): 100,000+			4.319	5	0.505				15.411	5	0.009	
* Monthly income (in BDT): 50,000–100,000	1.243	1.022	1.480	1	0.224	3.467	0.257	1.047	0.060	1	0.806	1.293
* Monthly income (in BDT): 20,000–50,000	0.692	0.821	0.711	1	0.399	1.999	1.071	0.908	1.391	1	0.238	2.917
* Monthly income (in BDT): 10,000–20,000	0.423	0.827	0.261	1	0.609	1.526	0.327	0.903	0.131	1	0.717	1.387
* Monthly income (in BDT): below 10,000	0.864	0.830	1.084	1	0.298	2.373	0.952	0.914	1.085	1	0.298	2.590
No income	0.995	0.909	1.198	1	0.274	2.704	−0.542	0.969	0.313	1	0.576	0.582
Constant	0.846	0.911	0.863	1	0.353	2.331	1.305	1.033	1.596	1	0.206	3.688

^a Variable(s) entered in step 1: Sex, education, house ownership, marital status, and monthly income. Model summary for residential neighborhood: $\chi^2 = 17.009$ (0.199), -2 Log likelihood = 519.462 ^a, Cox and Snell R Square = 0.039; and Nagelkerke R Square = 0.055; Model summary for business neighborhood: $\chi^2 = 29.608$ (0.005), -2 Log likelihood = 400.762 ^a, Cox and Snell R Square = 0.067; and Nagelkerke R Square = 0.106; ^a Estimation terminated at iteration number 4 because parameter estimates changed by less than 0.001. * Note: BDT 93.5 is equivalent to USD 1.

5.3. Factors Associated with Areas Becoming Street Crime Hotspots in Residential and Business Neighborhood Areas in Chittagong City

The locational characteristics of RBN in Chittagong city are very much varied since it is the prime port city and commercial hub of Bangladesh. Crime hotspot areas had a high intensity of crime. A large number of street crime hotspots were identified for various reasons. Specifically, money transactions, the presence of slums, being overcrowded, rush, and business turn an area into a hotspot. The negligence of duty of the law enforcement personnel was found primarily responsible for transforming a place into a hotspot. Additionally, corruption, inactiveness, and lack of police patrolling could be considered as negligence of police duty. Mismanagement, such as lack of street lighting, bad condition and narrow road, and escaping opportunities, were some of the other causal factors associated with areas becoming street crime hotspots in RBN areas. Busy or dense locations pave the way for USC. The percentage of slum dwellers in the city is also above 36% [41]. Most of the street crime hotspots in the city were found more common and surrounded by slum dwellers and, as a result, offenders hide in slums. The major factors associated with an area becoming a street crime hotspot could be categorized into five groups, such as

(i) social, (ii) economic, (iii) geographical, (iv) governance, and (v) planning and design (see Table 4). City dwellers mentioned that the corruption of law enforcement agencies (69.58%) was the main cause. Additionally, key informants (56.67%) and small group members (73.33%) explained that the lack of police patrolling was the main reason for creating street crime hotspots, but police officers mentioned (62.50%) that escaping opportunities in the nearest slum has an important role in crime in RBN areas in Chittagong city. The factors identified in this study in increasing street crime hotspots in Chittagong city could be of benefit in various ways, such as the USC hotspots analysis model in RBN areas indicating the spatial distribution of street crimes impacts the intensity on the social and economic life and livelihood in Chittagong city. This analysis and discussion might be useful for law enforcement agencies as well as other stakeholders in dismantling street crime hotspots in Chittagong city.

