S E R V I N G C A N A D I A N S

Research and Statistics Division

Exploring the Link between Crime and Socio-Economic Status in Ottawa and Saskatoon: A Small-Area Geographical Analysis

Department of Justice Canada
Ministère de la Justice Canada

Canada

Exploring the Link between Crime and Socio-Economic Status in Ottawa and Saskatoon: A Small-Area Geographical Analysis

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Methodological Series

Research and Statistics Division

rr06-6e

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Executive Summary

In recent decades, considerable research has been devoted to examining issues related to crime and demography/social status at the inter-urban level in Canada. This 'macro' research usually involves the collection and analysis of criminal offence and socio-economic data for municipalities or Census Metropolitan Areas (CMAs). Research in urban geography and other disciplines has demonstrated that extensive spatial variability exists within Canadian urban centres with respect to social status and it is clear that crime is not distributed evenly across a city. The three studies presented in this publication adopt a 'micro' approach by using Ottawa and Saskatoon as case studies to examine the relationship between crime and socio-economic status at the intra-urban level and, in the process, a model for small area crime analysis in Canada is developed.

Study # 1 of Ottawa examined 2001 criminal offence data obtained from the Ottawa Police Service and socio-economic indicators drawn from the 2001 Census aggregated at the level of the dissemination area (DA). The DA is the smallest geographic area for which census data are available and is comprised of several city blocks. A total of 32 variables (6 crime and 26 socio-economic) in 1187 DAs in Ottawa were analyzed by way of multivariate statistical techniques including principal components analysis and multiple regression. In addition, geographic information systems software (ArcGIS) was used to produce a series of maps displaying the distribution of high crime areas in Ottawa and the spatial relationship between these areas and disadvantaged communities.

The study found that overall in Ottawa there is a weak statistical association between crime and socio-economic status and that there are no clear social 'predictors' of crime at the level of the DA. The mapping of crime variables displayed that "High Crime Areas" (HCAs) are largely contained to the built up urban core with very few HCAs evident in outlying and rural areas. The GIS analysis revealed that there is a moderate geographic relationship between crime and socio-economic status in the city, with 40% of socially disadvantaged DAs also being HCAs. When specific areas were examined more closely, a number of important characteristics did emerge

from the study. For example, HCAs were found to have above average levels of low-income, single people, and rented dwellings. In addition, the study identified a number of "Hot-Spots" in the city (a combination of high crime and social disadvantage) and these areas were found to have higher rates of violent crime and substantially larger proportions of recent immigrants, visible minorities and residents living in apartment buildings.

With respect to crime prevention strategies in Ottawa, it is apparent that attention should focus on enforcement and social upgrading in disadvantaged communities with high rates of crime and programs should be designed to reflect the social characteristics and meet the needs of the residents living in these areas. At the same time, continued attention should be directed at reducing criminal opportunity in other locations such as residential suburbs, commercial areas and public spaces.

Study # 2 investigated the relationship between crime, socio-economic status and segregation in Saskatoon and established several "predictors" of crime. The study examined 2003 crime statistics, 2001 Census variables and development/planning indicators in Saskatoon's 55 residential neighbourhoods. A total of 31 neighbourhood variables were analyzed by statistical techniques including principal components analysis, multiple regression and spatial autocorrelation. A series of maps showing the distribution of crime and neighbourhood characteristics were produced with ArcGIS.

The study found that there is a strong relationship between crime and socio-economic status in Saskatoon's neighbourhoods. Aboriginal people, lone-parents and low-income families were identified as particularly vulnerable segments of the population with respect to violent and major property crimes. The mapping of crime variables revealed a solid clustering of High Crime Areas (HCAs) on the west side of the South Saskatchewan River, particularly in the inner city. This was especially evident for violent HCAs. By comparison, minor property and drug offences displayed a more dispersed pattern. While a majority of Aboriginal and low-income people live on the west side of the city, segregation is not a prominent feature of Saskatoon's urban social geography. HCAs were found to have higher proportions of singles and people who have

recently moved, significantly lower levels of educational attainment, poorer quality and older housing and higher unemployment.

From a policy perspective, the study reviewed a number of initiatives undertaken by the City of Saskatoon and the Saskatoon Police Service to improve quality of life and deal with increasing crime in inner city neighbourhoods. Based on the results of the statistical and geographic analysis, the study recommended that additional policy efforts should focus on four related areas: (1) housing quality and affordability, (2) education and training, (3) youth programs and services and (4) Aboriginal violence. In addition, it was proposed that the federal government expand its Urban Aboriginal Strategy (UAS) and continue to work in collaboration with the Province of Saskatchewan and the City of Saskatoon to provide affordable stable housing and education and training options especially for young inner city Aboriginals. The goal should be to improve the quality of life of residents living in these communities thereby reducing levels of victimization and contact with the justice system.

Study # 3 involved the re-aggregation of the Ottawa dissemination area data from Study # 1 to match the larger boundaries of the city's 50 neighbourhoods. The crime and socio-economic data were then re-analyzed at this level of geography and compared to the findings of the Saskatoon neighbourhood analysis (Study # 2). The study found that a change in geography does have an impact on the statistical relationship between crime and socio-economic status. Several indicators were found to have a significant effect on crime levels in Ottawa's neighbourhoods including higher proportions of single people and youth not attending school as well as lower average household incomes. The mapping of crime variables indicated a fairly dispersed pattern of High Crime Areas (HCAs) within Ottawa's urban core and a visible presence in several of the city's western suburban neighbourhoods.

1. Introduction

In Canada, very little research has been devoted to exploring the geographic relationship between the incidence of crime and socio-economic status at the intra-urban level. While there is undoubtedly strong interest by criminologists, urban geographers and others in investigating these links, research has been hindered by the fact that crime data are difficult to obtain for small geographic areas such as the neighbourhood or city block. Several police services across Canada are developing mechanisms to make small area data available. By comparison, in recent years, researchers in the United States and the United Kingdom have benefited from greater access to crime data and, as a result, are increasingly integrating this information with census and other population based data at smaller levels of geography.

This publication has two principal objectives. The first is to contribute to the Canadian literature in urban social geography and criminology by using Ottawa and Saskatoon as case studies to explore the geographic relationship between crime and socio-economic status in the two cities. The second objective is to develop a research model for small area crime analysis in Canada that will contribute to a better comprehension of the social and economic circumstances associated with crime at the intra-urban level and assist in the formulation of policies for crime prevention and social upgrading.

The Canadian Centre for Justice Statistics (CCJS) releases crime data on an annual basis reported by individual police departments across Canada aggregated according to the Uniform Crime Reporting Survey (UCR). The data are available at a number of geographic levels including the Census Metropolitan Area (CMA) and the Census Sub-Division (CSD). Several municipal police services in Canada make monthly and annual crime statistics available for their patrol areas. While these data are useful in examining general trends, the geographic areas represented are quite large and given the extensive socio-spatial variability that exists in Canadian cities, there is also a need to study patterns and relationships within urban areas at a smaller scale.

It is important to point out that the offence data for both Ottawa and Saskatoon obtained for this research consists only of the location and type of crime committed but does not include the address or any other characteristics of the offender. Some offending clearly occurs in or near the residence of the offender (such as domestic assault or minor property) and is, therefore, meaningfully understood by population and household characteristics of the surrounding small area (such as a neighbourhood). Other types of offending, such as break and enter, occur in or near the residence or workplace of the victim but not the residence of the offender indicating that knowledge of the local area may be relevant from the perspective of the target. Yet other offences, such as assaults, occur in public areas such as bar and entertainment districts, shopping areas and workplaces that bring together populations from many residential parts of the city. In these cases, there is clearly no direct relationship between the characteristics of local residents and offending patterns in the area.

This publication presents the results of three studies on crime and neighbourhood characteristics. Study # 1 examines crime and socio-economic status in Ottawa at the level of the dissemination area (DA), the smallest geographic unit for which census data is available. The working hypothesis for Study # 1 is that there is a positive relationship between crime and disadvantaged communities in Ottawa.

Study # 2 employs data for neighbourhoods in Saskatoon (geographic units significantly larger than DAs) to examine the relationship between crime, socio-economic status and segregation in the city. Specifically, the study addresses the following research question: *What are the predominant social and environmental characteristics that have an impact on crime in Saskatoon's neighbourhoods and how can the identification of suitable predictors of crime lead to public policy initiatives aimed at alleviating community crime and reducing levels of victimization*?

Finally, Study # 3 re-aggregates Ottawa's DA level data to match the boundaries of the city's neighbourhoods. This new dataset is then re-analyzed and compared directly to the findings of the Saskatoon neighbourhood study, allowing a more meaningful comparison of the two cities. The effect of a change in the level of geography on the relationship between crime and neighbourhood characteristics is examined and discussed.

2. Social and Geographic Aspects of Crime: A Review of Theory and Literature

Research in criminology reveals that certain social characteristics are linked with a greater likelihood of involvement in criminal activity. As Sacco and Kennedy (2002, p.39) explain, it has been well documented that most offenders tend to be young, disadvantaged males. In fact, in Canada in 1999, 86 percent of all adult offenders and 75 percent of all youth offenders (aged 12 to 17) were males. Social and economic disadvantage has been found to be strongly associated with crime, particularly the most serious offences including assault, robbery and homicide. Data collected on offenders shows that they tend to be unemployed or employed in low-paying, unskilled jobs. There is also an association between offenders and minority groups, particularly African-Americans in the United States and Aboriginal people in Canada (Short, 1997, p. 26; Sacco and Kennedy 2002, p. 40).

The social characteristics of victims of crime are similar to those of offenders. According to the 1999 General Social Survey (GSS), young people in Canada between the ages of 15 and 24 experienced the highest rates of violent and property crimes. The GSS also found that rates of personal victimization were highest in urban areas and among single people and those living in households with low incomes (below $30,000). In his study of Canada's 24 largest cities, Mata (2003) found that higher rates of crime were linked to the presence of groups at risk including Aboriginals, women and lone parents. However, with respect to certain property related crimes such as break and enter, auto-theft and vandalism, studies have shown that rates of victimization in Canada are greater for households with higher incomes (Sacco and Kennedy 2002, p. 48).

The study of the social characteristics of offenders and victims can be extended into a critical examination of the role of place in influencing criminal activity. Research has been conducted on the social and economic factors contributing to the level and type of crime experienced in a community. The geography of crime with its emphasis on mapping and spatial analysis has emerged in recent years as a growing area of research. However, 'cartographic criminology' has a long history. For example, in the 19th century, community leaders and government officials in

Europe and North America produced maps to demonstrate that patterns of crime were spread unevenly across cities and regions (Herbert 1989, p.1).

In the 1920s and 1930s, ecological theory (also referred to as the Chicago School of Criminology) was developed by Robert Park and Ernest Burgess. It postulates that crime will always display an uneven geographical distribution and that this variation is the result of the interrelationship between humans (or groups of humans) and their surroundings. As Schmalleger and Volk (2001, p. 201) explain, ecological theory emphasizes the demographic and geographic attributes of groups and views "the social disorganization that characterizes delinquency areas as a major cause of criminality and of victimization". Using Chicago as a model, Park and Burgess found that criminal activity was associated with what they referred to as "zones in transition" located around the city centre (Winterdyk 2000, p. 216).

As supporters of the ecology approach, Clifford Shaw and Henry McKay (1942), advanced social disorganization theory in their study of communities with high levels of crime. Again, using Chicago as a case study, they observed that crime rates were unevenly distributed throughout the city in a non-random manner and that communities closest to the city centre were those with the highest rates. These neighbourhoods were found to be areas in transition, having low socio-economic status, high numbers of ethnic/racial minorities and high residential mobility (Wilcox, Land, Hunt 2003, p.28). Shaw and McKay concluded that the high levels of crime were not a function of the personal attributes of the groups living in the neighbourhoods but rather argued that "the structural factors of poverty, high heterogeneity, and high mobility created 'social disorganization', and it was community-level social disorganization that was presumed to cause crime" (Wilcox, Land, Hunt 2003, p.28). Furthermore, Short (1997, pp.50-51) argues that research (primarily in the United States) has found that in broad terms, other factors often combine with poverty to produce high rates of violent crime such as family structure and community change. In the mid 1990s, there was a revival of Shaw and McKay's approach in the form of the "New Chicago School" which adopted computerized mapping and spatial analysis techniques, particularly through the use of Geographic Information Systems (GIS) (Ainsworth 2001, p. 85).

Working within the framework of the ecology of crime, American criminologist Rodney Stark (1987) asks how neighbourhoods can remain areas of high crime and deviance despite a complete turnover of their populations. He concludes that there must be something about places that sustains crime. Stark developed a theory of deviant neighbourhoods and proposes that there are five characteristics, or essential factors, that distinguish high crime areas:

1. high population density,
2. poverty,
3. mixed use of buildings for residential and commercial purposes,
4. transience, and
5. dilapidation.

Stark (1987, pp.895-904) proposes thirty propositions to form a theory of dangerous places and to explain the ecology of crime. They include the following:

1. The higher the density, the greater the association between those most and least disposed to crime.
2. The greater the density, the higher the level of moral cynicism.
3. Where homes are more crowded, there will be a greater tendency to congregate outside the home in places where there are opportunities to deviate.
4. Where homes are crowded, there will be less supervision of children.
5. A reduced level of supervision results in poor school achievement, with a consequent reduction in stakes in conformity.
6. Poor, dense neighbourhoods tend to be mixed-use neighbourhoods.
7. Mixed-use offers increased opportunity for congregating outside the home in places conducive to deviance.
8. Poor, dense, mixed-use neighbourhoods have high transience rates.

The ecological approach has been criticized for its over-emphasis on place while overlooking the individual. As Schmalleger and Volk (2001, p. 204) explain, by focusing on the role that social institutions and social disorganization play in criminal activity, ecological approaches do not

adequately account for the influence of "individual psychology, distinctive biology, or personal choice on criminal activity". Another criticism is that rates of neighbourhood crime can be influenced to some degree by police decision-making where active enforcement in a particular community creates the perception of higher levels of criminal activity than actually exist. Many crimes occur in neighbourhoods that are not characterized by social disorganization. Crimes related to violence, property and drugs routinely occur in affluent communities and other parts of the city (Schmalleger and Volk 2001, p. 205). Furthermore, Felson (2002, pp.62-63) contends that rates of residential burglary are higher in lower density cities and suburban communities where physical layout and design features offer greater opportunity.

Another broad theoretical tradition, which addresses some of the criticisms of the ecological approach, is the concept of *criminal opportunity*. It is assumed that opportunity is the necessary condition for crime and that the growing number of consumer goods in stores and homes and the sharp rise in personal affluence has provided increasing opportunities for criminal activity. Closely associated with this concept is the *routine activities theory* of crime, in which demographic or social class factors contribute to particular activity routines that merge three prerequisites for crime: 1) the presence of a motivated offender (such as an unemployed teenager), 2) a suitable target (such as a home containing goods which could be easily resold) and, 3) the absence of a capable guardian (homeowner, watchful neighbour, friend or relative) (Clarke and Felson, 1993, p.9; Knox 1995, p.256; Hackler 2000, p.169). As Wilcox, Land and Hunt (2003, p.22) describe, the routine activities approach "stems from rational choice assumptions and emphasizes the circumstances under which crime is most likely". While a small number of offenders may choose targets far from their home, the large majority will "stake-out" local areas with which they are familiar when searching for a suitable target. Offenders tend to operate in areas that they have come to know, possibly while engaging in non-criminal activities (Ainsworth 2001, p.86).

With growing affluence and changing lifestyles, people are spending less time in home-based routine activities and more time outside of the home in activities that increase their risk of being victims (i.e. in bars and other public places). At the same time, their unguarded residences are more likely to be targets of crime, particularly in suburban areas, which usually do not have as many neighbours who are relatives or close acquaintances and who are effective guardians of

their property (Hackler 2000, p.170). Another factor is the proliferation of easily transportable wealth, such as computers, digital cameras and DVD players, putting homes (and in many cases individuals) possessing such valuables at a greater risk of being victimized. As Felson (2002, p.35) expresses, the items most sought after by offenders are "concealable, removable, available, valuable, enjoyable, and disposable".

Within the context of the geography of crime, a number of recent studies in North America and Europe have employed data and mapping techniques to explore the relationship between crime and socio-economic status at the intra-urban level. For example, research in Canada has shown that crime is not evenly distributed within cities and there are significant differences in the levels and types of crime experienced between cities. Cities in Western Canada generally have higher rates of crime than those in Central and Atlantic Canada. In a study conducted by the Canadian Centre for Justice Statistics, Fitzgerald, Wisener and Savoie (2004) examined the neighbourhood characteristics and distribution of crime in Winnipeg. They analyzed police reported crime data from the 2001 Incident-Based Uniform Crime Reporting Survey (UCR2) as well as the 2001 Census and City of Winnipeg land-use data. The study revealed that crime in Winnipeg in 2001 was concentrated in the city centre and that were significant differences in the characteristics of high and low crime neighbourhoods. High crime areas were found to have lower socio-economic status, less residential stability, higher population densities and certain land use patterns that may increase opportunity for crime in the city.

Ley and Smith (2000) examined the association between crime and social deprivation in Toronto and Vancouver. They secured disaggregated crime data for 207 patrol areas from the Metro Toronto Police and found high crime areas in and around the central city that when mapped corresponded closely with the most deprived neighbourhoods. A similar situation existed in Vancouver with areas of high deprivation intersecting with high levels of reported crime. Massimo, Haining and Signoretta (2001) employed a GIS-based spatial analysis to model high-intensity crime areas (HIAs) in a sample of large cities in England. They integrated census data into their model and found that HIAs are characterized by populations that are deprived, live at high density and experience higher levels of population turnover. Bowers and Hirschfield (1999) used GIS to explore relations between crime and the distribution of different types of

disadvantaged, middle income and affluent residential neighbourhoods in Merseyside in north-west England. The study demonstrated how a GIS can be used to build up a complex, multi-level picture of relations between victim and offence locations.

3. The Social Geographies of Ottawa and Saskatoon and Overall Trends in Crime

Table 3.1 provides a list of selected socio-economic characteristics of Ottawa and Saskatoon from the 2001 Census. The data is shown for the Census Metropolitan Area (CMA) and the central city of each. In this report, the term "central city" is used to refer to the largest municipality within each CMA – the City of Ottawa and the City of Saskatoon. As can be seen, in terms of population, the Ottawa CMA is more than 4 times the size of the Saskatoon CMA while Ottawa's central city population (comprising the City of Ottawa and excluding the Gatineau portion of the CMA) is almost four times the size of Saskatoon's central city. Population growth between 1996 and 2001 was significantly higher in Ottawa's CMA and central city as was the arrival of new immigrants over the same period. Saskatoon, particularly it's central city, experienced low growth between 1996 and 2001 and saw only a small number of new immigrants coming to the city.

A distinguishing feature of many cities in western Canada is that they have higher proportions of Aboriginal residents than those in Central and Atlantic Canada. According to the 2001 Census, 20,275 Aboriginal people live in the Saskatoon CMA giving it the highest rate among all mid-to-large sized urban areas in Canada (9.1%). Nearly 10% of the central city population is Aboriginal. A large number of the city's Aboriginals live in and around the core neighbourhoods, particularly on the west side of the South Saskatchewan River and overall, they suffer from significantly higher levels of socio-economic disadvantage. By comparison, Ottawa has a smaller Aboriginal population totalling 13,500 or just over 1% of its CMA and central city populations.

Both Ottawa and Saskatoon have relatively strong economies with job growth evident in professional service occupations such as education, management, administration and science. However, as can be seen in Table 3.1, Saskatoon's CMA and central city unemployment rates are slightly higher. (The unemployment rate among Saskatoon's Aboriginal population is 22%

and among North American Indian males it is 33%). Both cities have generally well-educated residents, although Ottawa's level of educational attainment is higher. More than 80% of the city's population aged 20 and over has at least a high school diploma compared to 75% in Saskatoon. And, while the proportion that has a college certificate or diploma is comparable between the two cities, a significantly higher percentage of Ottawa residents have acquired a university degree. The gap between the two cities can be explained, in part, to the fact that Aboriginals in Saskatoon, on average, have lower levels of education then non-Aboriginals.