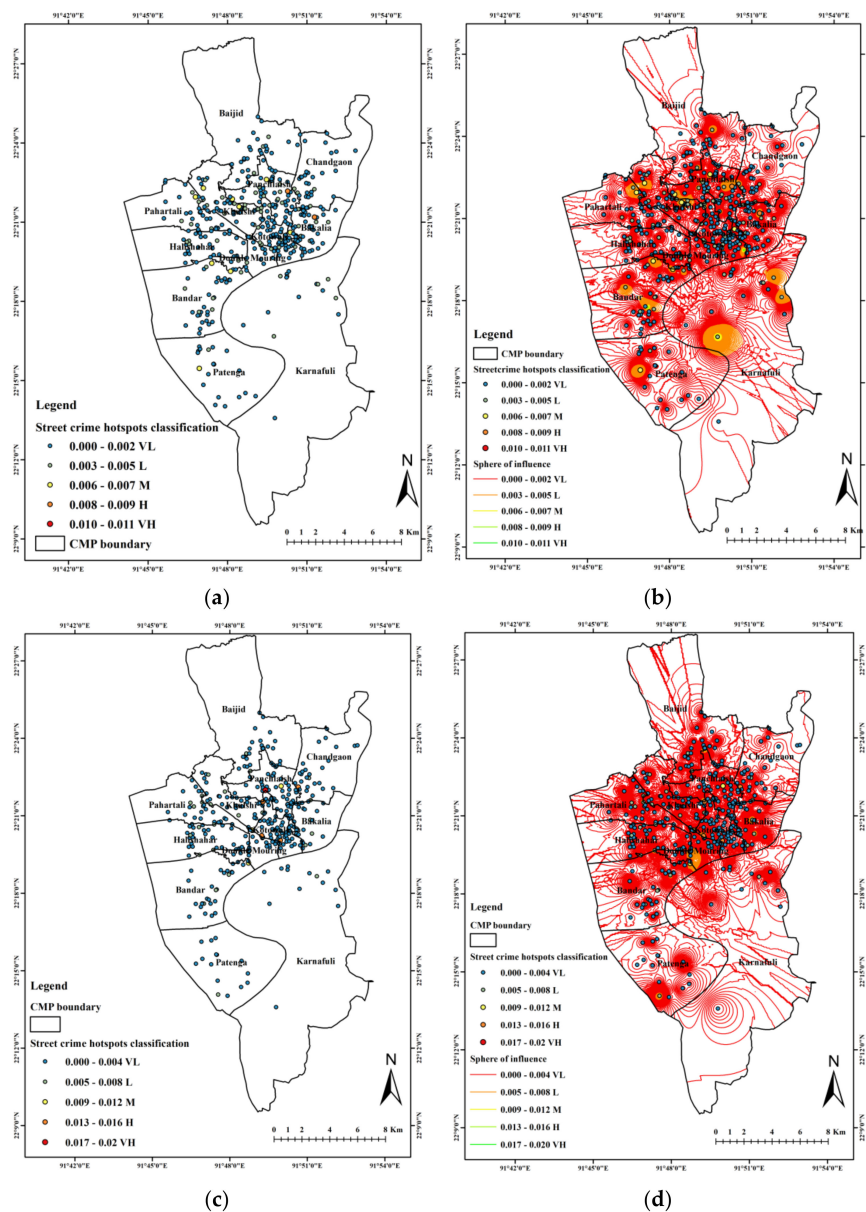


Figure 8. Street crime hotspots vulnerability models in RN and BN in Chittagong city. (a) Vulnerability analysis of street crime hotspots in residential neighborhood areas. (b) Analysis of the sphere of influence of crime hotspots in residential neighborhood areas. (c) Vulnerability analysis of street crime hotspots in the business neighborhood. (d) Analysis of the sphere of influence of crime hotspots in the business neighborhood.



neighborhood areas.



business neighborhood areas in Chittagong city.