Table 3.1 also reveals that there is a significant difference in income levels between the two cities with the Ottawa CMA having a median family income of nearly $70,000 compared to just under $55,000 in the Saskatoon CMA. Even more telling is a difference of nearly $20,000 in the median family incomes in the two central cities. It should be noted, however, that the cost of living is higher in Ottawa, particularly as related to housing prices. Furthermore, the table shows that a slightly lager proportion of families and a substantially greater percentage of unattached individuals in Saskatoon are living in low-income. The poorer socio-economic condition of Aboriginal people in Saskatoon is a factor in the income gap between the two cities. For example, according to the 2001 Census, the average income in Saskatoon is $28,045 while for Aboriginals it is $17,667 and for North American Indians $14,513.

As shown in Figures 3.1 and 3.2, in 2003, Saskatoon had the highest crime rate among all CMAs in Canada (15,164 per 100,000 population) as well as the highest violent crime rate (1,718 per 100,000 population). By comparison, the Ottawa CMA (Ontario portion) had one of the lowest overall crime rates (6,325 per 100,000 population) and violent crime rates (754 per 100,000 population). Furthermore, Figure 3.3 reveals that Saskatoon had the second highest rate of property crime among all CMAs (after Regina) while Ottawa had one of the lowest.

Table 3.2 provides a detailed look at selected crime statistics in Ottawa and Saskatoon in 2001, 2002 and 2003. The table makes it apparent that Saskatoon has an acute crime problem. For a city with a population of about 225,000 it has recorded very high numbers of total criminal code incidents during the 3-year period. In fact, when comparing the data between the two

cities, Saskatoon has higher rates of crime in every category and for each offence type in 2001, 2002 and 2003.

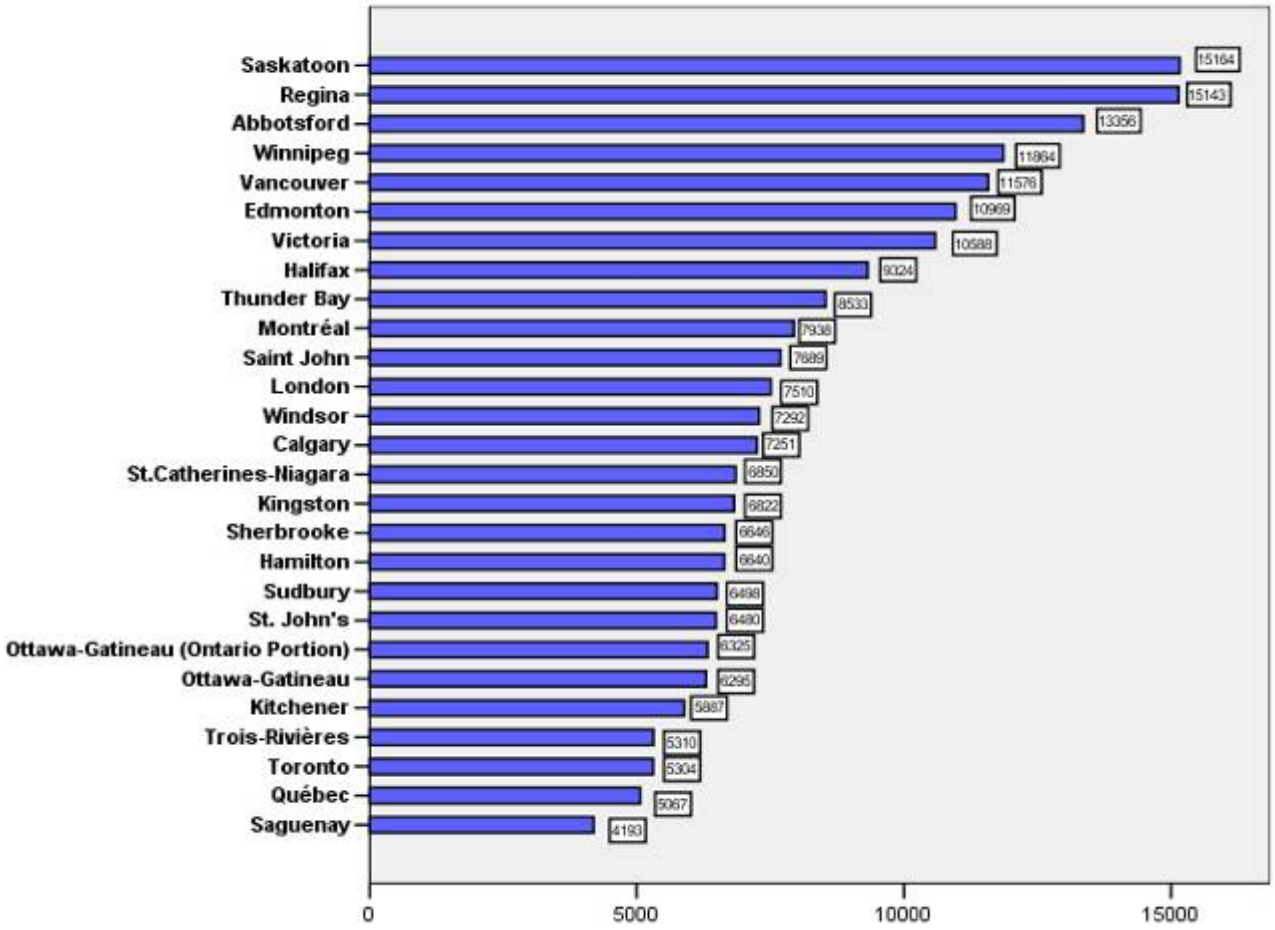
In addition to Saskatoon having an overall crime rate more than double that of Ottawa, there are a number of other trends that can be drawn from the data in Table 3.2. As seen, an important feature of crime in Saskatoon is the prevalence of violent offences, particularly assault and robbery. In 2003, the city recorded 3,351 total assaults and 739 robberies, large numbers considering the size Saskatoon's population. The rate of assaults (1,388 per 100,000 population) was more than twice that of Ottawa's and the rate of robberies (306 per 100,000 population) more than three times. It is clear that Saskatoon also has a significant problem with 'break and entering' offences. In 2003, the city registered 5,028 of these crimes (both residential and commercial) compared to 5,749 in Ottawa, a city with more than three times the population size. Furthermore, in 2003, the rate of offences involving 'theft under $5000' was more than twice that of Ottawa's. While it may be viewed as a relatively minor issue, both Ottawa and Saskatoon have witnessed increases in offences related to property damage, largely incidents of vandalism committed primarily by youth. These crimes labeled as 'mischief under $5000' were again more prevalent in Saskatoon, which in 2003 recorded a rate almost three times that of Ottawa. Figure 3.4 is a graph showing changes in crime rates in Ottawa and Saskatoon between 1999 and 2003. As shown, there was a relatively steep increase of 30% in Saskatoon's total crime rate between 1999 and 2003 with a particularly sharp rise between 2002 and 2003. By comparison, Ottawa's crime rate was generally flat but did fall slightly between 1999 and 2003. The graph also displays changes in the violent crime rate in the two cities and indicates that while Saskatoon recorded steady increases over the five-year period, particularly between 2002 and 2003, Ottawa's rates were more or less stable.

Table 3.1
Selected 2001 Census Indicators: Ottawa and Saskatoon

Variable	Ottawa (CMA)	City of Ottawa	Saskatoon (CMA)	City of Saskatoon
Total Population	1,063,664	774,072	225,927	196,811
Population Change 1996-2001	6.5	7.3	3.1	1.6
% Recent Immigrants	3.6	4.5	1.4	1.5
% Aboriginal Population	1.2	1.1	9.1	9.8
Unemployment Rate	5.6	5.8	6.7	7.2
% of Population with Less than Grade 12 Education[1]	18.5	15.6	25	24.3
% of Population with a College Certificate or Diploma[1]	17.9	18.2	18.9	15.9
% of Population with a University Degree[1]	28	31.9	19.3	20.4
Median Family Income[2]	$69,518	$73,507	$54,362	$54,025
Incidence of Low-Income Families[2]	11.6	11.4	13.5	14.7
Incidence of Low-Income among Unattached Individuals[2]	33.4	32	40.4	41.1

[1] Based on population aged 20 and over.
[2] Based on 2000 income

Figure 3.1
Total Criminal Code Offences (Excluding Traffic), 2003
Census Metropolitan Areas (CMAs)



Rate per 100,000 population

Figure 3.2
Total Violent Offences, 2003
Census Metropolitan Areas (CMAs)
Rate per 100,000 population

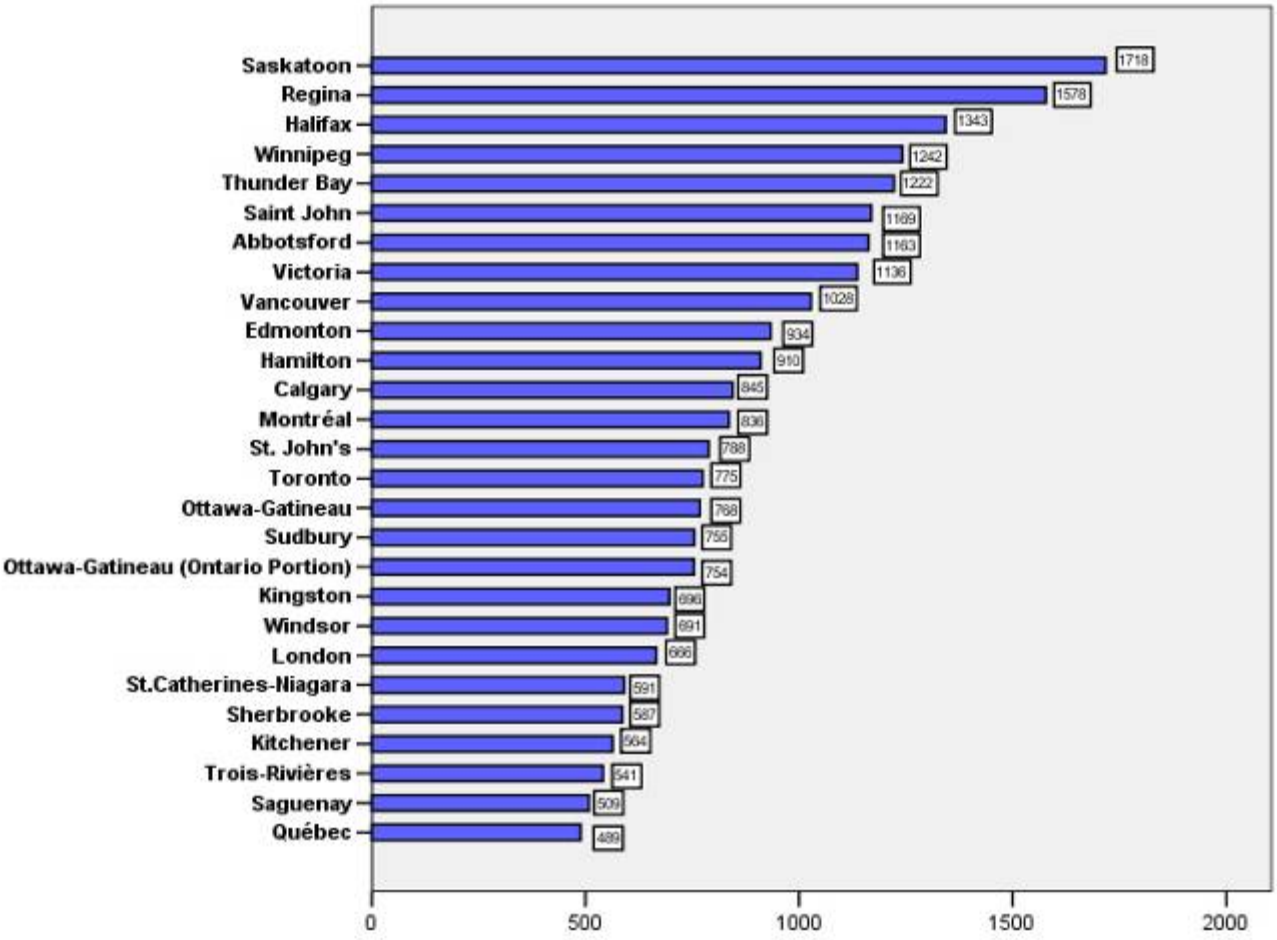


Figure 3.3
Total Property Offences, 2003
Census Metropolitan Areas (CMAs)
Rate per 100,000 population

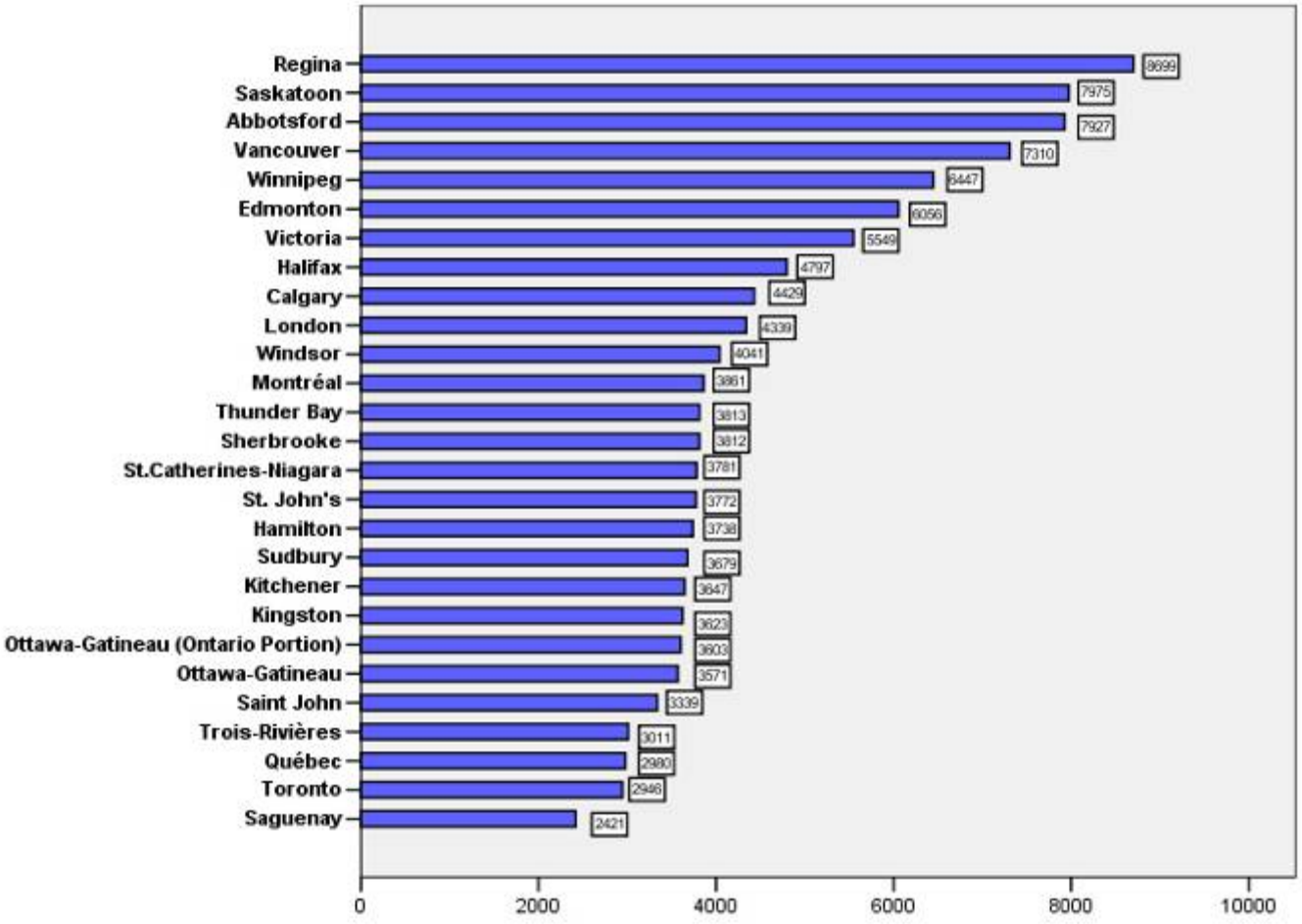
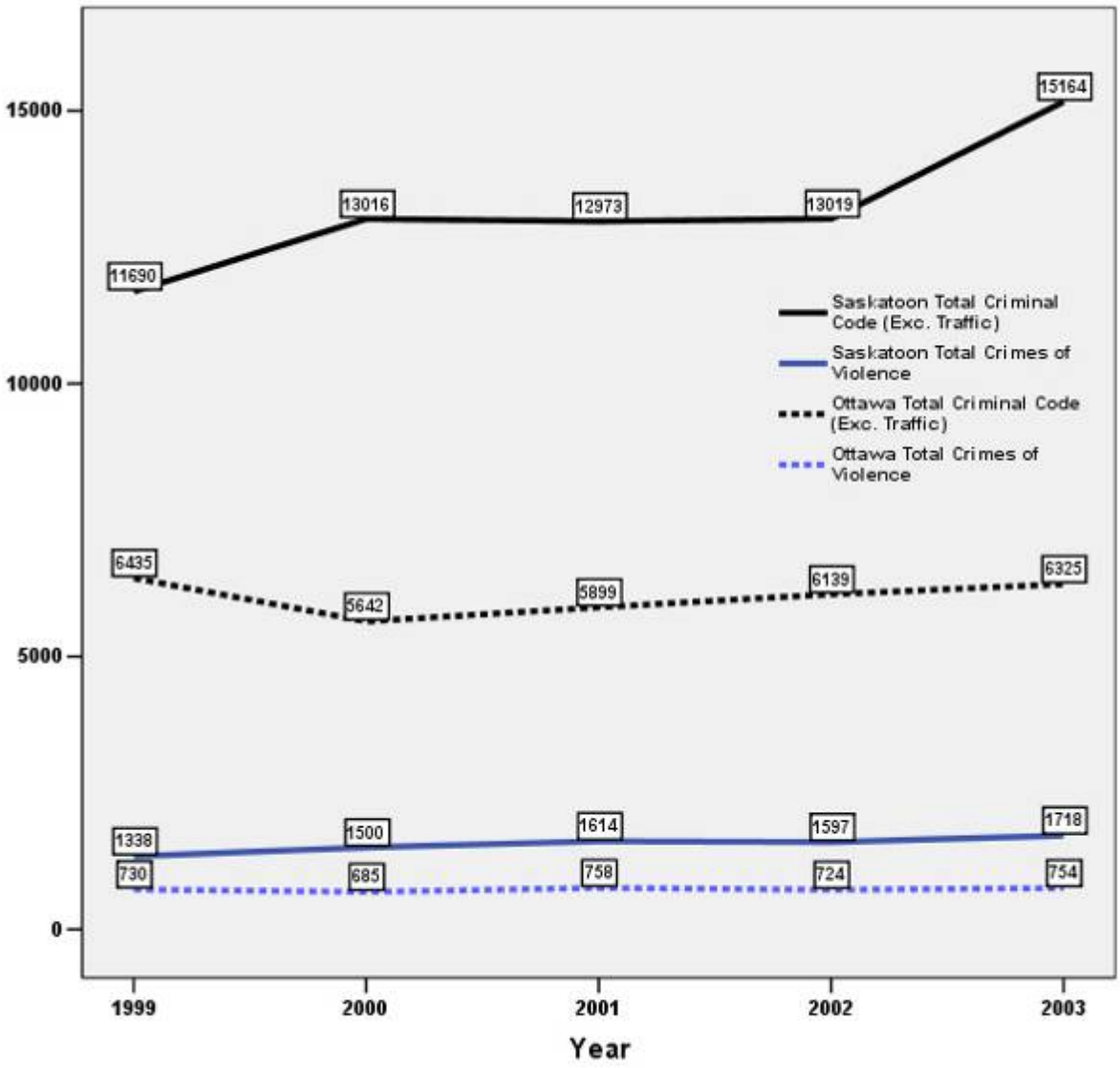


Table 3.2
Selected Crime Statistics: Ottawa and Saskatoon

	Ottawa-Gatineau CMA (Ontario Portion)					
	Actual Incidents			Rate per 100,000 population		
	2001	2002	2003	2001	2002	2003
Total Criminal Code Incidents and Federal Statute Incidents (Exc. Traffic).	50,049	52,762	54,820	5,899	6,139	6,325
Total Crimes of Violence	6,431	6,288	6,540	758	724	754
Assault (total)	5,485	5,331	5,583	646	620	644
Robbery	883	788	865	104	91	100
Total Property Crimes	28,565	30,636	31,229	3,366	3,564	3,603
Break & Entering	5,217	5,346	5,749	615	622	663
Theft – Motor Vehicle	4,158	4,125	3,481	490	480	401
Theft under $5000	15,579	17,244	17,737	1,836	2,006	2,046
Total - Other Criminal Code	15,053	15,898	17,051	1,774	1,849	1,967
Mischief Under $5000 (property damage)	6,638	6,974	7,390	782	811	852
Total – Federal Statutes	1,557	1,785	1,369	183	207	158
Drugs	1,401	1,642	1,154	165	191	133
	Saskatoon CMA					
	Actual Incidents			Rate per 100,000 population		
	2001	2002	2003	2001	2002	2003
Total Criminal Code Incidents and Federal Statute Incidents (Exc. Traffic)	30,845	31,097	37,596	12,972	13,018	15,164
Total Crimes of Violence	3,838	3,815	4,146	1,614	1,597	1,718
Assault (total)	3,270	3,245	3,351	1,375	1,358	1,388
Robbery	529	522	739	222	218	306
Total Property Crimes	15,255	15,215	19,250	6,416	6,369	7,974
Break & Entering	4,160	3,938	5,028	1,749	1,648	2,082
Theft – Motor Vehicle	1,309	1,271	1,795	550	532	743
Theft under $5000	7,816	8,117	10,311	3,287	3,398	4,271
Total - Other Criminal Code	11,752	12,067	13,209	4,942	5,051	5,472
Mischief Under $5000 (property damage)	4,418	4,132	5,139	1,858	1,729	2,128
Total – Federal Statutes	917	1,111	991	386	465	410
Drugs	673	721	678	283	301	281

Figure 3.4
Selected Criminal Code Offences, Ottawa[1] and Saskatoon[2] 1999-2003
Rate per 100,000 population



[1] Ottawa-Gatineau CMA (Ontario Portion)

[2] Saskatoon CMA

Source: Uniform Crime Reporting (UCR) Survey, Canadian Centre for Justice Statistics

4. Sources of Data

Study # 1 - Ottawa Dissemination Areas

Two types of data were collected and analyzed: criminal offence data obtained from the Ottawa Police Service (OPS) for 2001 and socio-economic data drawn from Statistics Canada's 2001 Census. Both the crime and census data were aggregated at the level of the dissemination area (DA). Dissemination areas were defined by Statistics Canada for the 2001 census and are small areas composed of one or more neighbouring city blocks, with a population of 400 to 700 persons. They are the smallest standard geographic areas for which all census data are disseminated. In 2001, there were approximately 1,200 DAs in Ottawa. Their small size makes them ideal for the geographic analysis of intra-urban patterns of criminal activity and socio-economic status.

Each criminal offence in 2001 was referenced to a geographic coordinate (longitude and latitude) by the OPS, recorded according to offence type (i.e. assault, break and enter, etc) and stored as a separate data point. For this project, the OPS supplied the point data aggregated to match the boundaries of Ottawa DAs, allowing the criminal offence data to be compared directly with census information. As shown in Table 4.1, the crime data were grouped into 6 principal offence types: "Total Offences", "Violent", "Major Property", "Minor Property", "Drugs" and "Disturbance/Other". The breakdown of types of offences in each group is listed in Table 4.2. The table shows that a total of 44,559 offences were included for analysis in the study. (Several offences, including traffic violations and certain federal statutes, were omitted). Minor property crimes accounted for more than half (54%) of all offences reported to police in Ottawa in 2001 with 'theft under $5000' being the most common incident within this category. Major property crimes represented 20% percent of the total with 'auto theft' the most prevalent. There were almost 7,000 violent offences in the city (16% of the total) with 'assault' comprising nearly two-thirds (63%) of the incidents in this group. The remaining offences were related to drugs (2% of the total) and 'disturbance/other' (8%). It is important to emphasize again that the crime data refers only to the location where the incident occurred but not the address of the offender,

meaning that a high crime level in a neighbourhood, for instance, is not necessarily a reflection of the actions of the people residing there.

Table 4.1 displays the 26 socio-economic census variables used in the study. The objective was to establish a concise set of indicators, which reflect the socio-economic status and levels of disadvantage in Ottawa's communities. From the list, it is clear that unemployment, labour force participation, low income and low educational attainment are direct measures of disadvantage and have been used frequently in studies of urban social differentiation in North America and Europe. The recent immigrant, visible minority and lone-parent variables are not direct measures but are included because of the numerous problems that are associated with these groups in Canada including lower incomes, higher unemployment rates and subsequent dependency on social transfers. The three youth-related variables were included to highlight the potential problems related to crime and disadvantage in those communities with higher levels of young people who are unemployed and/or not attending school. Within the context of criminological theory, particularly *social disorganization* (Shaw and McKay) and the *theory of deviant neighbourhoods* (Stark), a number of mobility and housing related census variables were employed in the study including family status (single and married), residents who have moved during the past year, dwellings that are owned and rented, the age of housing, the type of dwelling (houses, row houses, apartments) and household density.

As shown in Table 4.1, the crime variables were calculated to reflect their rate per 1,000 population in each DA. A database was constructed consisting of 32 variables (6 criminal offences and 26 census indicators) for each of the 1187 DAs in Ottawa. (DAs with missing or suppressed census data were excluded from the study).

Study # 2 - Saskatoon Neighbourhoods

The Planning Branch of the City of Saskatoon has defined neighbourhood boundaries, which are displayed in Figure 7.1. The map highlights the nine communities designated as 'core neighbourhoods', seven of which are located on the west side of the South Saskatchewan River and include the Central Business District (CBD). Periodically, the Planning Branch publishes a report titled "Neighbourhood Profiles" in which detailed census, planning, real estate, school

board and vehicle data is compiled for each of the city's neighbourhoods. The most recent edition (2003) was obtained for this study, which included data from the 2001 Census. In addition, 2003 criminal offence data was acquired from the Planning Unit of the Saskatoon Police Service (SPS). The SPS collects crime data by quadrant and fits this data to meet approximately the boundaries of each neighbourhood in the city. As a result, there may be some overlap of incidents into adjacent neighbourhoods. For this study, the crime, census and development/ planning data were compiled for 55 residential neighbourhoods. Due to low population numbers or missing values, industrial neighbourhoods were not included in the research.

Table 4.3 lists the 31 variables used in the study assembled into three categories. The crime variables were grouped into 5 main offence types: Total Offences, Violent, Major Property, Minor Property and Drugs. The sub-offences in each of these categories are listed in Table 4.4.

Table 4.3 also shows the 22 socio-economic census variables used in the study. Many have been employed in previous studies of crime and socio-economic status including population density, educational attainment, low-income, unemployment, lone-parent families, recent immigrants and housing characteristics. Saskatoon has a large and relatively disadvantaged Aboriginal population and since this group has been identified as 'at risk' with respect to crime (La Prairie 2000, Sacco and Kennedy, 2002; Mata, 2003) the decision was made to include this variable in the study. Finally, the third category is "Development, Planning and Vehicle Data" and includes variables denoting average home selling price, park space and vehicle use.

Table 4.5 shows a breakdown of types of criminal incidents in the Saskatoon CMA in 2003 as collected and presented by the Canadian Centre for Justice Statistics in their Uniform Crime Reporting (UCR) Survey. It shows that there were a total of 37,596 incidents in the urban area. Property crimes accounted for more than half (51%) of all incidents reported to police in Saskatoon in 2003 with 'theft under $5000' being the most common within this category. 'Break and Enters' are clearly a problem in the city with 5,028 incidents reported, comprising about 26% of all property crimes. There were over 4,100 violent offences in Saskatoon (11% of the

total) with ‘assault’ comprising nearly three-quarters (74%) of the incidents in this group. The remaining incidents were related to ‘Other Criminal Code Incidents’ (35% of the total) with ‘Mischief – property damage’ being the most prevalent within this category. Finally, ‘Federal Statutes’, comprised mostly of drug offences, accounted for just 3% of all incidents.

Study # 3 – A Comparison of Neighbourhoods in Ottawa and Saskatoon

As stated, one of the objectives of Study # 3 is to re-aggregate the dissemination area data used in the first Ottawa study to match the boundaries of the city’s 50 neighbourhoods and compare these to Saskatoon’s neighbourhoods. Table 4.6 lists the variables used in the analysis for the two cities at the neighbourhood level. As seen, the majority of the crime variables and many of the census variables were employed for both cities. A number of other variables were used for analysis in just one of the cities to reflect their unique characteristics. For example, two variables relating to immigration were included in the Ottawa analysis because immigration plays a greater role in the social geography of the city than it does in Saskatoon. Similarly, a variable measuring Aboriginal identity was included in the Saskatoon analysis as the city has a much larger number of these residents.

Table 4.1
Study # 1 – Ottawa Dissemination Areas
Crime and Census Variables

Criminal Offence Variables, 2001 (rate per 1,000 population)	**Acronym**
1. Total Offences	TOTAL_OFF
2. Violent	VIOLENT
3. Major Property	MAJOR_PROP
4. Minor Property	MINOR_PROP
5. Drugs	DRUGS
6. Disturbance/Other	DIST_OTHER
Socio-Economic Variables, 2001 Census	**Acronym**
1. Percent of total population that is aged 15 to 24	TOT_YOUTH
2. Percent of total population that are immigrants	TOT_IMM
3. Percent of total population that are recent immigrants (1996-2001)	REC_IMM
4. Percent of total population that are visible minorities	VIS_MIN
5. Average income (2000)	AVG_INC
6. Average family income (2000)	AVG_FAM_INC
7. Percent of population aged 15+ living in low income (2000)	LOW_INC
8. Labour force participation rate	LFP_RATE
9. Unemployment rate	UNEMP
10. Youth unemployment rate (aged 15-24)	YOUTH_UNEMP
11. Percent total population aged 1+ that has moved during past year	MOVERS_1_yr
12. Percent total population aged 15+ that is single	SINGLE
13. Percent total population aged 15+ that is married	MARRIED
14. Percent of total census families that are lone-parent families	LONE_PARENT
15. Percent of occupied private dwellings that are owned	DWEL_OWNED
16. Percent of occupied private dwellings that are rented	DWEL_RENTED
17. Percent of occupied private dwellings built before 1961	OLD_HOUSE
18. Percent of occupied private dwellings that are houses	HOUSE
19. Percent of occupied private dwellings that are row houses	ROW_HOUSE
20. Percent of occupied private dwellings that are apartments in high-rise buildings (five or more storeys)	APT_HIGH_RISE
21. Percent of occupied private dwellings that are apartments in low-rise buildings (fewer than five storeys)	APT_LOW_RISE
22. Average number of persons in private households	AVG_PERS_HSLD
23. Percent of youth not attending school	YOUTH_NO_SC
24. Percent of population aged 20+ without a high school diploma	NO_HS_DIP
25. Percent of population aged 20+ with a college diploma	COLLEGE_DIP
26. Percent of population aged 20+ with a university degree	UNIV_DEGREE

Table 4.2
Study # 1 – Ottawa Dissemination Areas
Total Offences by Major Crime Groups, 2001*

	Total Offences		Overall Proportion
Criminal Offences	**44559**		**100%**
Violent – Total	**6946**	**100%**	**16%**
Abduction	95	1%	
Assault	4358	63%	
Assault – Sexual	243	3%	
Homicide	19	0%	
Robbery	810	12%	
Harass - Stalking	228	3%	
Threats	1193	17%	
Major Property – Total	**9008**	**100%**	**20%**
Arson	162	2%	
B&E Commercial	1430	16%	
B&E Residential	3116	35%	
Theft over $5000	723	8%	
Auto Theft	3577	40%	
Minor Property – Total	**23856**	**100%**	**54%**
Fraud	2202	9%	
Counterfeit	343	1%	
Theft from vehicle	3535	15%	
Theft Under $5000	11093	46%	
Mischief	6393	27%	
Possession	290	1%	
Drugs – Total	**1099**	**100%**	**2%**
Drugs Possession	956	87%	
Drugs Trafficking	99	9%	
Drugs - Other	44	4%	
Disturbance/Other Total	**3650**	**100%**	**8%**
Disturbance	109	3%	
Harass – Other	1162	32%	
Indecent Act	172	5%	
Threats - Other	1404	38%	
Weapons	141	4%	
Prostitution	127	3%	
Escape Custody	83	2%	
Firearms	129	4%	
Unlawfully at Large	132	4%	
Obstruct Justice	84	2%	
Resist Arrest	107	3%	

* Traffic offences and certain federal statute offences were excluded from the study.

Table 4.3
Study # 2 – Saskatoon Neighbourhoods
Crime, Census and Development/Planning Indicators

Criminal Offence Variables, 2003 (rate per 1,000 population)	**Acronym**
1. Total Offences	TOTAL_OFF
2. Violent	VIOLENT
3. Major Property	MAJOR_PROP
4. Minor Property	MINOR_PROP
5. Drugs	DRUGS
Socio-Economic Variables, 2001 Census	**Acronym**
1. Population density - number of persons per hectare	POP_DENS
2. Percent total population aged 15+ that is single	SINGLE
3. Percent total population aged 1+ that has moved during past year	MOVERS
4. Percent of total population by Aboriginal identity	ABORIGINAL
5. Percent of youth not attending school	YOUTH_NO_SC
6. Percent of population aged 20+ without a high school diploma	NO_HS_DIP
7. Percent of population aged 20+ with a college diploma	COLLEGE_DIP
8. Percent of population aged 20+ with a university degree	UNIV_DEGREE
9. Government transfer payments as a percentage of total income.	GOVT_TRANSFER
10. Percent of total census families that are lone-parent families	LONE_PARENT
11. Incidence of low-income families in 2000 (%)	LOW_INC_FAM
12. Incidence of low-income unattached individuals in 2000 (%)	LOW_INC_IND
13. Percent of occupied private dwellings that are houses	HOUSE
14. Percent of occupied private dwellings that are apartments in high-rise buildings (five or more storeys)	APT_HIGH_RISE
15. Percent of occupied private dwellings that are owned	DWEL_OWNED
16. Percent of occupied private dwellings that are rented	DWEL_RENTED
17. Percent of occupied private dwellings requiring major repairs	MAJOR_REPAIRS
18. Percent of occupied private dwellings built before 1961	OLD_HOUSE
19. Average value of dwelling $	$DWELLING
20. Labour force participation rate	LFP_RATE
21. Unemployment rate	UNEMP
22. Youth unemployment rate (aged 15-24)	YOUTH_UNEMP
Development, Planning and Vehicle Data	**Acronym**
23. Average home selling price (2002)	AVG_SELL_PRICE
24. Total park space in acres as a percentage of total neighbourhood area (2003)	PARK_ACRES
25. Number of persons per park acre in neighbourhood (2003)	PERS_PARK_ACRE
26. Number of vehicles per resident (2002)	VEH_PERS

Table 4.4
Study # 2 – Saskatoon Neighbourhoods
Crime Data Classification

Total Offences
Violent
Violations causing death
Attempted murder
Sexual assaults
Assaults
Robbery
Armed robbery
Criminal harassment (stalking)
Major Property
Arson
Break and enter residential
Break and enter business
Break and enter other
Theft of motor vehicle
Theft over $5000
Minor Property
Theft under $5000
Mischief
Controlled Drugs and Substances

Table 4.5
Study # 2 – Saskatoon Neighbourhoods
Criminal Incidents – Saskatoon CMA, 2003

	Actual Incidents		Overall Proportion
Total - Criminal Code and Federal Statute Incidents (Exc. Traffic)	**37596**		**100%**
Total Crimes of Violence	**4146**	**100.0%**	**11%**
Homicide	8	0.2%	
Attempted Murder	9	0.2%	
Assault	3065	73.9%	
Sexual Assault	286	6.9%	
Other Sexual Offences	34	0.8%	
Abduction	5	0.1%	
Robbery	739	17.8%	
Total Property Crimes	**19250**	**100.0%**	**51%**
Breaking And Entering	5028	26.1%	
Theft - Motor Vehicle	1795	9.3%	
Theft Over	91	0.5%	
Theft Under	10311	53.6%	
Have Stolen Goods	779	4.0%	
Frauds	1246	6.5%	
Total - Other Criminal Code	**13209**	**100.0%**	**35%**
Prostitution	101	0.8%	
Gaming And Betting	1	0.0%	
Offensive Weapons	250	1.9%	
Arson	164	1.2%	
Counterfeiting currency	317	2.4%	
Indecent Acts	49	0.4%	
Kidnapping	48	0.4%	
Public Morals	12	0.1%	
Mischief Over (property damage)	48	0.4%	
Mischief Under (property damage)	5139	38.9%	
Other Criminal Code Offences (Ex. Traffic)	7080	53.6%	
Total - Federal Statutes	**991**	**100.0%**	**3%**
Drugs	678	68.4%	
Other Federal Statutes	313	31.6%	

Source: Uniform Crime Reporting (UCR) Survey, Canadian Centre for Justice Statistics

Table 4.6
Study # 3 – Comparison of Ottawa – Saskatoon Neighbourhoods
Variables used Ottawa and Saskatoon Neighbourhood Analysis
(Ott = Ottawa, Sask = Saskatoon)

	Criminal Offence – Ottawa (2001), Saskatoon (2003) - (rate per 1,000 pop.)
Ott/Sask	1. Total Offences
Ott/Sask	2. Violent
Ott/Sask	3. Major Property
Ott/Sask	4. Minor Property
Ott/Sask	5. Drugs
Ott	6. Disturbance
	Socio-Economic, 2001 Census
Ott/Sask	Population density - number of persons per hectare
Ott	Percent of total population that is aged 15 to 24
Ott/Sask	Percent total population aged 15+ that is single
Ott	Percent total population aged 15+ that is married
Ott/Sask	Percent total population aged 1+ that has moved during past year
Sask	Percent of total population by Aboriginal identity
Ott	Percent of total population that are recent immigrants (1996-2001)
Ott	Percent of total population that are visible minorities
Ott/Sask	Percent of youth not attending school
Ott/Sask	Percent of population aged 20+ without a high school diploma
Ott/Sask	Percent of population aged 20+ with a college diploma
Ott/Sask	Percent of population aged 20+ with a university degree
Sask	Government transfer payments as a percentage of total income.
Ott/Sask	Percent of total census families that are lone-parent families
Ott/Sask	Incidence of low-income families in 2000 (%)
Ott/Sask	Incidence of low-income unattached individuals in 2000 (%)
Ott	Average household income
Ott/Sask	Percent of occupied private dwellings that are houses
Ott	Percent of occupied private dwellings that are row houses
Ott/Sask	Percent of occupied private dwellings that are apartments in high-rise buildings
Ott	Percent of occupied private dwellings that are apartments in low-rise buildings
Ott/Sask	Percent of occupied private dwellings that are owned
Ott/Sask	Percent of occupied private dwellings that are rented
Ott/Sask	Percent of occupied private dwellings requiring major repairs
Ott/Sask	Percent of occupied private dwellings built before 1961
Ott/Sask	Average value of dwelling $
Ott/Sask	Labour force participation rate
Ott/Sask	Unemployment rate
Ott/Sask	Youth unemployment rate (aged 15-24)
	Development, Planning and Vehicle
Sask	Average home selling price (2002)
Sask	Total park space in acres as a percentage of total neighbourhood area (2003)
Sask	Number of persons per park acre in neighbourhood (2003)
Sask	Number of vehicles per resident (2002)

5. Methods of Analysis

Section 5.1- Plan of Analysis

This publication is based on three separate studies and, as a result, the methods used in the analysis are slightly different. They represent a progressive calibration of techniques of statistical and geographic analysis. Study #1 of Ottawa is based on data for the smallest areal units available—dissemination areas (DAs). Study # 2 of Saskatoon is based on data for neighbourhoods. While the methods used in the Ottawa study were again employed, the geographic analysis was expanded to include spatial autocorrelation. In Study # 3, Ottawa's DAs are re-aggregated to match the boundaries of the city's neighbourhoods, and the findings of this analysis are compared directly to those of Saskatoon at the neighbourhood level.

Section 5.2 - Statistical and Geographic Methods of Analysis

Descriptive Statistics

In all three studies, the crime variables were calculated as a rate per 1,000 population related to the geographic unit of analysis (DAs or neighbourhoods). All of the census and socio-economic variables in the three studies were calculated at the ratio scale with the exception of variables relating to average income and value of dwelling, which were left at the interval scale. Descriptive statistics were calculated for each dataset to determine the minimum, maximum, mean, standard deviation and coefficient of variation of each variable.