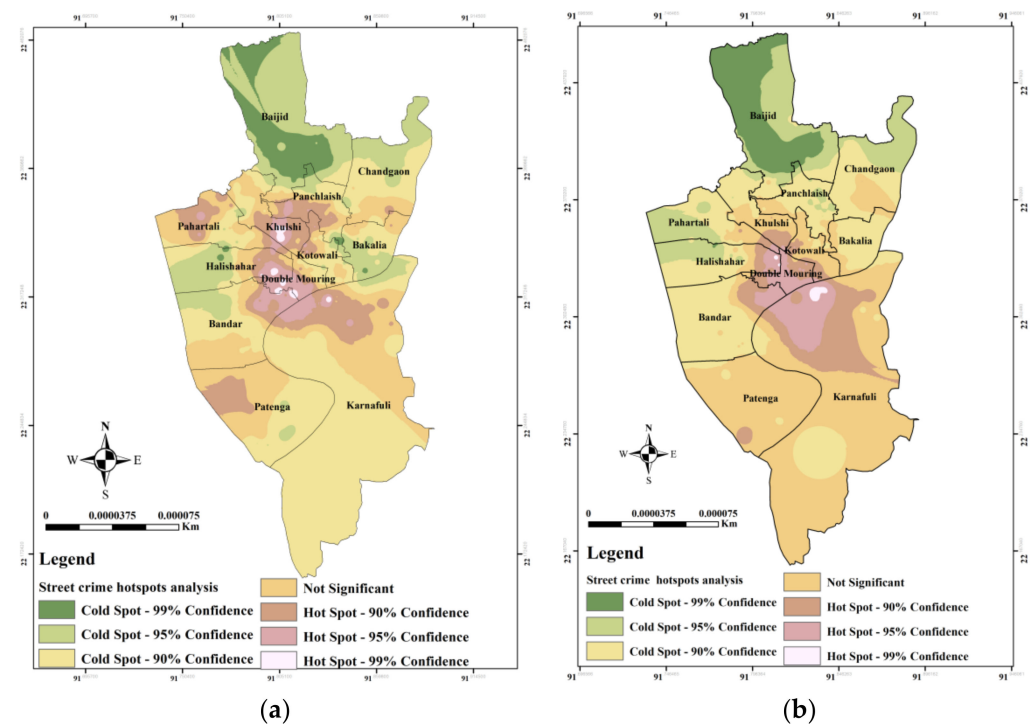


Figure 11. Street crime hotspot models in RN and BN in Chittagong city. (a) Model of spatial autocorrelation map of street crime hotspots in residential neighborhood areas. (b) Model of spatial autocorrelation map of street crime hotspots in business neighborhood areas.

Empirical research results suggest that, when the police focus on crime hotspots, the latter can significantly benefit the incidence of crime in these areas and hotspot policing is an effective crime prevention strategy [42]. Additionally, good neighborhood policing can identify suspects, be aware of vulnerable people in their community, and relay community concerns and intelligence to other sections of the force. Research has also identified that the output of policing is one of the many aspects of crime control and prevention and a review of the literature examining police production functions demonstrated that the output of the police is public safety and protection of the rights of individuals, with the police seeking to maximize this output. An ideal system of crime control would reduce crime as far as possible, spreading the benefits of crime reduction as fairly as possible; however, in doing so, it preserves the liberties (of movement and privacy) that society deems to be essential [43]. Therefore, communities, urban local government, law enforcement agencies, and urban planning authorities can take immediate action considering these research results. Table 8 shows the magnitude of factors' impact on the increase in street crime centers in RBN areas in Chittagong city.

5.4. Limitations and Suggestions

This study was based on personal experiences and perceptions as well as crime statistics of CMP playing a vital role in analyzing the USC hotspots and associated factors of areas becoming street crime hotspots in Chittagong city. Very few studies were found regarding urban crime in Bangladesh and a single study was conducted in Chittagong city [14,15]. A sufficient amount of literature related to USC and street crime hotspots was unavailable. Table 9 shows the directions and measures for reducing urban crime in Chittagong city.

Table 8. Magnitude of factors' impact on the increase in street crime centers in RBN areas in Chittagong city.

Types of Factors Affecting the Increase in Street Crime	Impact on the Increase in Street Crime in RN Areas	Impact on the Increase in Street Crime in BN Areas
Social	Poverty and living in a slum (13.86%)	Poverty and living in a slum (10.15%)
	Illiteracy and lack of awareness (5.69%)	Drug addiction (4.75%)
	Drug addiction (5.41%)	Local influence and political patronization (1.85%)
Economic	Vast people gatherings and busy places (16.47%)	Vast people gathering and busy commercial place (21.4%)
	Depression and unemployment (3.84%)	Misuse of political power and political patronization (extortion) (4.29%)
	Commercial/bazar area (1.26%)	Depression/unemployment/illiteracy (4.18%)
Geographical	Narrow, bad condition, and zigzag street (11.45%)	Narrow, bad condition, or zigzag street (10.56%)
	Hiding opportunity in the mass gathering, hill, forest, and local neighborhood (4.1%)	Hiding opportunities in the mass gathering, hill, forest, and in the local neighborhood (5.32%)
Governance	Corruption/inactiveness of police force/lack of security (8.28%)	Corruption, inactiveness of the police force, and lack of security (8.09%)
	Misuse of political power and political patronization (3.41%)	
	Local influence and political leaders patronization (2.13%)	Far from the police station (0.92%)
Planning and design	Lack of street lighting (8.3%)	Lack of street lighting (8.36%)
	Congested area or unplanned settlement (4.64%)	Traffic congestion (7.11%)
	Traffic congestion (3.33%)	Congested area and unplanned settlement (3.26%)