Transformation of Variables

For the purposes of statistical analysis and to meet the basic assumptions and constraints of the general linear model, each of the crime and socio-economic variables employed in the three studies were transformed into a Z-score for each geographic unit of analysis (the DA or neighbourhood).

The formula for this transformation is as follows:

$$Z_i = (x_i - x) / sd_x$$

(Where Z_i is the Z score, x_i is the original value, **x** is the mean of all values of x, and **sd** is the standard deviation of that mean).

Following the transformation, therefore, each variable has a mean of 0 and a standard deviation of 1, allowing the relative position of each case (DA or neighborhood) to be assessed. For example, higher crime areas will have Z-score above 0 while lower crime areas will have values below 0. This standardization brings variables from different units of measurement onto the same scale and provides the quantitative justification for further statistical analysis, particularly multivariate. This type of transformation is common in crime research and was employed recently in a study of Winnipeg by Fitzgerald, Wisener and Savoie (2004).

Principal Components Analysis

Each of the three studies involved conducting a principal components analysis (PCA) on their respective datasets to examine the statistical relationship between crime and socio-economic status in Ottawa and Saskatoon. Essentially, PCA is a data reduction technique. It replaces a set of variables with a smaller number of components, which are made up of inter-correlated variables representing as much of the original data set as possible. Principal components analysis is an appropriate technique in an inductive search for common patterns of crime and socio-economic status in an urban area with the use of small area statistics and has been used in crime research by Hung (2002) and Mata (2003).

Multiple Regression

Multiple regression analysis is a multivariate technique that assesses the relationship of two or more independent variables on one dependent variable. It is used to describe the individual contribution of a number of independent variables toward predicting a dependent variable (McKean and Byers 2000). For this research, multiple regression analyses were performed on each of the datasets in the three studies to examine the strength and intensity of the relationship

between crime (the dependent variable) and socio-economic conditions (the independent variables) and to identify significant "predictors" of crime in Ottawa and Saskatoon. Standard multiple regression and step-wise multiple regression models were tested for each of the crime variables used in the studies (including total crime, violent, major property, minor property and drug offences).

Cartographic and GIS Analysis

For each of the three studies, a series of maps were produced to illustrate the geographic distribution of crime in Ottawa and Saskatoon and to examine the spatial relationship between crime and certain socio-economic conditions in both cities. ArcGIS (ESRI, www.esri.com) was the software used in this research. In Study # 1, the Ottawa Police Service (OPS) provided 2001 crime data for the city's 1187 dissemination areas. This data, along with 2001 census data, was then joined to Statistics Canada's digital cartographic file for Ottawa. In Study # 2, a digital cartographic file showing Saskatoon's 55 residential neighbourhood was obtained from the Planning Unit of the City of Saskatoon. This geographic data was then matched with 2003 crime, 2001 census and additional planning/development data for the city. In Study # 3, a digital cartographic file displaying Ottawa's 50 residential neighbourhoods was acquired from the Planning Department of the City of Ottawa. As stated above, the crime and census data from Study # 1 was re-aggregated to match these neighbourhood boundaries.

Choropleth maps were produced in each of the three studies. This type of map is used when the quantity in the geographical division is represented by the colour or shade of the area symbol placed in the enumeration unit – in this case, the DA or neighbourhood. As Dent (2000, p. 5) explains, several assumptions are made when choropleth maps are used. First, it is assumed that that the quantity being mapped is uniform in the enumeration area. Second, it is assumed that densities, rates or ratios are more important than absolute values. Because enumeration areas vary in size, symbolizing absolute values with shaded area symbols can lead to misinterpretation. Since all of the crime and socio-economic data employed in the three studies is aggregated to match geographic boundaries, it was determined that choropleth mapping was the most appropriate. The mapping classification is based on intervals of crime intensity. In Study # 1, high crime areas in Ottawa's DAs were mapped according to three categories – elevated, high

and highest – in relation to their Z-values. In Studies # 2 and # 3, crime rates per 1,000 population in Ottawa and Saskatoon's neighbourhoods are mapped according to five categories ranging from lowest to highest rates of crime per 1,000 population.

Spatial Autocorrelation

Spatial autocorrelation was employed for the Saskatoon study only (Study # 3). It is apparent that while statistical techniques such as multiple regression and principal component analysis are effective in crime research they are non-spatial by design. And, while mapping is appropriate in illustrating geographic patterns of crime and socio-economic status, visualization in itself, is not an explicitly spatial approach. As a result, the technique of spatial autocorrelation was used in the Saskatoon study to directly determine the presence of spatial pattern in the mapped variables due to geographic proximity. As Johnston et al (2000, p.775) explain:

> The most common form of spatial auto-correlation is where similar values for a variable tend to cluster together in adjacent observation units, so that on average across the map the values for neighbours are more similar than would occur if the allocation of values to observation-units were the result of a purely random mechanism.

In other words, spatial autocorrelation is used to determine clusters of strong association in the variables and is employed in this study to gauge the level of geographic concentration of crime in Saskatoon and the spatial relationship between crime and neighbourhood characteristics.
The software CrimeStat developed by Levine & Associates (2002) was used to calculate Moran's "I", one of the most commonly used spatial autocorrelation indicators. Moran's I (Moran, 1950) is also one of the oldest spatial statistics and is applied to zones or points, which have continuous variables associated with them (intensities). It is calculated as follows:

$$I = \frac{N \sum_i \sum_j W_{ij} (X_i - \bar{X})(X_j - \bar{X})}{(\sum_i \sum_j W_{ij}) \sum_i (X_i - \bar{X})^2}$$

where N is the number of cases, **Xi** is the variable value at a specified location, **i**, **Xj** is the variable value at another location, **j**, 0 is the mean of the variable and **Wij** is a distance weight applied to the comparison between location **i** and location **j**. The statistic is interpreted much like a correlation coefficient with values near +1 indicating a strong spatial pattern (high values located close to one another and low values located close to one another) and values near –1 indicating strong negative spatial autocorrelation. The significance of Moran's I is calculated as follows:

$$Z(I) = \frac{I - E(I)}{S_{E(I)}}$$

where I is the empirical value calculated from a sample, E (I) is the theoretical mean of a random distribution and $S_{E(I)}$ is the theoretical standard deviation of E(I).

CrimeStat uses point locations to calculate spatial autocorrelation statistics. The data entry for the program requires X and Y values in the form of a projected coordinate system. Therefore, ArcGIS was used to compute the X and Y coordinates (not longitude and latitude) for the centroid of each of the 55 residential neighbourhoods in Saskatoon. To calculate Moran's I, CrimeStat also requires that intensity values be associated with each point. In this case, the intensity values were the Z-scores (not to be confused with the Z value of significance) for the five crime and 3 selected socio-economic variables in the 55 neighbourhoods.

6. Study # 1 Findings: Dissemination Areas of Ottawa

Section 6.1 – Descriptive Statistics

Table 6.1 shows the descriptive statistics for the 6 crime and 26 census variables used in the analysis. The table indicates that all 6 crime variables have high coefficients of variation (the standard deviation divided by the mean) indicating significant dispersion of individual values around the mean. In particular, minor property and drug offences have values that

fluctuate greatly among the 1187 DAs examined in Ottawa, pointing to substantial geographic disparity within Ottawa. Similarly, several of the census variables also have high coefficients of variation including those denoting recent immigrants, people living in low income, youth unemployment and apartment high-rises suggesting a significant geographic disparity of disadvantaged residents in the city.

Section 6.2 – Principal Components Analysis

As Table 6.2 shows, the analysis produced an 8-component solution, accounting for 78.5% of the total variance in the dataset. An examination of the component loadings in Table 6.3 reveals that the 5 crime variables (violent, major and minor property, drugs and disturbance/other) are highly inter-correlated with one-another (Component 2) but are not significantly associated with any of the 26 socio-economic variables. The other components identify a number of dimensions of socio-economic status in Ottawa, including "mobility and housing" (Component 1), "income and education" (Component 3), "immigrants and visible minorities" (Component 4) and "youth and unemployment" (Component 7). As can be seen in Table 6.3, none of these dimensions (by way of component loadings) is significantly related to any of the 5 crime variables, suggesting that, overall, there is a weak association between crime and socio-economic status in Ottawa at the intra-urban scale – at least with the use of data at the DA level. These findings essentially confirm the output from the correlation matrix (31 variables x 31 variables) which displayed relatively low correlation coefficients between the crime and socio-economic variables, in the range of $r = -0.35$ to $r = 0.35$.

Section 6.3 – Multiple Regression

Table 6.4 shows the results of the regression analysis between each of the 6 crime variables and 6 selected census variables characterizing disadvantage. An effort was made to select independent variables that were not highly correlated with one another but, nevertheless, demonstrate a range of factors associated with disadvantaged communities (youth, recent immigrants, low-income, mobility, apartment high-rises and low education). The table demonstrates that in Ottawa there appears to be a rather weak statistical association between crime and factors related to socio-economic disadvantage with low multiple correlation

coefficients{R} and coefficients of multiple determination {R^2}. In fact, each crime variable has an R^2 below 0.11, clearly demonstrating that the 6 socio-economic variables, when taken together, are not strong predictors of increased levels of crime. In other words, no more than 11% of the variation in any of the crime indicators can be explained by the socio-economic variables at the level of the DA.

Despite the overall weak relationship, however, several of the independent variables, when examined individually, had significant beta coefficients (transformed partial regression coefficients) at the 95% confidence level ($p<0.05$). The recent immigrant variable recorded significant negative betas on 5 of the 6 crime variables pointing to an inverse relationship between the two indicators - the higher the level of crime in an area the fewer recent immigrants living there. Table 6.4 also indicates that people living in low-income (LOW_INC) and residential mobility (MOVERS_1_yr) were the best predictors of crime. In fact, mobility was the only socio-economic indicator to record significant betas on all of the crime variables. Interestingly, the presence of young people (TOT_YOUTH) was not a significant predictor of crime.

The 1187 DAs in Ottawa were ranked from highest to lowest according to their Z-scores on the variable "Total Offences" with the top quintile (20%) of DAs being identified as "High Crime Areas" (n=237). A second multiple regression was performed on the data for these areas. Table 6.5 shows the results and demonstrates that in Ottawa's High Crime Areas (HCAs) there appears to be a weak statistical association between crime and factors related to socio-economic disadvantage with low values of R and R^2 for each of the six crime variables. Furthermore, only one independent variable, mobility (MOVERS_1_yr), had significant betas on the crime indicators related to violence and drugs. A third multiple regression analysis was performed on the data set. This time, the 1187 DAs were ranked from highest to lowest according to their Z-scores on the variable "Low-Income" with the top quintile (20%) of DAs being identified as "Disadvantaged Areas" (n= 237). Table 6.6 shows the results of the analysis and again reveals a weak overall association in these areas between crime and factors related to disadvantage.

Section 6.4 – Cartographic and GIS Analysis: Examining Spatial Patterns of Crime and Disadvantage

High Crime Areas (HCAs)

Figure 6.1 is a map illustrating the location of 'High-Crime Areas' (HCAs) with respect to total offences in 2001. The map inset clearly illustrates that these areas are concentrated within the built-up central core and suburbs of Ottawa, with very few HCAs visible in the outer and rural parts of the city. (Two HCAs are present in the southwest corner of Cumberland and another in the southeast portion of Goulbourn). However, the enlarged section of the map shows a dispersed pattern of HCAs at the three levels (elevated, high and highest) within the urban core, including sections of the inner city and a prominent visibility of large DAs (in terms of area) in suburban locations. Compared to central Ottawa, these suburban locations have lower residential densities and larger spaces devoted to commercial activity and industrial parks.

There are several clusters of DAs at the "highest" crime level (above 1 SD) in downtown Ottawa (the Central Business District and 'Market' area), the east-central part of the city (Vanier, Overbrook and Ottawa North-East) and several communities west of downtown including Carlington. An examination of the raw data reveals that the higher crime rates in these areas are attributable to large numbers of incidents relating to minor property offences (particularly 'theft under $5000' and 'theft from vehicle') and to a lesser extent to major property offences (most notably 'residential break and enter' and 'auto-theft'). In addition, the downtown HCAs (including the Market) have a much higher than average number of violent offences, particularly 'threats' and 'assault'. The map also highlights what appears to be 'corridors' of HCAs adjacent to major transportation routes such as Highways 417 and 17 (east-west) and Highway 16 (north-south) indicating a spatial relationship between crime and mobility/accessibility. These 'corridors' contain some of the city's highest residential densities and significant commercial activity, including several of the city's largest shopping centres such as Place d'Orleans, St. Laurent, Pinecrest and Bayshore.

Figures 6.2 to 6.5 consist of a series of maps displaying the geographic distribution of HCAs according to four offence types: "Violent", "Major Property", "Minor Property", and "Drugs".

"Violent" HCAs (Figure 6.2) are somewhat more concentrated within the central core of Ottawa (with the exception of several DAs in the rural portion of Cumberland) and are particularly noticeable in the inner city (Center Town and the Market) as well as in Vanier/Overbrook and parts of Ottawa North-East. While the large majority of "Major Property" HCAs are located within the central core of the city, Figure 6.3 reveals a more dispersed pattern with several HCAs also visible in suburban and rural communities, where rates of residential and commercial break and enters tend to be higher. Figure 6.4 shows that "Minor Property" HCAs have a more compact distribution, particularly in the inner city and along transportation corridors where higher densities and the concentration of commercial activity likely present greater opportunities for offences such as theft. Figure 6.5 illustrates that HCAs associated with drug offences are the most dispersed geographically in Ottawa with a number of these areas visible in the rural parts of the city. Drug crimes, however, accounted for only 2% of all offences in Ottawa in 2001 (Table 4.2).

Disadvantaged Areas

Figure 6.6 consists of a map showing the geographic distribution of disadvantaged DAs in Ottawa according to their Z-scores on the variable 'Low-Income'. In light of the serious socio-economic problems associated with people living in low-income, including higher unemployment, lower rates of labour force participation and educational attainment and greater dependency on social assistance, it was felt that this variable would be the most appropriate composite measure of disadvantage. Similar to the crime classification, the Z-scores for low-income were ranked from highest to lowest with the top quintile (20%) of DAs being identified as "disadvantaged" (n=237). The map clearly displays a very tight spatial concentration of disadvantage at all levels ('elevated', 'high' and 'severe') within Ottawa's central core, particularly the inner city neighbourhoods of Dalhousie, Centre Town, Sandy Hill and Lower Town as well as a large cluster (including DAs at a 'severe' level of disadvantage) in the east- central portion of the city, comprising the communities of Vanier, Overbrook and Ottawa North-East.

Other pockets of disadvantaged DAs are present in the south central part of the city including several neighbourhoods in Riverview, Alta-Vista and Hunt Club and in west central Ottawa and

Carlington. Further west, similar conditions are present in several DAs in Pinecrest/Queensway, Nepean North and Bells Corners. It is also evident that across the city, individual areas of 'severe' disadvantage are in most cases bordered by areas of 'elevated' and 'high' disadvantage. All of these areas are characterized by significantly lower family and household incomes, higher rates of unemployment, lower levels of educational attainment and higher proportions of recent immigrants, visible minorities, lone-parent families and people who are single.

The Intersection of High Crime and Disadvantaged Areas

The "intersection" operation in ArcGIS was used to create a series of maps showing the location of DAs in Ottawa that are both disadvantaged and have a high crime rate. Figure 6.7 is a map displaying the intersection of HCAs (by total offences) and disadvantaged areas in the city. In total, 98 of the 1187 DAs (8% of the total and 41% of HCAs) were found be to experiencing both conditions. Geographically, these "Hot-Spots" are clustered tightly in Ottawa's inner core (Dalhousie, Centre Town, Sandy Hill, and Lower Town), as well as large sections of Vanier, Overbrook and Ottawa North-East. The map also reveals several small, isolated "Hot-Spots" within suburban communities surrounding the core including Riverview, Alta-Vista, Hunt Club, Pinecrest/Queensway and Nepean North. Figure 6.8 illustrates the intersection of HCAs (by violent offences) and disadvantaged areas and reveals a very similar spatial distribution. In this case, 103 DAs (9% of the total and 43% of HCAs) were found to be both violent and disadvantaged.

Table 6.7 provides a summary of criminal offence and socio-economic conditions in the four main spatial groupings presented thus far in the report:

1. High Crime Areas (n=237)
2. Disadvantaged Areas (n=237)
3. "Hot-Spots" A – Intersection of Total Offence HCAs/Disadvantage (n=98)
4. "Hot-Spots" B – Intersection of Violent Offence HCAs/Disadvantage (n=103).

It lists the mean Z-scores on the 6 crime variables and 23 selected census indicators for the DAs in the four groups. Scores higher than 0 indicate conditions above the citywide average while

scores less than 0 signify conditions below the citywide average. It is important to note that the figures in this table do not necessarily imply cause and effect between crime and socio-economic status but rather present a general picture of conditions in these areas.

The table reveals that HCAs, on average, have higher proportions of people living in low income (0.671) as well as singles (0.831) and have more rented dwellings (0.673) and apartment low rises (0.599). In addition, they have larger proportions of residents who have not finished high-school (0.589). "Disadvantaged Areas", on the other hand, have only slightly higher than average rates of total criminal offences (0.279) but moderately higher rates of violent crimes (0.495). Table 6.7 also shows that the "Hot-Spots" (A & B) are characterized by significantly higher proportions of recent immigrants (0.841, 0.822), visible minorities (0.978, 1.039), residents who had moved during the past year (0.850, 0.749), low rise apartments (0.938, 0.907) and substantially higher rates of residents without a high-school diploma (1.042, 1.174). With respect to the incidence of crime, the "Hot-Spots" had markedly higher rates of violent offences (1.284, 1.310).

Section 6.5 - Discussion

Ottawa is a relatively safe city with a low crime rate. Overall, it has an affluent population and a strong economy; but serious social problems persist in a number of disadvantaged communities. In 2001, minor property crimes were the most prevalent offences, accounting for 54% of the total. Two minor property-related crimes - 'theft under $5000' and 'mischief' together accounted for 40% of all offences. Violent crimes accounted for 16% of total offences in 2001.

The study found that there is a weak statistical association in Ottawa between crime and socio-economic disadvantage. The results of the analysis (principal components analysis and multiple regression) revealed that, overall, there are no clear social 'predictors' of crime in the city at the level of the dissemination area (DA). For example, when examining the city as a whole, DAs with higher proportions of youth, unemployed people, recent immigrants, visible minorities, renters or high-school dropouts are not more likely to be areas with higher crime rates.

The mapping of crime variables was effective in discerning geographic patterns of criminal activity in the city. In 2001, "High Crime Areas" (HCAs) were largely contained to the built-up urban core of Ottawa (including the suburbs) with very few HCAs evident in outlying and rural areas. While this was also the case with 'violent' and 'minor property' offences, the maps showed that 'major property' and 'drug' offences had a more dispersed pattern with several HCAs located in suburban and rural communities. The GIS analysis found that there was a moderate geographic relationship between crime and socio-economic status in the city, with 40% of disadvantaged DAs also being HCAs. Places where these two conditions intersected were labeled as "Hot-Spots" and represented just 8% of all DAs in the city. These "Hot-Spots" were found primarily in inner city communities but several were also visible in suburban neighbourhoods with low-income subsidized housing projects.

While the relationship between crime and socio-economic status was found to be tenuous at the citywide level, a number of characteristics did emerge when specific areas were examined more closely. HCAs, for example, exhibited certain conditions consistent with the *ecological approach* to criminology and *social disorganization theory*, most notably above average levels of low-income and transient residents. In addition, the "Hot-Spots" were found to have higher rates of violent crime and significantly larger proportions of recent immigrants, visible minorities and residents living in apartment buildings.

The concept of *criminal opportunity* is clearly applicable to the situation in Ottawa as the majority (60%) of HCAs in the city are not socially disadvantaged. Suitable targets for crime are found in areas where commercial, institutional and recreational activities are located, such as shopping centres, offices, transit-way stations, warehouses and recreational spaces. In addition, unguarded homes in suburban communities are targeted for their valuable and easily transportable goods. Furthermore, *routine activities theory* helps to explain the high rates of violent crime evident in areas with a concentration of bars and restaurants such as in Ottawa's Market district.

Table 6.1
Descriptive Statistics (n=1187)

Variable	Minimum	Maximum	Mean	Std. Deviation	Coefficient of Variation
TOTAL_OFF	0.0	2885.2	59.3	121.1	2.0
VIOLENT	0.0	368.7	9.1	17.1	1.9
MAJOR_PROP	0.0	274.0	12.0	18.5	1.5
MINOR_PROP	0.0	1810.4	31.8	75.8	2.4
DRUGS	0.0	337.4	1.5	10.2	6.8
DIST_OTHER	0.0	156.5	4.9	9.1	1.9
TOT_YOUTH	0.0	42.1	13.4	4.4	0.3
TOT_IMM	0.0	76.8	21.1	11.5	0.5
REC_IMM	0.0	50.7	3.9	6.4	1.6
VIS_MIN	0.0	83.2	16.4	15.2	0.9
AVG_INC	9741	130276	38767	12678	0.3
AVG_FAM_INC	18932	318590	85614	32522	0.4
LOW_INC	0.0	88.0	14.2	15.9	1.1
LFP_RATE	18.4	96.7	69.9	11.6	0.2
UNEMP	0.0	40.5	5.8	4.7	0.8
YOUTH_UNEMP	0.0	100.0	12.7	16.0	1.3
MOVERS_1_YR	0.0	66.7	15.4	10.3	0.7
SINGLE	20.3	89.7	49.7	14.8	0.3
MARRIED	10.3	79.7	50.3	14.8	0.3
LONE_PARENT	0.0	67.6	16.0	11.6	0.7
DWEL_OWNED	0.0	100.0	66.7	32.9	0.5
DWEL_RENTED	0.0	100.0	33.3	33.0	1.0
OLD_HOUSE	0.0	100.0	26.3	30.8	1.2
HOUSE	0.0	100.0	57.3	37.7	0.7
ROW_HOUSE	0.0	100.0	17.5	26.6	1.5
APT_HIGH_RISE	0.0	100.0	13.3	28.3	2.1
APT_LOW_RISE	0.0	98.2	9.3	17.1	1.8
AVG_PERS_HSLD	1.2	4.8	2.6	0.6	0.2
YOUTH_NO_SC	0.0	100.0	29.7	19.8	0.7
NO_HS_DIP	0.0	66.3	15.5	10.6	0.7
COLLEGE_DIP	2.1	49.1	18.2	6.8	0.4
UNIV_DEGREE	0.0	81.7	32.0	15.8	0.5

Table 6.2
Explanatory Power of the Principal Components

Component	Eigenvalue	% Total Variance	Cumulative %
1	9.8	31.6	31.6
2	3.8	12.3	43.9
3	2.7	8.8	52.7
4	2.3	7.6	60.2
5	2.0	6.3	66.5
6	1.5	4.7	71.3
7	1.2	3.7	75.0
8	1.1	3.5	78.5

Table 6.3
Component Loadings (varimax rotation)
City of Ottawa - Crime and Census Variables, 2001(n = 1187)

Variable	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5	Comp. 6	Comp. 7	Comp. 8
VIOLENT	0.181	**0.922**	0.119	0.043	0.028	0.034	0.038	-0.004
MAJOR_PROP	0.113	**0.790**	0.078	-0.013	-0.024	0.116	0.014	-0.024
MINOR_PROP	0.097	**0.954**	-0.053	0.047	-0.014	-0.011	0.001	0.007
DRUGS	0.029	**0.809**	-0.047	-0.002	0.031	-0.059	-0.024	0.034
DIST_OTHER	0.166	**0.847**	0.093	0.007	0.004	0.041	0.005	0.007
TOT_YOUTH	0.076	0.034	0.071	0.238	**0.815**	0.074	0.030	0.025
TOT_IMM	0.142	0.027	0.059	**0.857**	-0.046	0.129	0.100	-0.106
REC_IMM	0.377	0.003	0.024	**0.763**	0.099	-0.121	0.045	0.102
VIS_MIN	0.133	0.021	0.211	**0.802**	0.157	0.042	0.140	-0.251
AVG_INC	-0.357	-0.039	**-0.793**	-0.191	-0.149	0.107	-0.036	0.032
AVG_FAM_INC	-0.448	-0.050	**-0.743**	-0.224	-0.045	0.157	-0.010	0.097
LOW_INC	0.546	0.107	0.478	0.466	0.075	0.189	0.144	-0.097
LFP_RATE	0.038	-0.005	-0.372	-0.257	**0.644**	-0.354	-0.044	-0.152
UNEMP	0.225	0.021	0.256	0.371	0.037	0.069	**0.684**	0.030
YOUTH_UNEMP	0.009	0.001	-0.047	0.035	-0.009	-0.027	**0.920**	-0.067
MOVERS_1_yr	**0.693**	0.104	-0.090	0.201	0.186	-0.137	0.029	0.004
SINGLE	**0.867**	0.177	0.238	0.113	0.046	0.222	0.047	-0.121
MARRIED	**-0.867**	-0.177	-0.238	-0.113	-0.046	-0.222	-0.047	0.121
LONE_PARENT	0.360	0.018	0.471	0.241	0.094	0.158	0.134	-0.468
DWEL_OWNED	**-0.830**	-0.104	-0.241	-0.331	-0.047	-0.107	-0.063	0.021
DWEL_RENTED	**0.829**	0.104	0.243	0.332	0.046	0.110	0.064	-0.026
OLD_HOUSE	0.291	0.086	-0.011	-0.347	0.025	**0.652**	0.018	0.165
HOUSE	**-0.778**	-0.084	-0.118	-0.321	0.135	0.096	-0.049	0.417
ROW_HOUSE	0.042	-0.034	0.085	0.091	0.053	-0.241	0.022	**-0.916**
APT_HIGH_RISE	0.575	0.017	0.005	0.513	-0.392	-0.164	0.022	0.278
APT_LOW_RISE	**0.611**	0.184	0.063	-0.228	0.228	0.346	0.040	0.030
AVG_PERS_HSLD	**-0.789**	-0.132	0.004	0.048	0.426	-0.164	0.049	-0.176
YOUTH_NO_SC	0.420	0.058	0.188	-0.115	-0.070	-0.341	0.121	0.100
NO_HS_DIP	0.116	0.085	**0.821**	0.059	-0.252	0.216	0.046	0.012
COLLEGE_DIP	-0.163	-0.042	0.144	-0.261	0.118	**-0.684**	-0.031	-0.128
UNIV_DEGREE	0.054	-0.022	**-0.871**	0.116	0.028	0.296	-0.011	0.092

Component 1 – "Mobility and Housing"; **Component 2** – "Criminal Offences"
Component 3 – "Income and Education"; **Component 4** – "Immigration/Ethnicity"
Component 5 – "Youth/Labour Force"; **Component 6** – "Old Housing"
Component 7 – "Unemployment"; **Component 8** – "Row Housing"

Table 6.4
Results of Multiple Regression: Crime and Selected Socio-Economic Variables*Ottawa's Dissemination Areas (n = 1187)

Dependent Var.	**TOTAL_OFF**	**VIOLENT**	**MAJOR_PROP**	**MINOR_PROP**	**DRUGS**	**DIST_OTHER**
R	.232	.338	.242	.200	.129	.281
R^2	.053	.114	.058	.040	.016	.079
Adjusted R^2	.049	.109	.054	.035	.011	.074
Std. Error of Est.	.975	.943	.972	.982	.994	.961
Independent Vars.(Beta Coefficients)						
TOT_YOUTH	0.024	0.041	0.022	0.022	0.016	-0.010
REC_IMM	**-0.104**	**-0.109**	**-0.102**	**-0.095**	-0.077	**-0.098**
LOW_INC	**0.125**	**0.214**	**0.121**	0.087	0.079	**0.200**
MOVERS_1_yr	**0.156**	**0.169**	**0.139**	**0.144**	**0.108**	**0.151**
APT_HIGH_RISE	0.047	0.010	-0.009	**0.076**	-0.008	-0.004
NO_HS_DIP	0.033	**0.100**	**0.115**	-0.005	-0.011	0.065

* p<0.05, significant beta's are highlighted.

Table 6.5
Results of Multiple Regression: Crime and Selected Socio-Economic Variables*'High-Crime Areas' (n = 237)

Dependent Var.	**TOTAL_OFF**	**VIOLENT**	**MAJOR_PROP**	**MINOR_PROP**	**DRUGS**	**DIST_OTHER**
R	.207	.227	.085	.239	.185	.163
R^2	.042	.051	.007	.057	.034	.026
Adjusted R^2	.017	.026	-.018	.032	.009	.001
Std. Error of Est.	1.94	1.80	1.85	1.97	2.17	1.88
Independent Vars.(Beta Coefficients)						
TOT_YOUTH	0.006	0.041	0.030	-0.003	0.002	-0.032
REC_IMM	-0.058	-0.068	-0.035	-0.046	-0.090	-0.077
LOW_INC	0.002	0.072	-0.046	-0.024	0.076	0.096
MOVERS_1_yr	0.143	**0.192**	0.067	0.131	**0.156**	0.129
APT_HIGH_RISE	0.052	0.025	-0.009	0.083	-0.038	-0.003
NO_HS_DIP	-0.119	-0.022	-0.009	-0.153	-0.097	-0.101

* p<0.05, significant beta's are highlighted.

Table 6.6
Results of Multiple Regression: Crime and Selected Socio-Economic Variables*
'Disadvantaged Areas' (n = 237)

Dependent Var.	**TOTAL_OFF**	**VIOLENT**	**MAJOR_PROP**	**MINOR_PROP**	**DRUGS**	**DIST_OTHER**
R	.140	.231	.134	.149	.248	.228
R^2	.019	.053	.018	.022	.061	.052
Adjusted R^2	-.005	.028	-.007	-.003	.037	.027
Std. Error of Est.	1.15	1.19	1.48	1.11	.444	1.33
Independent Vars. (Beta Coefficients)						
TOT_YOUTH	0.076	0.075	0.094	0.081	0.117	-0.076
REC_IMM	-0.123	-0.156	-0.095	-0.099	-0.148	**-0.175**
LOW_INC	0.017	0.065	-0.032	-0.001	0.060	0.136
MOVERS_1_yr	0.094	**0.187**	0.005	0.068	**0.165**	**0.208**
APT_HIGH_RISE	0.058	0.029	-0.020	0.093	0.017	0.002
NO_HS_DIP	0.004	0.139	0.010	-0.039	0.175	0.000

* $p<0.05$, significant beta's are highlighted.

Figure 6.1 - High Crime Areas, Ottawa 2001 - Total Offences (Top Quintile, n = 237 Census DAs)

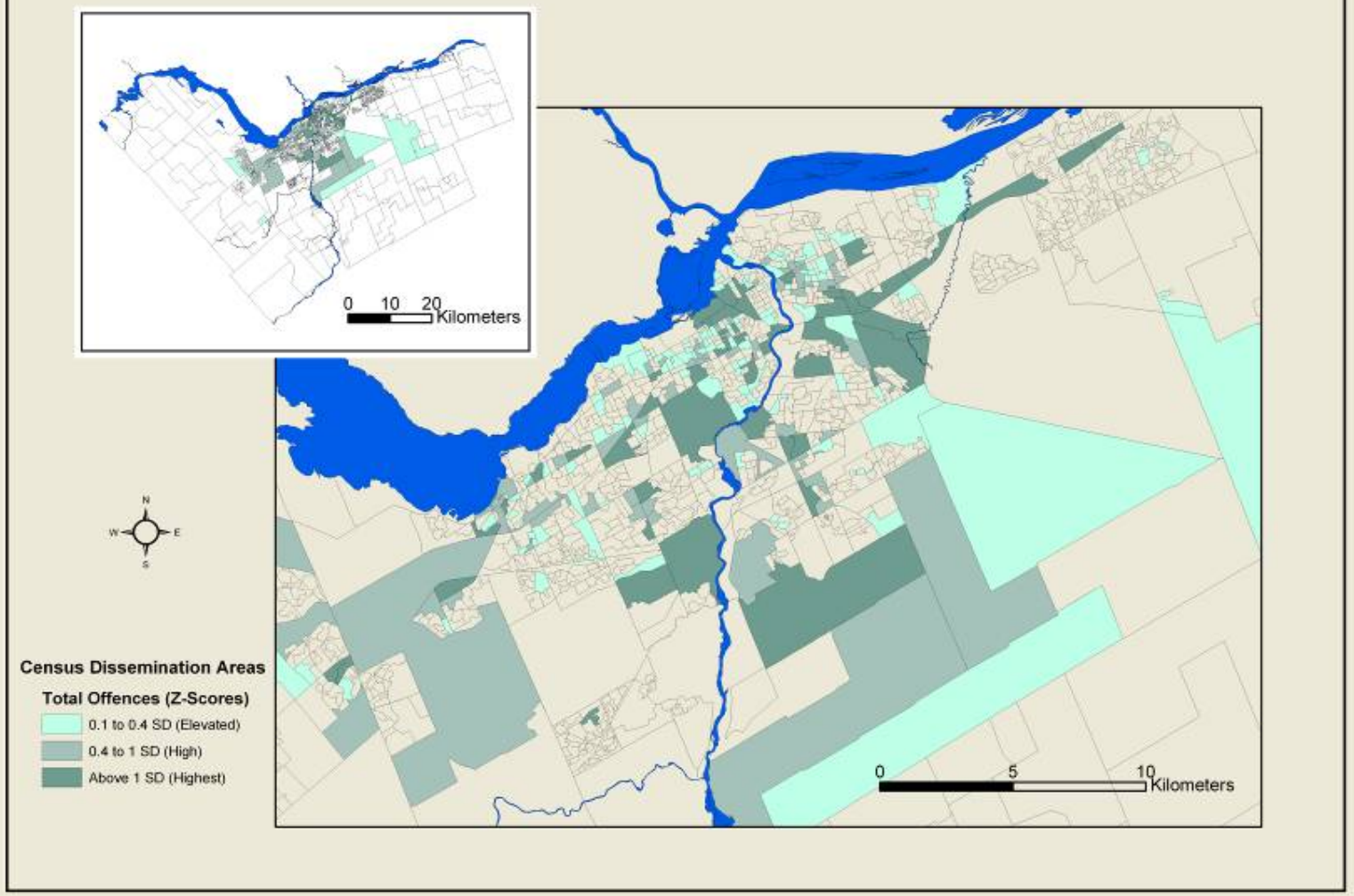


Figure 6.2 - High Crime Areas, Ottawa 2001 - Violent Offences (Top Quintile, n = 237 Census DAs)

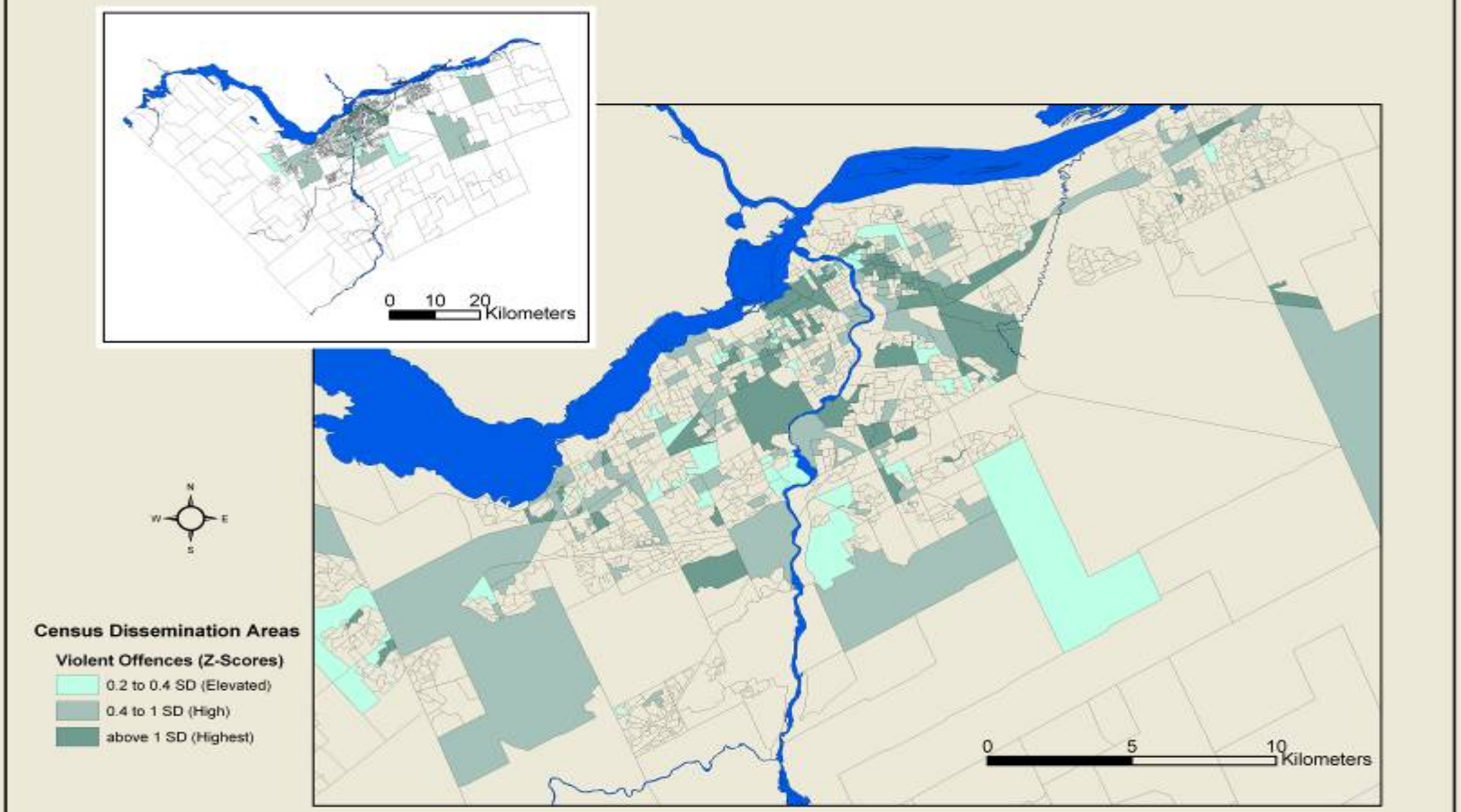


Figure 6.3 - High Crime Areas, Ottawa 2001 - Major Property Offences (Top Quintile, n = 237 Census DAs)

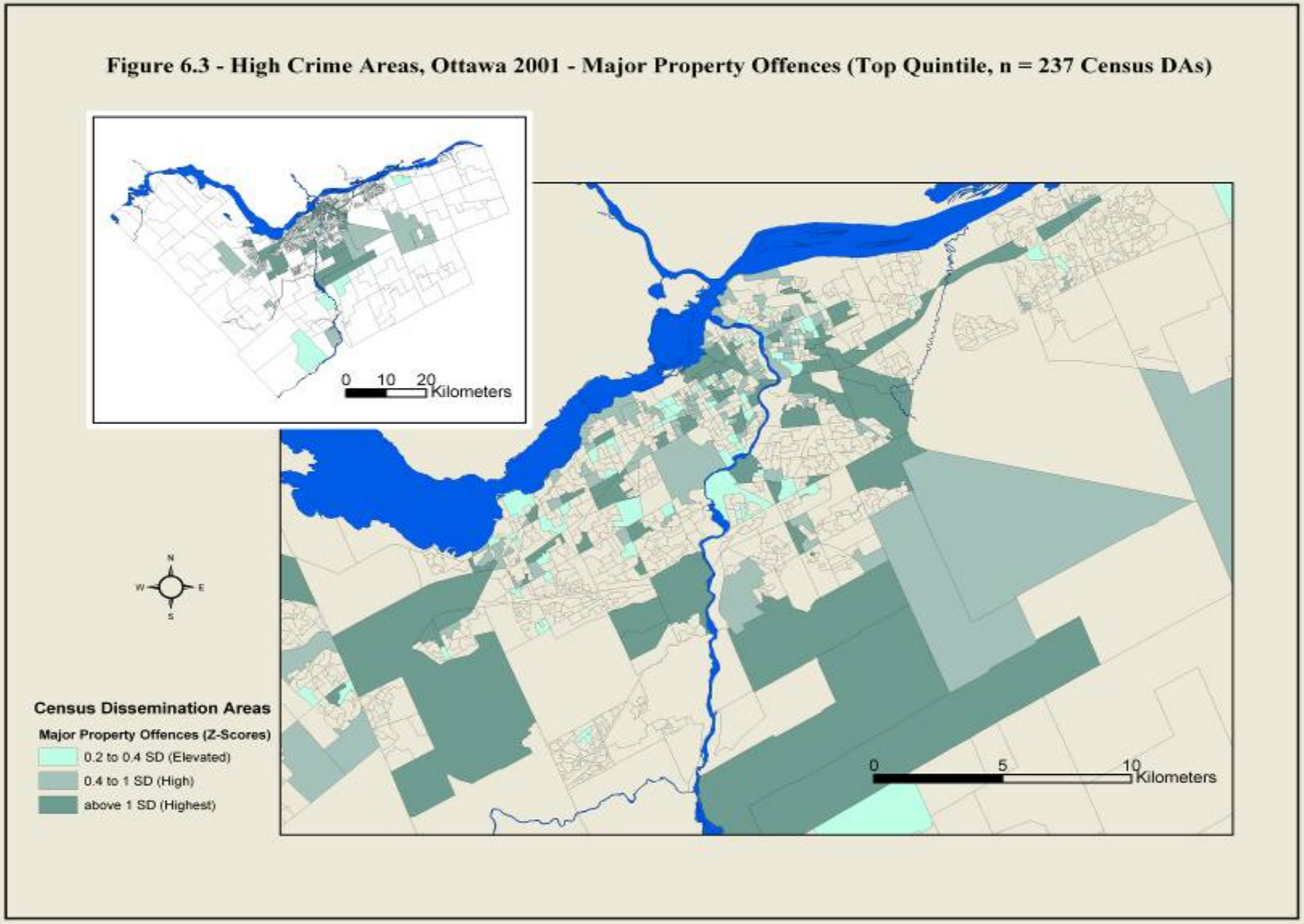


Figure 6.4 - High Crime Areas, Ottawa 2001 - Minor Property Offences (Top Quintile, n = 237 Census DAs)