On the contrary, urban areas in any country are the engine of economic growth and symbol of development [44]. In some countries, it exposes the cultural heritages and origin of cultural diffusion. Hence, to ensure safe and secure city life, necessary measures are required in every city. Chittagong city is the second-largest based on the population size and financial capital of Bangladesh. Around 90% of national export and import occur in this port city. More than 11% of the national GDP is contributed from this city. Additionally, it is one of the fast-growing cities in Bangladesh and around 6 million people currently live in this city. It can be noticed that, for the safe and secure movement of city dwellers, neighborhood communities first need to come forward and find out the mechanisms of how to make their community safe and secure from street crime [45]. Additionally, law enforcement agencies needed to be modernized and cope with the mindset of citizen-centric service delivery [46]. Along with city planning, development authorities also need to think about the issue of safety and security of city dwellers when they make the neighborhood and detail area plans of the city to ensure the quality of urban life [47]. The indicators of directions and street crime reduction measures and risks of non-implementation for reducing urban street crime bearing in mind the socio-economic issues, geographical factors as well as urban governance, urban planning and design in Table 7 need to be taken into consideration by all stakeholders to make Chittagong city safe and secure.

Table 9. Directions and measures for reducing urban street crime in Chittagong city.

Indicators of Direction	Tools for Reducing Urban Crime	Risks of Non-Implementation
Social	Social awareness program	More offenders due to ignorance
	Community guard	More opportunity for the perpetrators because of community disorganization
	Common entrance and exit gate	More opportunity for the perpetrators because of easy to enter and escape
	Helping law enforcement personnel	Difficult to catch perpetrators
	Introducing security alarm	More victims due to the ignorance of the community
Economic	Employment generation	More offenders as a result of unemployment
	Rehabilitation of perpetrators and slum people	More offenders caused by poverty and unemployment
	The rewarding of honest and brave people who helped law enforcement personnel in capturing the offenders	Bystanders and law enforcement personnel will not motivate to catch the perpetrators
	Introducing the social safety net program	More offenders due to poverty
	Increasing salary and allowances for the law enforcing personnel for their fulfilling basic needs	More corruption and inactiveness in law enforcement personnel
Geographical	Street widening	More victims due to congested roads and traffic jams
	Repairing streetlights	Perpetrators will take opportunities in the dark places
	Attention to transport nodes	Perpetrators will take opportunities in the mass gathering
	Ensuring sufficient open space	Zigzag and narrow streets create more opportunities for the perpetrators
	Installation of CCTV cameras in the vulnerable locations	More victims due to no risk to identify the perpetrators
Governance	Police patrolling	More offenders due to a lack of fear of being in police custody
	Increase activity of police force	More crime due to a lack of law enforcement personnel
	Developing new law controlling rapidly changing pattern of crime	Opportunities to escape from punishment due to weakness of law
	Law enforcement	More crime lack of punishment
	Catching the listed criminals and suspects	More perpetrators thinking not to go into police custody
Planning and design	Installation of CCTV cameras	More offenders due to no risk to identify
	Planned roads and streets	More crime due to mass gatherings and traffic jam
	New roads and flyover construction	More street crime due to traffic congestion
	Installation of a security post at a suitable location	More perpetrators consider the absence of police or easy to escape
	Panned urbanization	More crime due to mass gatherings and traffic jam

6. Conclusions

Location plays an important role in street crime occurrence. The formation of locational characteristics continuously varies. As a result, USC could be high or low in RBN areas in any city. USC hotspots also vary in considering the frequency of victimization, types of victimization, and level of victimization as well as factors influencing the formation of a high crime zone. This research explored the USC hotspots' sphere of influence, intensity zone of crime, and factors associated with an area becoming a street crime hotspot in RBN areas in Chittagong city. Primary and secondary sources of data were collected by using

several instruments, such as field surveys and published and unpublished research report analyses. Qualitative, quantitative, and spatial data analysis methods and techniques were applied in analyzing the collected data and information. It was found that male, married, landlord, and middle-income groups are more likely to be victimized than female, unmarried, rental house people, rich and no-income groups. These results match with the 80–20 rule that described that crime is highly concentrated among offenders, victims, or places [5]. More street crime hotspots were found in RN than in BN areas in Chittagong city [14,15]. The study also found inactive and insufficient police patrolling, and local political patronization to be vital hindrances. Problematic urban planning and design, such as zigzag streets and narrow street patterns, and insufficient streetlights, were the focal causes of becoming street crime hotspots in RBN areas. The creation of crime hotspots and their associated factors revealed a burning issue in urban planning and development in Chittagong city.