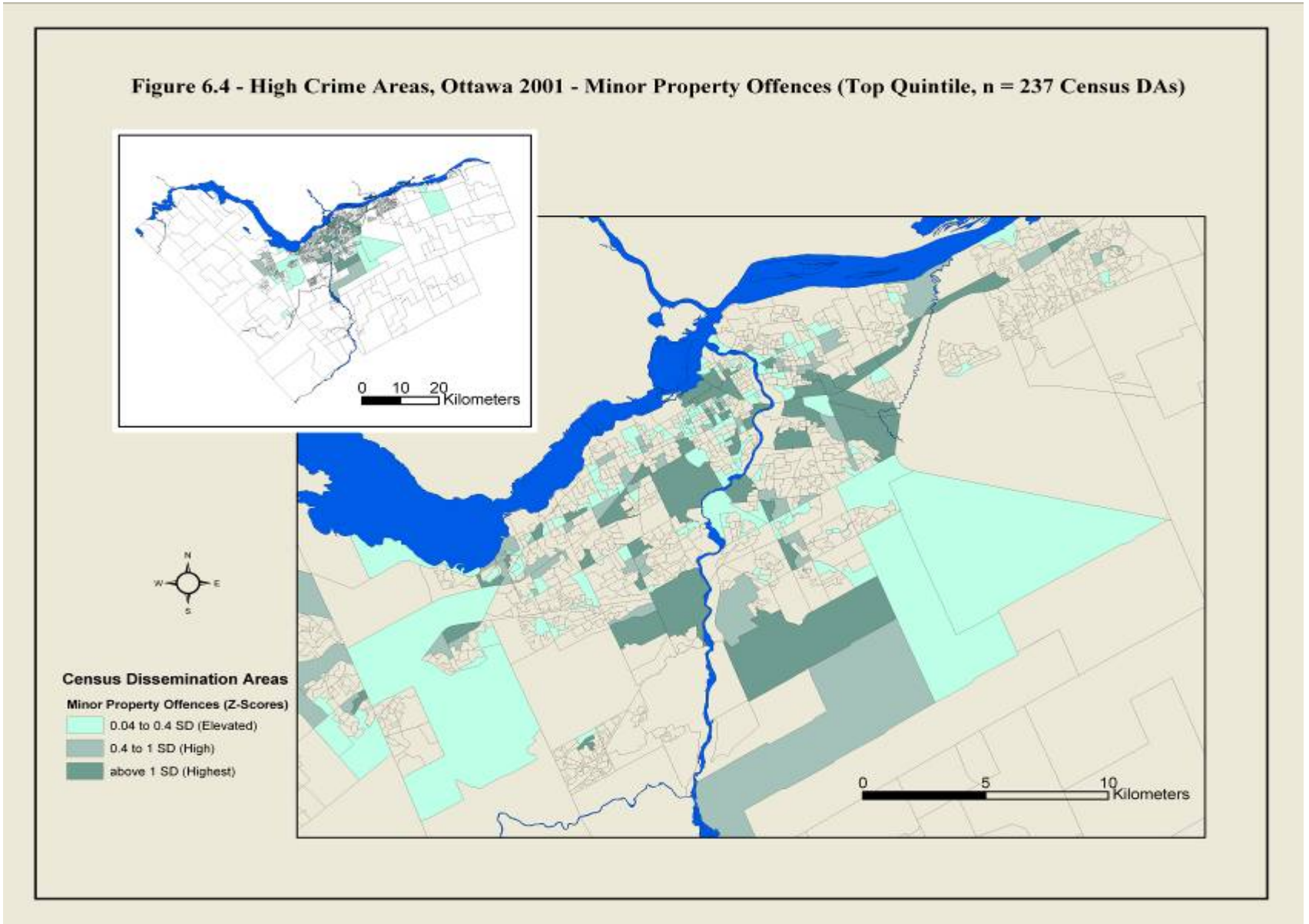
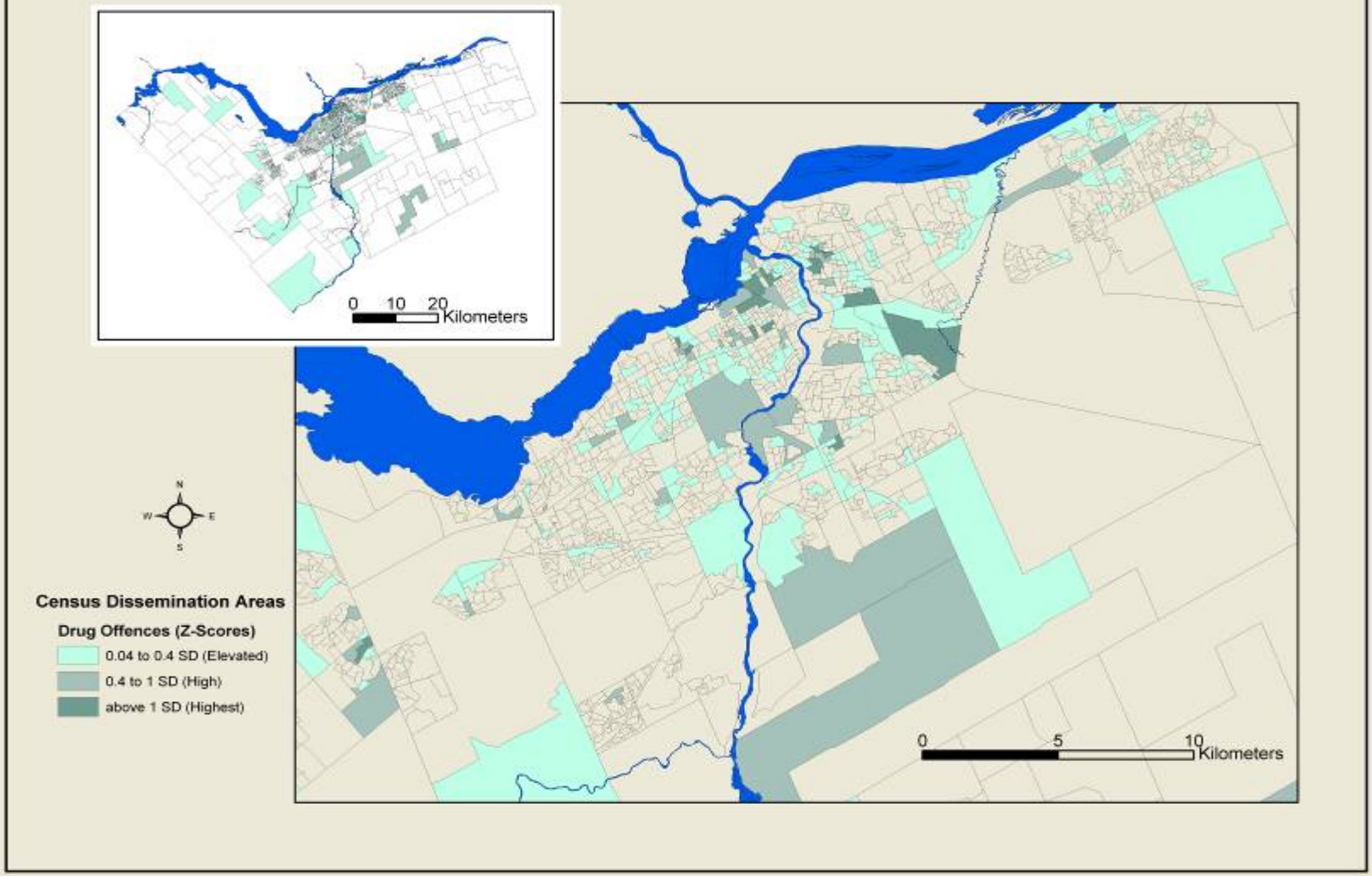


Figure 6.5 - High Crime Areas, Ottawa 2001 - Drug Offences (Top Quintile, n = 237 Census DAs)



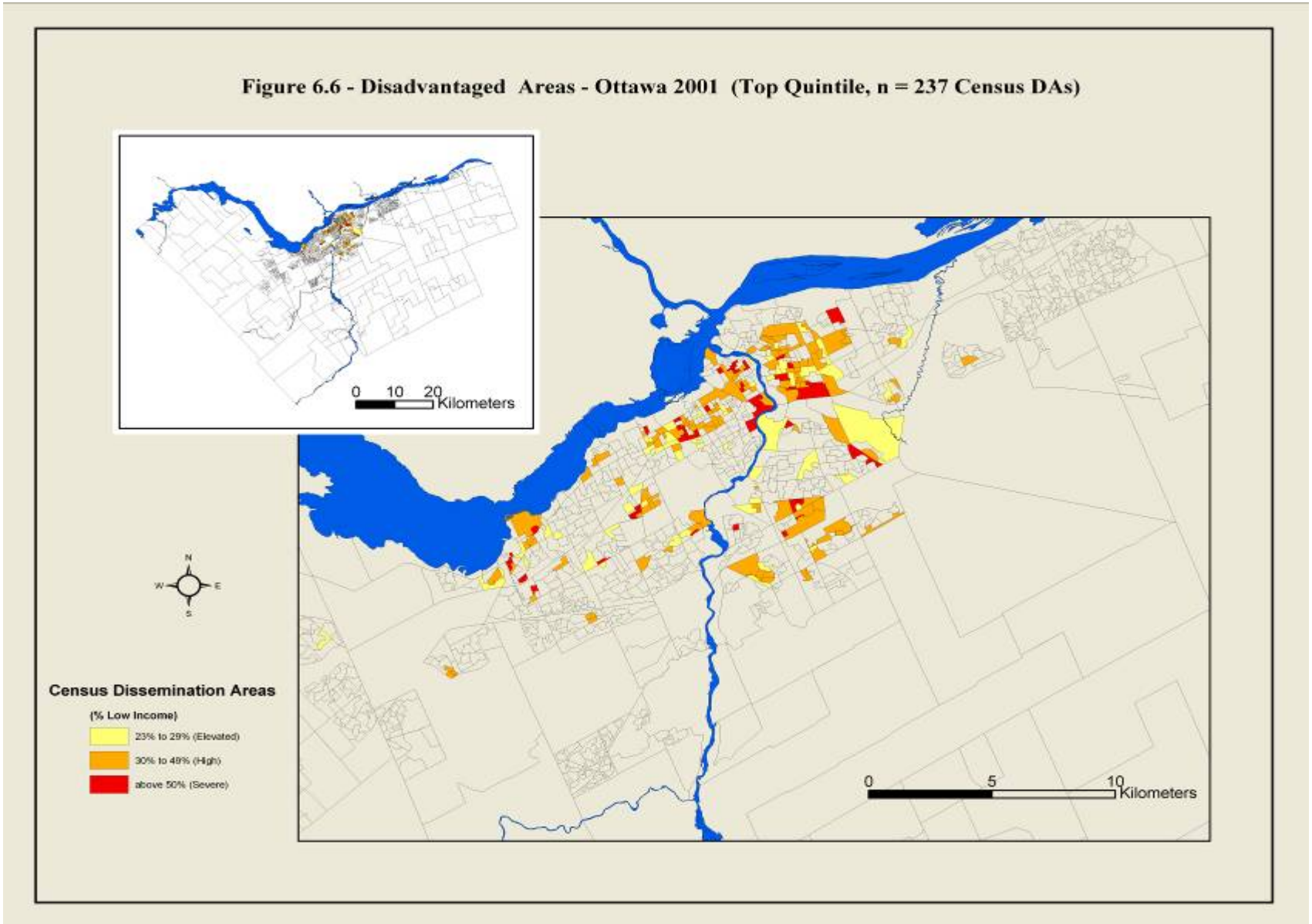
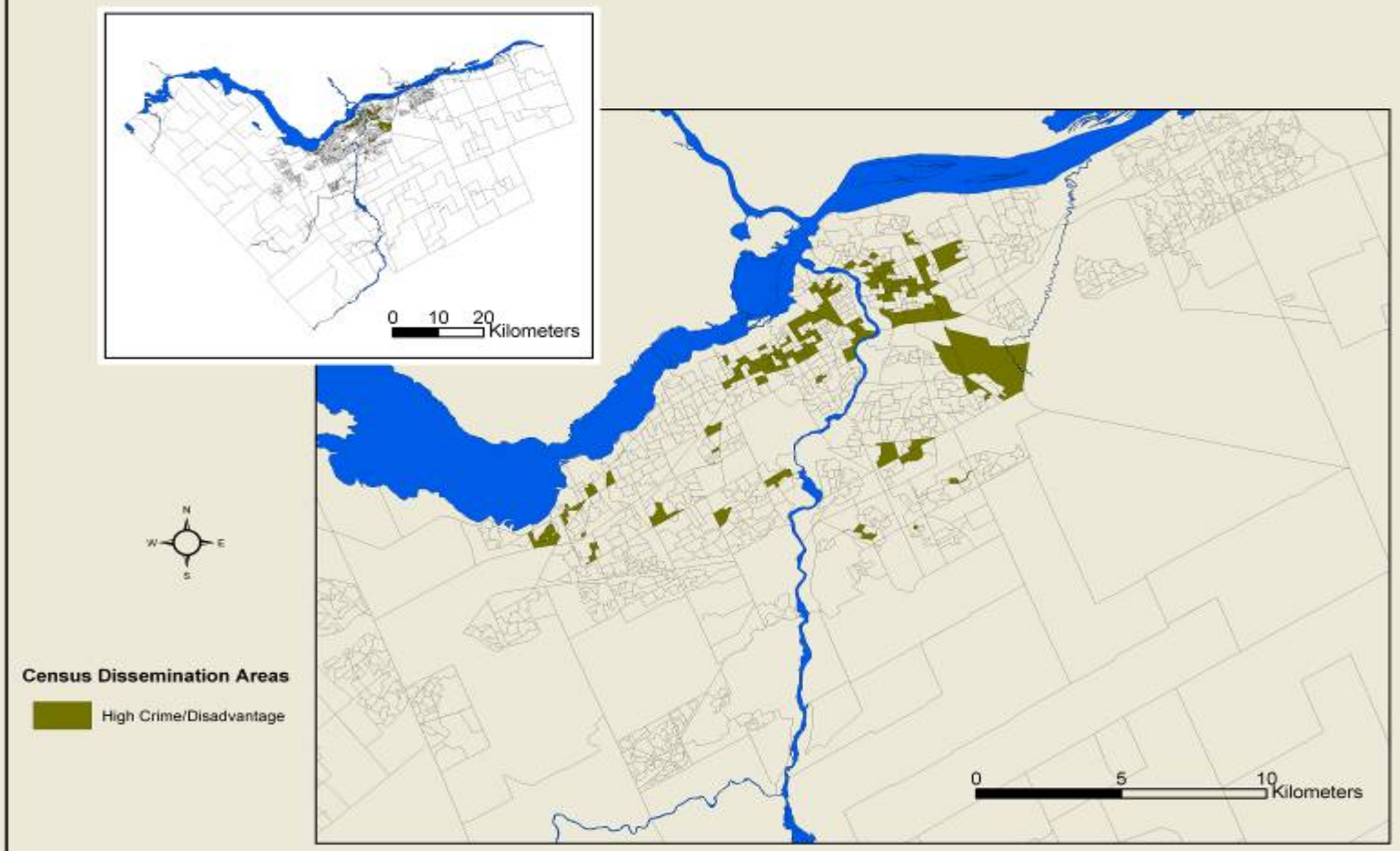


Figure 6.6 - Disadvantaged Areas - Ottawa 2001 (Top Quintile, n = 237 Census DAs)
0 10 20 Kilometers
N
W
E
S
Census Dissemination Areas
(% Low Income)
23% to 29% (Elevated)
30% to 49% (High)
above 50% (Severe)
0 5 10 Kilometers

Figure 6.7 - Intersection of High Crime (Total Offences) and Disadvantaged Areas - Ottawa 2001 (n = 98 Census DAs)



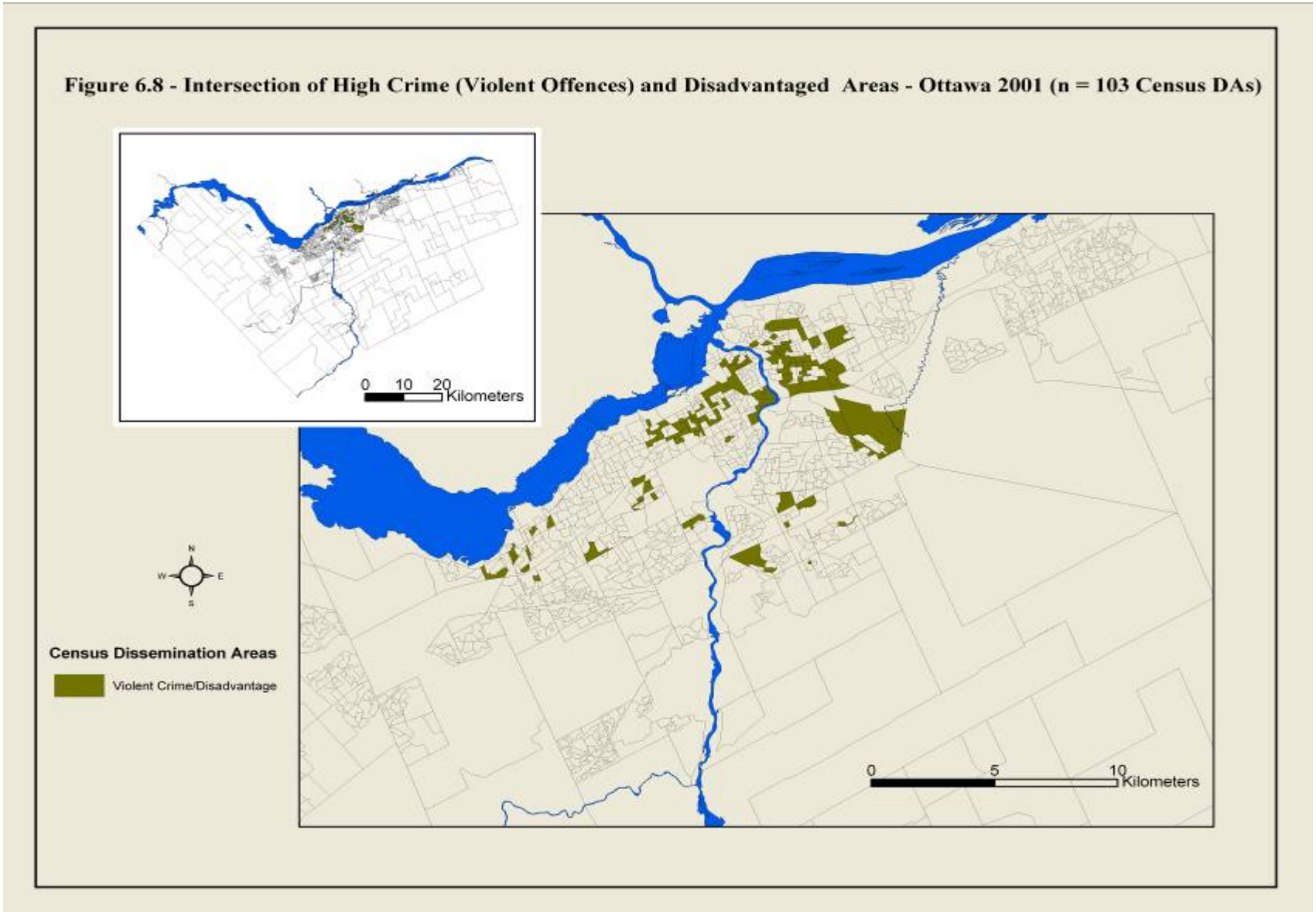


Figure 6.8 - Intersection of High Crime (Violent Offences) and Disadvantaged Areas - Ottawa 2001 (n = 103 Census DAs)
0 10 20 Kilometers
N
W
E
S
Census Dissemination Areas
Violent Crime/Disadvantage
0 5 10 Kilometers