In this regard, law enforcement agencies' efforts are associated with crime displacement or diffusion of crime control benefits, as well as problem-solving versus a focus on just increasing enforcement may bring about longer-term crime control gains. Additionally, community policing has far-reaching implications for crime control and prevention. The new emphasis is on making community members active participants in the process of crime hotspot problem solving, and the patrol officers' pivotal role in community policing. The neighborhood patrol officer, backed by the police organization, helps community members to mobilize support and resources to solve problems and enhance their quality of life [48]. Therefore, the outcomes of the research need to be taken into consideration for an integrated street crime prevention approach by the policymakers, urban local government, and community leaders to reduce the impacts of USC on their social and economic life. Finally, more research and investigation are also needed to identify the impacts of USC hotspots on the urban neighborhoods to dismantle street crime and improve quality of life in Chittagong city.

Author Contributions: Conceptualization, P.I.; methodology, P.I.; formal analysis, M.A.H.; investigation, M.A.H.; data curation, M.A.H.; writing—original draft preparation, M.A.H.; writing—review and editing, P.I.; supervision, P.I. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Acknowledgments: This study is conducted by Center of excellence in urban mobility research and innovation (UMRI), Faculty of Architecture and Planning, Thammasat University.

Conflicts of Interest: The authors declare that they have no conflict of interest.

References

1. Brantingham, P.L.; Glässer, U.; Kinney, B.; Singh, K.; Vajihollahi, M. Modeling urban crime patterns: Viewing multi-agent systems as abstract state machines. *Abstr. State Mach.* **2005**, 101–118.
2. Zhang, H.; Peterson, M.P. A spatial analysis of neighborhood crime in Omaha, Nebraska using alternative measures of crime rates. *Internet J. Criminol.* **2007**, 31, 1–31.
3. Taylor, R.B.; Harrell, A. *Physical Environment and Crime*; US Department of Justice, Office of Justice Programs, National Institute of Justice: Washington, DC, USA, 1996; pp. 11–12.
4. Herrmann, C.R. The dynamics of robbery and violence hotspots. *Crime Sci.* **2015**, 4, 33. [[CrossRef](#)]
5. Felson, M.; Boivin, R. Daily crime flows within a city. *Crime Sci.* **2015**, 4, 31. [[CrossRef](#)]
6. Chainey, S.; Ratcliffe, J. *Mastering GIS: Technology, Applications and Management*; GIS and Crime Mapping; John Wiley and Sons, Ltd.: Denmark, UK, 2005.
7. Iamtrakul, P.; Padon, A.; Klaylee, J. Analysis of urban sprawl and growth pattern using geospatial technologies in Megacity, Bangkok, Thailand. *Geoinform. Data Anal. Lect. Notes Data Eng. Commun. Technol. ICGDA* **2022**, 143, 109–123.

8. John, E.E.; Spencer, C.; James, G.C.; Michael, L.; Ronald, E.W. *Mapping Crime: Understanding Hotspots*; US Department of Justice, Office of Justice Programs, National Institute of Justice: Washington, DC, USA, 2005; pp. 11–12.
9. Lisowska-Kierepka, A. How to analyse spatial distribution of crime? Crime risk indicator in an attempt to design an original method of spatial crime analysis. *Cities* **2021**, *120*, 103403. [\[CrossRef\]](#)
10. Braga, A.A.; Turchan, B.; Papachristos, A.V.; Hureau, D.M. Hot spots policing of small geographic areas effects on crime. *Campbell Syst. Rev.* **2019**, *15*, 1046. [\[CrossRef\]](#)
11. Wickremasinghe, H.T.; Kaluthanthri, P.C. Spatial distribution of crimes in urban areas: An insight from Sri Lanka. *Malays. J. Soc. Space* **2021**, *17*, 207–220. [\[CrossRef\]](#)
12. Rahman, M.M. Urbanization and Urban Crime in Bangladesh. 2013. Available online: <http://www.police.gov.bd/userfiles/file/UrbanizationAndUrbanCrimeInBangladesh.pdf> (accessed on 4 May 2022).
13. Centre for Policy Dialogue (CPD). Bangladesh Perspectives 2003. Available online: http://www.cpd.org.bd/pub_attach/DR-47.pdf (accessed on 4 May 2022).
14. Haider, M.A.; Iamtrakul, P. Theoretical concepts of crime and practices in urban planning and design process for safe urban life. *Int. J. Build. Urban Inter. Landsc. Technol.* **2018**, *12*, 7–24.
15. Haider, M.A.; Iamtrakul, P.; Nath, B. Spatial perception analysis of the socio-economic effect of urban street crime in the residential neighborhoods in Chittagong City, Bangladesh. *Int. J. Build. Urban, Inter. Landsc. Technol.* **2020**, *15*, 77–92.
16. Adel, H.; Salheen, M.; Mahmoud, R.A. Crime in relation to urban design. case study: The Greater Cairo Region. *Ain Shams Eng. J.* **2016**, *7*, 925–938. [\[CrossRef\]](#)
17. Wu, W.; Ge, X.J. Communal space design of high-rise apartments: A literature review. *J. Des. Built Environ.* **2020**, *20*, 35–49. [\[CrossRef\]](#)
18. Mia, M.A.; Nasrin, S.; Zhang, M.; Rasiah, R. Chittagong, Bangladesh. *Cities* **2015**, *48*, 31–41. [\[CrossRef\]](#)
19. Bako, A.I.; Bello, N.A.; Abdulyeken, A.O.; Balogun, F.A. A review of urban residential neighbourhood security. *KIU J. Humanit.* **2018**, *3*, 139–150.
20. Iamtrakul, P.; Raungratanaamporn, I.; Klaylee, J. The impact of urban development on social capital in urban fringe areas of Bangkok, Thailand. *Lowl. Technol. Int.* **2018**, *20*, 331–340.
21. Sampson, R.J.; Raudenbush, S.W. Systematic social observation of public spaces: A new look at disorder in urban neighborhoods. *Am. J. Sociol.* **1999**, *105*, 603–651. [\[CrossRef\]](#)
22. Arvanites, T.M.; Defina, R.H. Business cycles and street crime. *Criminology* **2006**, *44*, 139–164. [\[CrossRef\]](#)
23. Sypion-Dutkowska, N.; Leitner, M. Land use influencing the spatial distribution of urban crime: A case study of Szczecin, Poland. *ISPRS Int. J. Geo-Inf.* **2017**, *6*, 74. [\[CrossRef\]](#)
24. Graif, C.; Gladfelter, A.S.; Matthews, S.A. Urban poverty and neighborhood effects on crime: Incorporating spatial and network perspectives. *Sociol. Compass* **2014**, *8*, 1140–1155. [\[CrossRef\]](#)
25. Bland, M.; Leggetter, M.; Cestaro, D.; Sebire, J. Fifteen minutes per day keeps the violence away: A crossover randomised controlled trial on the impact of foot patrols on serious violence in large hot spot areas. *Camb. J. Evid. Based Polic.* **2021**, *5*, 93–118. [\[CrossRef\]](#)
26. Braga, A.A.; Turchan, B.S.; Papachristos, A.V.; Hureau, D.M. Hot spots policing and crime reduction: An update of an ongoing systematic review and meta-analysis. *J. Exp. Criminol.* **2019**, *15*, 289–311. [\[CrossRef\]](#)
27. Gardiner, R.A. *Design for Safe Neighborhoods: The Environmental Security Planning and Design Process*; Department of Justice, Law Enforcement Assistance Administration, National Institute of Law Enforcement and Criminal Justice: Washington, DC, USA, 1978.
28. Iamtrakul, P.; Chayphong, S. The perception of Pathumthani residents toward its environmental quality, suburban area of Thailand. *Geogr. Pannonica* **2021**, *25*, 136–148. [\[CrossRef\]](#)
29. Cahill, M.E. *Geographies of Urban Crime: An Intra-Urban Study of Crime in Nashville, Tennessee, Portland, Oregon and Tucson, Arizona*; The University of Arizona: Tucson, AZ, USA, 2004.
30. Kamalipour, H.; Faizi, M.; Memarian, G. Safe Place by Design: Urban Crime in relation to Spatiality and Sociality. *Curr. Urban Stud.* **2014**, *2*, 152–162. [\[CrossRef\]](#)
31. Christens, B.; Speer, P.W. Predicting violent crime using urban and suburban densities. *Behav. Soc. Issues* **2005**, *14*, 113. [\[CrossRef\]](#)
32. Anselin, L.; Cohen, J.; Cook, D.; Gorr, W.; Tita, G. Spatial analyses of crime. *Crim. Justice* **2000**, *4*, 213–262.
33. Craglia, M.; Haining, R.; Wiles, P. A comparative evaluation of approaches to urban crime pattern analysis. *Urban Stud.* **2000**, *37*, 711–729. [\[CrossRef\]](#)
34. Asl, H.B.; Moghadam, H.Z.; Parhiz, F. Analysis of spatial patterns for urban crimes in the informal settlement area of Islamabad in Zanjan. *Int. J. Acad. Res. Bus. Soc. Sci.* **2014**, *4*, 1–9. [\[CrossRef\]](#)
35. Park, Y.; Rogers, G.O. Neighborhood planning theory, guidelines, and research: Can area, population, and boundary guide conceptual framing? *J. Plan. Lit.* **2015**, *30*, 18–36. [\[CrossRef\]](#)
36. Easton, G.; Owen, J. *Creating Walkable Neighborhood Business Districts: An Exploration of the Demographic and Physical Characteristics Needed to Support Local Retail Services*; Makers Architecture & Urban Design: Seattle, WA, USA, 2009; pp. 1–27.
37. City of Fairfield. *Fairfield Municipal Code a Codification of the General Ordinances of the City of Fairfield*; California Code Publishing Company: Seattle, WA, USA, 2021. Available online: <https://www.codepublishing.com/CA/Fairfield/> (accessed on 18 June 2021).