Table 6.7
Mean Z-Scores for Crime and Selected Socio-Economic Variables

Variable	High Crime Areas (n=237)	Disadvantaged Areas (n=237)	Intersection 1 Total Off./Disad. (n=98)	Intersection 2 Violent/Disad. (n=103)
TOTAL_OFF	0.937	0.279	0.883	0.783
VIOLENT	1.038	0.495	1.284	1.310
MAJOR_PROP	1.012	0.313	0.976	0.803
MINOR_PROP	0.858	0.197	0.721	0.615
DRUGS	0.355	0.095	0.306	0.290
DIST_OTHER	0.908	0.396	0.999	0.872
TOT_YOUTH	0.083	0.485	0.486	0.500
REC_IMM	0.242	0.963	0.841	0.822
VIS_MIN	0.293	1.008	0.978	1.039
AVG_INC	-0.425	-1.036	-1.104	-1.129
AVG_FAM_INC	-0.479	-1.062	-1.130	-1.138
AVG_HSLD	-0.555	-1.110	-1.205	-1.205
LOW_INC	0.671	1.639	1.814	1.870
LFP_RATE	-0.216	-0.487	-0.538	-0.590
UNEMP	0.343	1.033	1.158	1.317
YOUTH_UNEMP	0.066	0.271	0.236	0.335
MOVERS_1_yr	0.423	0.761	0.850	0.749
SINGLE	0.831	1.159	1.430	1.389
LONE_PARENT	0.445	1.007	1.100	1.187
DWEL_OWNED	-0.674	-1.304	-1.392	-1.346
DWEL_RENTED	0.673	1.308	1.391	1.349
HOUSE	-0.535	-1.048	-1.134	-1.051
ROW_HOUSE	-0.063	0.156	0.043	0.030
APT_HIGH_RISE	0.312	0.803	0.757	0.673
APT_LOW_RISE	0.599	0.589	0.938	0.907
YOUTH_NO_SC	0.281	0.374	0.457	0.519
NO_HS_DIP	0.589	0.802	1.042	1.174
COLLEGE_DIP	-0.259	-0.337	-0.385	-0.390
UNIV_DEGREE	-0.227	-0.474	-0.526	-0.638

7. Study # 2 Findings: Neighbourhoods of Saskatoon

Section 7.1 – Descriptive Statistics

Table 7.1 displays the descriptive statistics for the 31 variables used in the study. The five crime variables were calculated as a rate per 1,000 population in each of Saskatoon's 55 residential neighbourhoods, a standard procedure in crime analysis. The remaining 26 census and development/planning variables were calculated at the ratio scale with the exception of two, average value of dwelling ($DWELLING) and average selling price of a dwelling (AVG_SELL_PRICE) which were left at the interval scale. The table shows that several of the variables, including those related to crime, have high coefficients of variation (the standard deviation divided by the mean) indicating greater dispersion of individual values around the mean. In particular, violent offences and drug offences have values that fluctuate widely among the 55 neighbourhoods, suggesting significant geographic disparity within Saskatoon. As very few of the 31 variables have "approximate" normal distributions coupled with the fact that they originate from different sources (police data, census indicators, development/planning information) each of the 31 variables was transformed into a Z-score for every neighbourhood in the dataset (55).

Section 7.2 - Principal Components Analysis

Table 7.2 shows that the PCA produced a 6-component solution, accounting for more than 84% of the total variance in the dataset, a large proportion indicating a significant degree of inter-correlation amongst the variables. Component 1 alone accounts for just under 47% of the total variance. An examination of the component loadings in Table 7.3 reveals that there is a positive association between crime (particularly violent and major property crimes) and socio-economic disadvantage in Saskatoon (Component 1). The characteristics of disadvantaged neighbourhoods are marked by high loadings on variables relating to mobility (SINGLE, MOVERS), ethnicity/family (ABORIGINAL, LONE_PARENT), education (NO_HS_DIP), income (GOVT_TRANSFER, LOW_INC_FAM), housing (DWEL_RENTED, MAJOR_REPAIRS) and labour force activity (UNEMP, YOUTH_UNEMP). A closer scrutiny of the table reveals that 3

variables on Component 1 have high loadings above 0.9 (ABORIGINAL, LONE_PARENT and LOW_INC_FAM) pointing to the presence of a particularly vulnerable group of people in Saskatoon with respect to both social deprivation and crime, namely Aboriginal single mothers living in low-income. Component 2 isolates the incidence of minor property and drugs offences in neighbourhoods with apartment high-rises and lower labour force participation. The remaining components identify several dimensions of socio-economic status and land-use characteristics in the city, including "park space" (Component 3), "housing value and education" (Component 4), and "density and old housing" (Component 5).

Section 7.3 - Multiple Regression Analysis

A step-wise multiple regression was performed on the Saskatoon neighbourhood dataset. Table 7.4 shows the results of the regression analysis between each of the 5 crime variables and a selection of neighbourhood indicators. When using SPSS for Windows for this procedure, tests were run to measure the level of multicollinearity among the independent variables. Each independent variable in the 5 regression models had tolerance values close to 0.1 and variance inflation factors (VIF) well below the rule-of-thumb value of 5 (Rogerson 2001, p.136). In fact, all were below 2 indicating low multicollinearity thus strengthening the predictive value of the regression models.

The table clearly demonstrates that there is a strong association between crime and neighbourhood characteristics in Saskatoon with each of the crime variables recording fairly high coefficients of multiple determination (R^2) and adjusted R^2. Regression model # 1 shows that four independent variables, 'youth not at school' (YOUTH_NO_SC), 'population that is single' (SINGLE), 'level of social assistance' (GOVT_TRANSFER) and 'apartment high-rises' (APT_HIGH_RISE), when taken together, account for nearly 70% (adjusted R^2 = .666) of the variation of total crime in Saskatoon's 55 residential neighbourhoods. The variable GOVT_TRANSFER recorded the highest beta coefficient (.339) among the four independent variables indicating that the level of social assistance in a community (in the form of residents who require welfare and other benefits as a major source of their income) can be considered as a significant predictor of crime. As can be expected, the need for social assistance is clearly

associated with socio-economic disadvantage and is related to factors such as low-income, unemployment, lower educational attainment, and rented housing.

Regression model # 2 points very clearly and directly to a troublesome association between violent crime and Aboriginal people in Saskatoon. The two independent variables explain more than 70% (adjusted R^2 = .715) of the variation in violent crime in the city's neighbourhoods with ABORIGINAL standing out as the key predictor recording a beta coefficient of .651. As seen in Table 4.5 above, assaults accounted for about 75% of violent crimes in Saskatoon in 2003. These results suggest that it is primarily Aboriginal people who are at risk of being victims of physical violence.

Regression model # 3 reveals that the most significant predictors of major property crime in Saskatoon are average home selling price (AVG_SELL_PRICE); people who have recently moved (MOVERS) and the presence of older homes (OLD_HOUSE). In other words, older neighbourhoods with low real-estate values appear to be vulnerable to major property offences particularly residential break and enter and motor vehicle theft. Regression model # 4, which measures minor property crime, has a slightly smaller adjusted R^2 value of .596 and identifies apartment high-rises (APT_HIGH_RISE), youth who are not at school (YOUTH_NO_SC) and dwellings that are rented (DWEL_RENTED) as the most important predictors. Offences related to minor theft (under $5000) and mischief are especially prevalent in neighbourhoods with these characteristics. Finally, drug offences in Saskatoon (Regression model # 5) appear to be influenced by the presence of apartment high-rises (APT_HIGH_RISE), low-income families (LOW_INC_FAM) and youth who are not at school (YOUTH_NO_SC). It should be noted, however, that drug offences accounted for less than 2% of all incidents in Saskatoon in 2003 (Table 4.5).

Section 7.4 - Mapping and GIS Analysis: Identifying Spatial Patterns of Crime and Neighbourhood Characteristics

ArcGIS was used to create a series of maps displaying the geographic distribution of criminal offences and selected neighbourhood characteristics in the City of Saskatoon. A classification

scheme was devised to rank neighbourhoods according to their crime rates per 1,000 population: 1. Lowest, 2. Low, 3. Moderate, 4. High and 5. Highest.

For example, as can be seen in Figure 7.2, the classification for 'Total Offences' is as follows with the numbers in parentheses denoting the crime rate: 1. Lowest (0-35); 2. Low (35-100); Moderate (100-200); High (200-300) and Highest (300-600). For the purposes of this study, High Crime Areas (HCAs) are defined as any neighbourhood that is placed in the 'High' or 'Highest' categories. This classification scheme was adjusted to correspond with the crime rates for each of the four remaining offence types.

The map in Figure 7.2 shows that there is a noticeable presence of 'Moderate' and HCAs in the south and central sections of Saskatoon, particularly on the west side of the South Saskatchewan River. In fact, all of the HCAs are located there and most are clustered in and around the inner city including the 4 with the 'Highest' crime rates in 2003 – the Central Business District (546), Pleasant Hill (450), Kelsey-Woodlawn (374) and Riversdale (347). These 4 neighbourhoods are adjacent or very close to several other HCAs including Caswell Hill (296), King George (243), Westmount (234), and Mayfair (209). The two remaining HCAs are Confederation Park (227) located on the western edge of Saskatoon and the Airport Business Area (281) situated in the northwestern section of the city. While there is clearly a presence of elevated crime rates in the western part of the city, Figure 7.2 also reveals an interesting pattern of neighbourhoods with 'Moderate' crime rates adjacent to 8th Street, a major commercial thoroughfare on the east side of the South Saskatchewan River, pointing to a possible geographical association between crime and mobility/accessibility. These neighbourhoods include Nutana (150), Buena Vista (120), Varsity View (121), Grosvenor Park (147), Greystone Heights (104) and Brevoort Park (162).

Figure 7.3 is a map illustrating the distribution of violent offences in Saskatoon and it is immediately apparent that these crimes are far more concentrated in the west side of the city with all HCAs and all but 3 'Moderate' crime areas located there. Similar to total offences, there is a noticeably tight clustering of HCAs in and around the inner city including the 3 neighbourhoods with the highest violent crime rates – Pleasant Hill (131), Riversdale (105) and the Central Business District (85). Adjacent to these are other violent HCAs including King George (43),

Meadowgreen (35), Mont Royal (36), Westmount (46) Caswell Hill (41); further to the west, Confederation Suburban Centre (36) and Confederation Park (38) and just to the north, Kelsey-Woodlawn (58) and the Airport Business Area (54).

'Major Property' offences (Figure 7.4) display a similar pattern as 'Total Offences' with a cluster of HCAs visible in and around the core area and 'Moderate' and 'Low' crime areas evident in the southeast portion of Saskatoon. While 'Minor Property' offences (Figure 7.5) have a somewhat more dispersed pattern, all the HCAs are again located in the west side of the city. However, compared to 'Major Property' offences, a number of suburban residential neighbourhoods have slightly higher rates of minor property crimes including several in the southeast (Wildwood, Lakeview, Lakeridge and Briarwood), in the northeast (Sutherland, Forest Grove, Erindale, Arbor Creek, and Silverspring) and just to the northwest of the South Saskatchewan River (River Heights, Lawson Heights and Silverwood Heights). Finally, while 'Drugs' accounted for less than 2% of all offences in 2003, these crimes display a similarly dispersed pattern (Figure 7.6).

Figure 7.8 is a map showing the geographic distribution of low-income families in Saskatoon. Due to the serious socio-economic problems related to families living in low-income, including higher unemployment, lower educational attainment and greater dependency on social assistance, it is appropriate to use this census indicator as composite measure of disadvantage. For the objectives of this study, a 'disadvantaged' area is defined as any neighbourhood having more than 20% of its families living in low-income. The map indicates that a socio-economic divide does exist in Saskatoon with 13 of the 16 'disadvantaged' neighbourhoods located in a relatively tight cluster in the west side of the city, particularly in and surrounding the core area. Several of these neighbourhoods have strikingly high rates of low-income families including the Airport Business Area (62.5%), Confederation Suburban Centre (57%), Pleasant Hill (57%) and Riversdale (51%). Other 'disadvantaged' neighbourhoods on the west side of the river include King George (34%), Holiday Park (21%), Meadowgreen (35%), Westmount (37%), Caswell Hill (26%), Kelsey-Woodlawn (29%), Mayfair (26%), Massey Place (27%) and Confederation Park (21%). While the east side of the river is generally more prosperous, there are 3 suburban neighbourhoods that can be classified as 'disadvantaged'- Grosvenor Park (20%), Nutana

Suburban Centre (21%) and Sutherland (21%). It is evident that there is a geographical association between disadvantaged neighbourhoods and crime in Saskatoon. An inspection of the maps in Figures 7.2 and 7.7 indicates that 9 of the 16 disadvantaged neighbourhoods are also High Crime Areas (HCAs) and conversely that all but one of the HCAs are disadvantaged (see table below).

Neighbourhood	% Low-Income Families	Total Crime Rate
Airport Business Area	62	282
Pleasant Hill	56	450
Riversdale	51	348
Westmount	37	235
King George	34	244
Kelsey-Woodlawn	29	374
Mayfair	26	209
Caswell Hill	26	296
Confederation Park	21	228

As stated, Aboriginal people in Western Canada, including those living in urban areas, have been found to experience greater levels of socio-economic disadvantage and to have greater contact with the justice system, particularly as victims but also as offenders (La Prairie 2002). However, it is important to point out that a study conducted by the Canadian Centre for Justice Statistics (2000) found that in Saskatchewan, crime rates on reserves were double those in urban and rural areas. According to the 2001 Census, Saskatoon has a sizeable Aboriginal population (20,275) comprising 9% of the city's total. Between 1996 and 2001, the Aboriginal population grew by 25.5% compared to 1% for non-Aboriginals. Overall, Saskatoon has a relatively strong economy and in 2001 recorded an unemployment rate of 6.7%. However, Aboriginal residents have fared poorly in the labour market with a jobless rate of 22%. Even more striking is unemployment among North American Indian males at 33%. Furthermore, the 2001 Census shows that the average income in Saskatoon is $28,045 while for Aboriginal peoples it is $17,667 and for North American Indians $14,513. These statistics point to a high level of socio-economic disadvantage among the city's Aboriginal residents.

Figure 7.8 is a map showing the distribution of Aboriginal residents in Saskatoon's neighbourhoods. While it is clearly visible that there are more Aboriginal people living on the west side of the river, it is important to point out that there is not a high level of segregation in

the city. A reasonable measure of ethnic segregation is when more than 30% of a neighbourhood's population is made up of one particular group of people sharing an identifiable characteristic such as race or ancestry. As can be seen Figure 7.8, only 3 neighbourhoods have more than 30% Aboriginal residents - Pleasant Hill (48%), Riversdale (43.5%) and Confederation Suburban Centre (37%). In addition to these, just 6 other neighbourhoods have 20% or more Aboriginal residents – Meadowgreen (28%), Airport Business Area (27%), Westmount (23%), Caswell Hill (25.5%), Massey Place (21%) and Mayfair (20%). It is clear, then, that the majority of residents in all of Saskatoon's neighbourhoods are non-Aboriginal suggesting that issues of victimization, crime and socio-economic status impact a much wider segment of city's population. However, the regression analysis (Table 7.4) indicates that there is a strong relationship between Aboriginal people and violent crime in Saskatoon. An examination of the maps in Figures 7.3 and 7.8 reveals that 7 of the 9 neighbourhoods with Aboriginal populations greater than 20% are also violent High Crime Areas (see table below).

Neighbourhood	% Aboriginal	Violent Crime Rate
Pleasant Hill	48.4	131
Riversdale	43.5	105
Confederation SC	37.4	36
Meadowgreen	28.0	35.5
Airport Business Area	26.7	54
Westmount	22.8	46
Caswell Hill	21.5	41.5

The two exceptions are Mayfair, located just north of the city's core, which is a 'Moderate' violent crime area and Massey Place, just west of the core, which is a 'Low' violent crime area.

Section 7.5 - Spatial Autocorrelation

Table 7.5 shows that each of the 5 crime variables has a calculated Moran's I value greater than 0 and a significant Z value (at the 99% confidence interval) indicating positive spatial autocorrelation. The most spatially concentrated crimes in Saskatoon are major property offences (I = 0.188, Z = 7.90) followed by violent offences (I = 0.125, Z = 5.49) and total offences (an aggregate variable) (I = 0.118, Z = 5.20) meaning that neighbourhoods with high rates of crime tend to be located close to other neighbourhoods with high rates of crime. The least spatially concentrated or most dispersed crimes are minor property offences (I =0.065, Z=3.21) and drug

offences (I=0.064, Z=3.15). The table also indicates that low-income families (I=0.112, Z=4.99) and Aboriginal residents (I=0.185, Z=7.78) are also geographically highly concentrated in Saskatoon compared to the distribution of the population as a whole (I=0.011, Z=1.13).

Moran's I was re-calculated for each variable using the 'adjustment for small distances' option in CrimeStat, in which the distance weights between two locations W_{ij} can never be greater than 1 mile. This ensures that "I" won't be excessively large for neighbourhoods (as represented by points) that are close together or adjacent. As shown in Table 7.5, while the adjusted Moran's I values are smaller than the original values, the first three crime variables (total, violent and major property) are positively and significantly spatially autocorrelated as are low-income families and Aboriginal residents.

Section 7.6 - Characteristics of High Crime Areas

Table 7.6 shows the mean values for each variable used in the study according to three groupings:

1. All residential neighbourhoods (n=55).
2. High Crime Areas, total offences (n=10).
3. High Crime Areas, violent offences (n=12).

The table reveals that there are considerable socio-economic disparities between HCAs and overall conditions in Saskatoon's neighbourhoods. HCAs have, on average, much higher proportions of single people, people who have recently moved, Aboriginal residents and youth who are not attending school. Low educational attainment is an important problem in HCAs with an average of more than 40% of residents aged 20 and over having not finished high school compared to the overall average of about 27%. Furthermore, the proportion of residents with university degrees is less than half that of the overall average. In addition, HCAs have residents who are far more dependent on government transfers and are more likely to be living in low-income. The rate of low-income families is more than double that of the neighbourhood average. Table 7.6 also indicates that there are noticeable disparities in housing conditions with HCAs having substantially larger proportions of renters as well as old housing and dwellings needing major repairs. The average value of dwellings and average home selling price are also markedly

lower in these areas. Finally, employment conditions are poorer in HCAs as evidenced by much lower rates of participation and significantly higher levels of unemployment. These socio-economic problems are particularly acute in the five HCAs listed in Table 7.7 all of which are located on the west side of the South Saskatchewan River in and around core area.