38. Bangladesh Police. Crime Statistics. 2018. Available online: https://www.police.gov.bd/en/crime_statistic/year/2018 (accessed on 18 June 2021).
39. Ahmadi, M. *Crime Mapping and Spatial Analysis*; International Institute for Geo-Information Science and Earth Observation, University of Twente: Enschede, The Netherlands, 2003.
40. Hart, T.; Zandbergen, P. Kernel density estimation and hotspot mapping: Examining the influence of interpolation method, grid cell size, and bandwidth on crime forecasting. *Polic. Int. J. Police Strateg. Manag.* **2014**, *37*, 305–323. [[CrossRef](#)]
41. Weisburd, D.; Telep, C.W. Hot spots policing: What we know and what we need to know. *J. Contemp. Crim. Justice* **2014**, *30*, 200–220. [[CrossRef](#)]
42. Oosthuizen, J.P.; Wakefield, A. Project Genesis: A Strategic Review of Neighbourhood Policing in Dorset. *Soc. Implic. Community-Oriented Polic. Technol.* **2018**, 77–81. [[CrossRef](#)]
43. Islam, N. *Slums of Urban Bangladesh: Mapping and Census, 2005*; United States Agency for International Development: Washington, DC, USA, 2006.
44. Padon, A.; Iamtrakul, P.; Thanapirom, C. The study of urbanization effect on the land use changes and urban infrastructures development in the Metropolitan Areas, Thailand. *IOP Conf. Ser. Earth Environ. Sci.* **2021**, *738*, 012077. [[CrossRef](#)]
45. Iamtrakul, P.; Padon, A.; Klaylee, J. The study on association between urban factors and walkability of transit-oriented development (TOD). *GMSARN Int. J.* **2021**, *16*, 388–398.
46. Iamtrakul, P.; Klaylee, J.; Raungratanaamporn, I. Participatory Planning Approach towards Smart Sustainable City Development. In Proceedings of the International Structural Engineering and Construction. Interdisciplinary Civil and Construction Engineering Projects, Cairo, Egypt, 26–31 July 2021; Volume 8.
47. Klaylee, J.; Iamtrakul, P.; Chollacoop, N. Urban Planning Measures for Smart City Development. In Proceedings of the International Structural Engineering and Construction, Interdisciplinary Civil and Construction Engineering Projects, Cairo, Egypt, 26–31 July 2021; Volume 8.
48. Community Policing Consortium, Publicity Manager, and United States of America. *Understanding Community Policing: A Framework for Action*; National Criminal Justice Reference Service, U.S. Department of Justice: Washington, DC, USA, 1994.