Section 7.7 - Summary of Findings and Policy Issues for Saskatoon

- In 2003, Saskatoon had the highest crime rate among all Census Metropolitan Areas (CMAs) in Canada. It also had the highest rate of violent crimes and the second highest rate of property crimes.
- Between 1999 and 2003, there was a steady increase in Saskatoon's crime rate with a particularly sharp rise of 16% between 2002 and 2003. Violent and property crimes rates also grew.
- In 2003, just over 50% of all crimes were property related with 'theft under $5,000' and 'break and entering' accounting for 80% of all the incidents in this category. Violent offences represented 11% of all crimes in Saskatoon, with 'assault' (75%) being the most frequent. Vandalism is also a problem in the city with 5,139 incidents recorded in 2003 within the offence type 'Mischief under $5,000 (property damage)'.
- The statistical analysis found that there is a relationship between crime and certain socio-economic characteristics in Saskatoon's 55 residential neighbourhoods. For instance, the principal components analysis (PCA) indicated that there is a strong association between violent and major property offences and vulnerable segments of the population, most notably Aboriginal people, lone-parents and low-income families.
- The multiple regression analysis confirmed the findings of the PCA and established several predictors of crime. The overall crime rate in a neighbourhood was found to be significantly influenced by youth not at school, single residents and residents relying on government transfers.
- The regression analysis also indicated a strong relationship between violent crime and Aboriginal residents in Saskatoon suggesting that this group is more likely to be victims of these crimes, particularly in certain inner city neighbourhoods.
- The mapping of crime variables revealed a visible clustering of High Crime Areas (HCAs) in the west side of the city, particularly in the core area. This was especially

evident for violent HCAs. By comparison, minor property and drug offences displayed a more dispersed pattern.

- There was a similar geographic clustering of low-income families and Aboriginal residents in and surrounding the core area.
- While more Aboriginal and low-income people live in the west side of the city, ethnic segregation is not a prominent feature of Saskatoon's urban social geography. There are only 3 neighbourhoods where Aboriginal residents comprise more than 30% of the total population and none have more than 50%, suggesting that issues of crime and victimization effect a wider segment of the population in HCAs.
- There is a geographic association between HCAs and neighbourhoods with higher proportions of low-income families and Aboriginal residents.
- HCAs were also found to have higher proportions of single people and residents who have recently moved, significantly lower levels of educational attainment, poorer quality and older housing and higher unemployment.

The principal findings of this study can contribute to a number of broad policy initiatives aimed at crime prevention, social upgrading and community development. It is apparent that Saskatoon's high crime rate is due, in large part, to a high concentration of crime in several neighbourhoods including the Central Business District (CBD), Pleasant Hill, Riversdale, Caswell Hill and King George. The majority of crime in the CBD is related to minor property offences, particularly theft. This is due to the fact that downtown area presents ample criminal opportunity as it contains significant retail activity and office space. Most CBDs in Canada have higher crime rates for this reason. Therefore, crime prevention strategies should be adopted where police work in collaboration with the downtown business community to reduce theft and other minor property offences by enhancing security and surveillance methods. The Saskatoon Police Service currently has a 'Business Security Program'.

In other HCAs, particularly the inner city neighbourhoods listed above, policy efforts should focus on social development in four related areas: 1. housing quality and affordability, 2. education and training, 3. youth programs and services and 4. Aboriginal violence. The City of Saskatoon has initiated several Local Area Plans (LAPs), which involve community consultation to evaluate neighbourhood issues and develop policies to guide future growth and improve

quality of life. For example, the Pleasant Hill LAP was completed in 2002 and identified a number of persistent problems in the neighbourhood such as a deteriorating infrastructure, poor housing quality, poverty and increasing crime. Several recommendations were made including investment in infrastructure and road maintenance, zoning changes to encourage commercial and residential development, limiting the number of pawn shops, conducting a community Safety Audit and upgrading park, recreation and heritage facilities (City of Saskatoon 2002). LAPs have been completed for other inner city neighbourhoods including Caswell Hill and King George and several more are either currently underway (Riversdale) or planned for the near future (City Park and Westmount).

In addition to the LAPs, the City of Saskatoon has developed a series of housing policies. Although the city does not own housing or manage housing programs, it is promoting affordable housing options and is partnering with organizations, including several in the private sector, to restore older housing units needing repair particularly in the inner city. An adequate supply of good quality affordable housing is at the cornerstone of creating stable neighbourhoods.

With respect to community-based initiatives, the police and the city have opened several youth drop-in centres, including one planned for Pleasant Hill and have initiated programs aimed at discouraging youth participation in gangs. According to the Criminal Intelligence Service Saskatchewan (2005) gangs, particularly Aboriginal gangs are a growing and serious problem in Saskatoon as they are involved in violence, drug dealing, recruitment and intimidation and have injected fear into inner city neighbourhoods. Efforts should to be stepped up in these communities to provide alternatives for youth at risk of becoming involved in gangs. For example, the work done in LAPs can be used as a catalyst for expanding youth services and programs particularly related to parks, recreation, arts, culture and education.

However effective these programs may be in reducing levels of crime and improving quality of life, it is clear that the City of Saskatoon needs greater assistance from higher levels of government, particularly at the federal level. An important feature of Saskatoon, like other cities in Western Canada, is the large in-migration of Aboriginal people from reserves and rural areas. In most cases, the migration from reserves means Registered Indians are no longer under the

jurisdiction of the federal government and the provision of social services to them becomes the responsibility of provincial and municipal governments. As stated, research by La Prairie (2002) indicates that certain cities, including Saskatoon, are high contributors to Aboriginal over-representation in the justice system. The federal government should expand its Urban Aboriginal Strategy (UAS) to provide additional financial assistance and to work in collaboration with the Province of Saskatchewan and the City of Saskatoon to upgrade the supply of affordable housing and to improve education and training options especially for young inner city Aboriginals. The UAS was introduced in 1998 and is currently involved in pilot projects in several cities including Saskatoon. With all three levels of government acting in cooperation the goal should be to improve the standard of living of Aboriginals and Non-Aboriginals living in disadvantaged neighbourhoods and over time to reduce levels of violence and contact with the justice system.

Table 7.1
Descriptive Statistics (n=55)

Variable	Minimum	Maximum	Mean	Std. Deviation	Coefficient o Variation
TOTAL_OFF	16.4	546.4	128.9	111.2	0.86
VIOLENT	0.3	131.3	19.4	26.2	1.35
MAJOR_PROP	3.7	125.6	35.5	30.3	0.85
MINOR_PROP	10.9	345.0	70.8	58.4	0.82
DRUGS	0.0	23.1	3.2	3.9	1.22
POP_DENS	2.3	45.0	25.0	8.9	0.36
SINGLE	12.4	61.4	35.9	10.1	0.28
MOVERS	7.3	51.7	21.1	8.7	0.41
ABORIGINAL	0.0	48.4	10.9	10.4	0.95
YOUTH_NO_SC	19.5	75.9	42.2	10.7	0.25
NO_HS_DIP	10.3	62.4	26.7	12.3	0.46
COLLEGE_DIP	5.8	22.1	15.6	3.5	0.22
UNIV_DEGREE	1.5	48.0	18.6	11.5	0.62
GOVT_TRANSFER	3	49	15.4	9.8	0.64
LONE_PARENT	4.1	62.2	20.2	11.1	0.55
LOW_INC_FAM	0.0	62.5	16.7	14.3	0.86
LOW_INC_IND	0.0	70.2	36.5	16.3	0.45
HOUSE	0.0	100.9	65.4	25.2	0.39
APT_HIGH_RISE	0.0	85.4	4.4	13.5	3.07
DWEL_OWNED	4.7	100.0	63.1	21.5	0.34
DWEL_RENTED	0.0	95.3	36.8	21.3	0.58
MAJOR_REPAIRS	0.0	30.2	6.7	5.6	0.84
OLD_HOUSE	0.0	85.7	30.4	31.4	1.03
$DWELLING	69,065	246,786	123477	35602	0.29
LFP_RATE	13.9	85.3	66.7	13.1	0.20
UNEMP	2.5	27.5	8.1	5.5	0.68
YOUTH_UNEMP	0.0	45.5	13.2	9.0	0.68
AVG_SELL_PRICE	53,130	225,624	119830	35930	0.30
PARK_ACRES	0.6	33.4	8.2	6.4	0.78
PERS_PARK_ACRE	11.7	896.7	189.3	143.7	0.76
VEH_PERS	0.2	1.3	0.6	0.2	0.33

Table 7.2
Explanatory Power of the Principal Components Analysis

Component	Eigenvalue	% Total Variance	Cumulative %
1	13.6	46.8	46.8
2	3.6	12.7	59.6
3	2.3	7.9	67.5
4	2.0	7.0	74.6
5	1.6	5.5	80.1
6	1.1	4.0	84.2

Table 7.3 Component Loadings
Rotation Method: Quartimax with Kaiser Normalization
Saskatoon – Crime, Census and Development/Planning Data

Variable	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5	Comp. 6
VIOLENT	**0.792**	0.428	0.060	0.008	-0.017	0.371
MAJOR_PROP	**0.789**	0.329	0.030	-0.169	0.262	0.243
MINOR_PROP	0.517	**0.726**	0.095	-0.054	0.218	0.130
DRUGS	0.492	**0.756**	0.189	-0.031	0.210	0.168
POP_DENS	-0.107	-0.044	0.352	-0.135	-0.802	-0.095
SINGLE	**0.762**	-0.098	0.406	0.145	0.167	-0.251
MOVERS	**0.786**	0.133	-0.063	0.394	0.183	-0.134
ABORIGINAL	**0.916**	-0.038	-0.007	-0.026	-0.147	0.266
YOUTH_NO_SC	**0.621**	0.082	0.090	-0.338	0.361	0.130
NO_HS_DIP	**0.663**	0.355	-0.341	-0.432	-0.077	0.153
COLLEGE_DIP	-0.467	-0.523	0.217	-0.125	0.189	0.027
UNIV_DEGREE	-0.568	0.034	0.260	**0.617**	0.071	-0.255
GOVT_TRANSFER	**0.701**	0.439	-0.379	-0.248	-0.019	-0.102
LONE_PARENT	**0.916**	-0.170	0.011	-0.077	-0.021	-0.010
LOW_INC_FAM	**0.969**	-0.048	-0.048	0.056	0.007	-0.031
LOW_INC_IND	**0.765**	0.138	0.071	0.001	-0.091	-0.453
HOUSE	-0.344	-0.550	0.242	-0.157	0.119	**0.622**
APT_HIGH_RISE	-0.032	**0.906**	-0.110	0.034	-0.056	-0.145
DWEL_RENTED	**0.706**	0.437	-0.009	0.125	-0.004	-0.487
MAJOR_REPAIRS	**0.818**	-0.093	0.170	-0.019	0.366	-0.009
OLD_HOUSE	0.468	0.029	0.358	-0.169	**0.601**	-0.093
DWELLING$	**-0.686**	0.065	-0.024	**0.662**	0.036	0.101
LFP_RATE	-0.379	**-0.632**	0.487	0.224	-0.003	0.172
UNEMP	**0.889**	0.098	-0.135	0.237	-0.140	0.025
YOUTH_UNEMP	**0.706**	-0.222	-0.014	0.377	-0.104	0.097
AVG_SELL_PRICE	**-0.759**	-0.098	-0.032	0.556	-0.050	0.026
PARK_ACRES	0.030	0.086	**-0.801**	-0.197	-0.031	-0.119
PERS_PARK_ACRE	0.059	-0.062	**0.785**	-0.166	-0.170	-0.059
VEH_PERS	**-0.771**	0.088	0.013	0.176	0.202	0.400

Component 1 – "Major Offences/Aboriginal Disadvantage";
Component 2 – "Minor Offences/Labour Force"; **Component 3** – "Park Space";
Component 4 – "University/Value of Dwelling"; **Component 5** – "Old Housing";
Component 6 – "Single Dwellings"

Table 7.4
Results of Multiple Regression – Saskatoon Neighbourhoods (n=55)*

Regression # 1	
Dependent Variable	Total Offences
R	.831
R^2	.690
Adjusted R^2	.666
Independent Variables (beta coefficients)	
YOUTH_NO_SC	.284
SINGLE	.302
GOVT_TRANSFER	.339
APT_HIGH_RISE	.327

Regression # 2	
Dependent Variable	Violent Offences
R	.852
R^2	.726
Adjusted R^2	.715
Independent Variables (beta coefficients)	
ABORIGINAL	.651
GOVT_TRANSFER	.284

Regression # 3	
Dependent Variable	Major Property Offences
R	.843
R^2	.710
Adjusted R^2	.693
Independent Variables (beta coefficients)	
AVG_SELL_PRICE	-.521
MOVERS	.345
OLD_HOUSE	.180

Regression # 4	
Dependent Variable	Minor Property Offences
R	.786
R^2	.618
Adjusted R^2	.596
Independent Variables (beta coefficients)	
APT_HIGH_RISE	.448
YOUTH_NO_SC	.399
DWEL_RENTED	.251

Regression # 5	
Dependent Variable	Drug Offences
R	.830
R^2	.688
Adjusted R^2	.670
Independent Variables (beta coefficients)	
APT_HIGH_RISE	.637
LOW_INC_FAM	.308
YOUTH_NO_SC	.291

* $p<0.01$, all beta coefficients are significant at the 99% confidence level.

Figure 7.1
City of Saskatoon Neighbourhoods

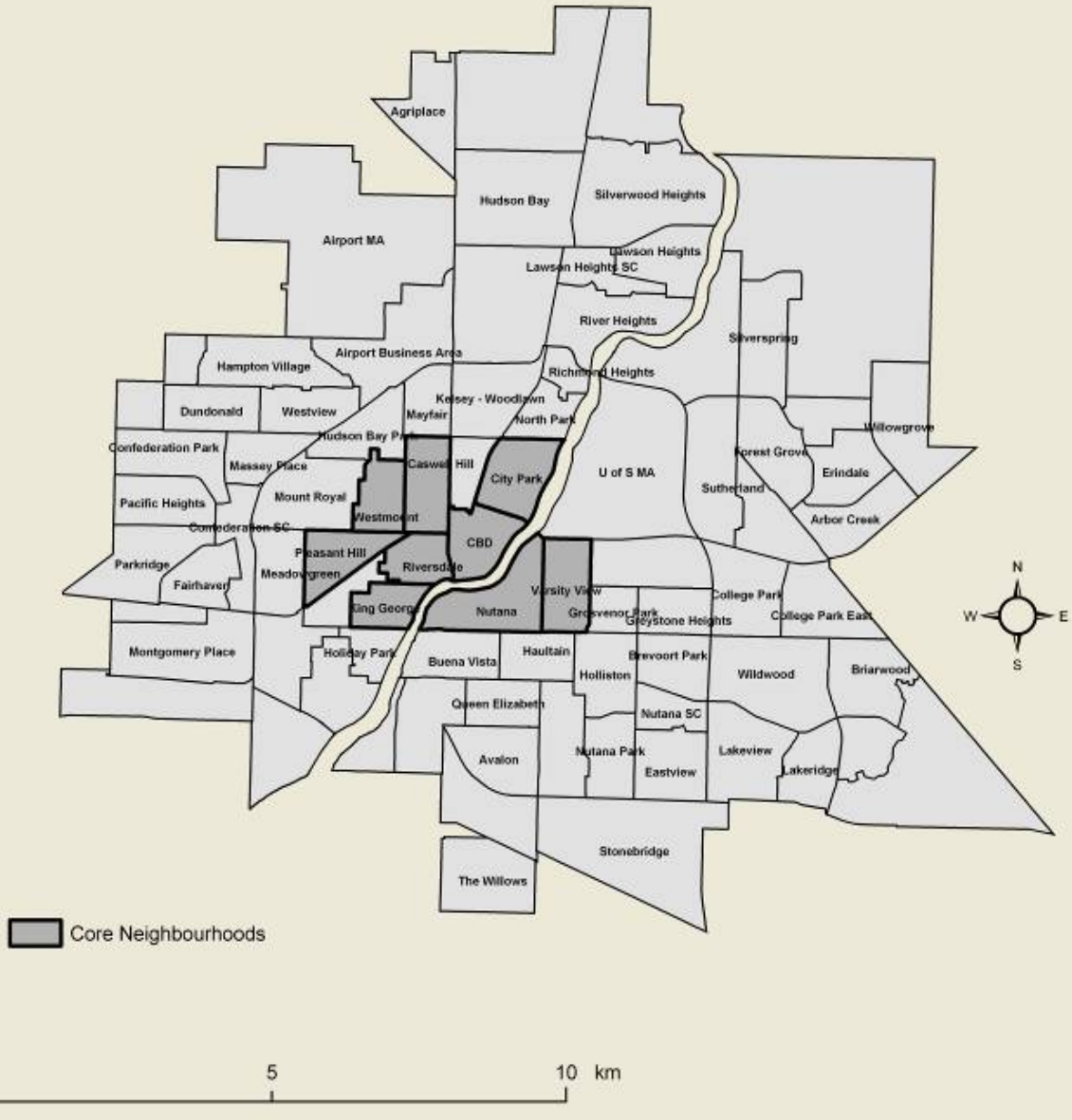


Figure 7.2
City of Saskatoon, Total Criminal Code Offences, 2003
Rate per 1,000 Population

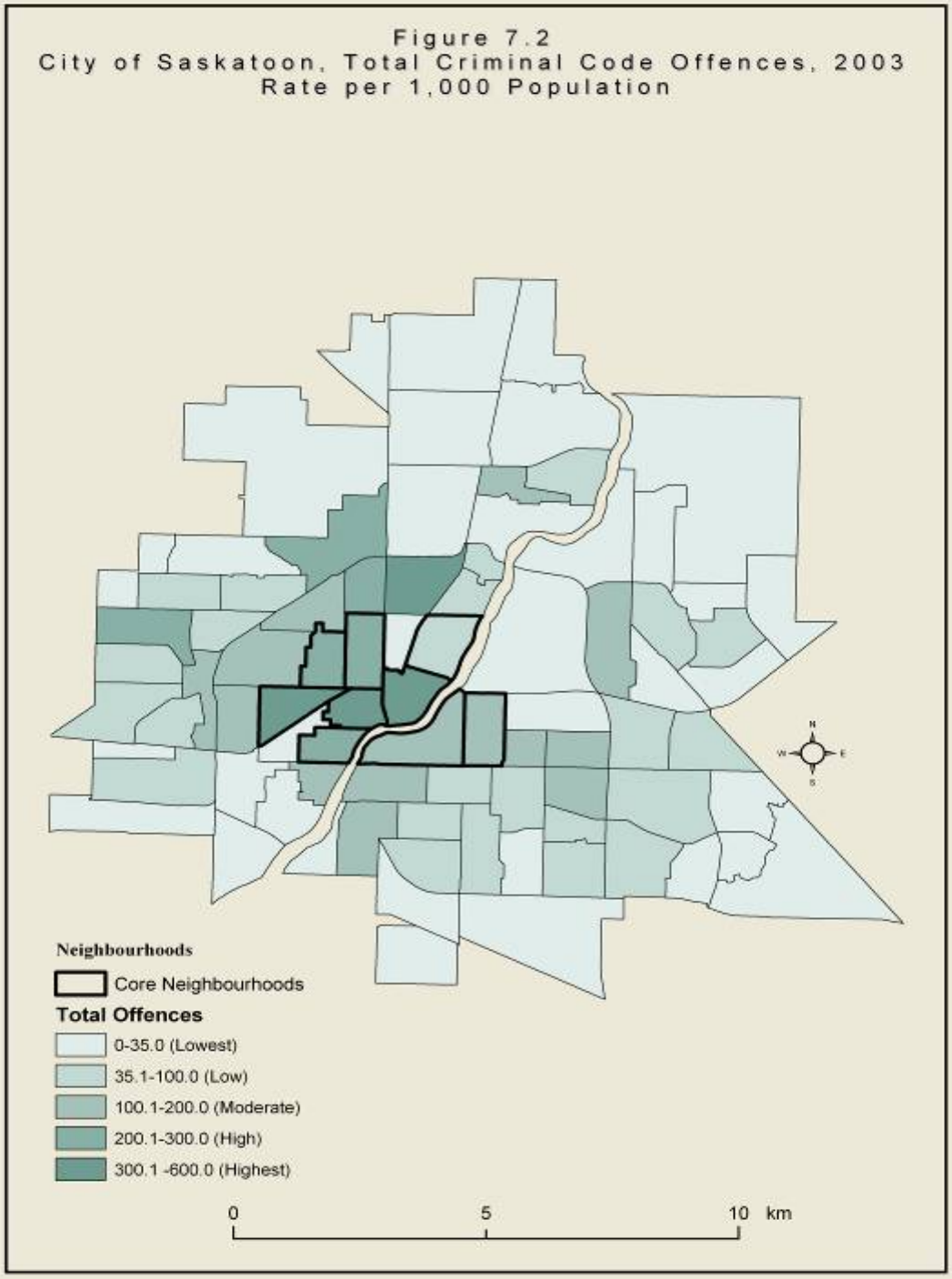


Figure 7.3
City of Saskatoon, Violent Offences, 2003
Rate per 1,000 Population

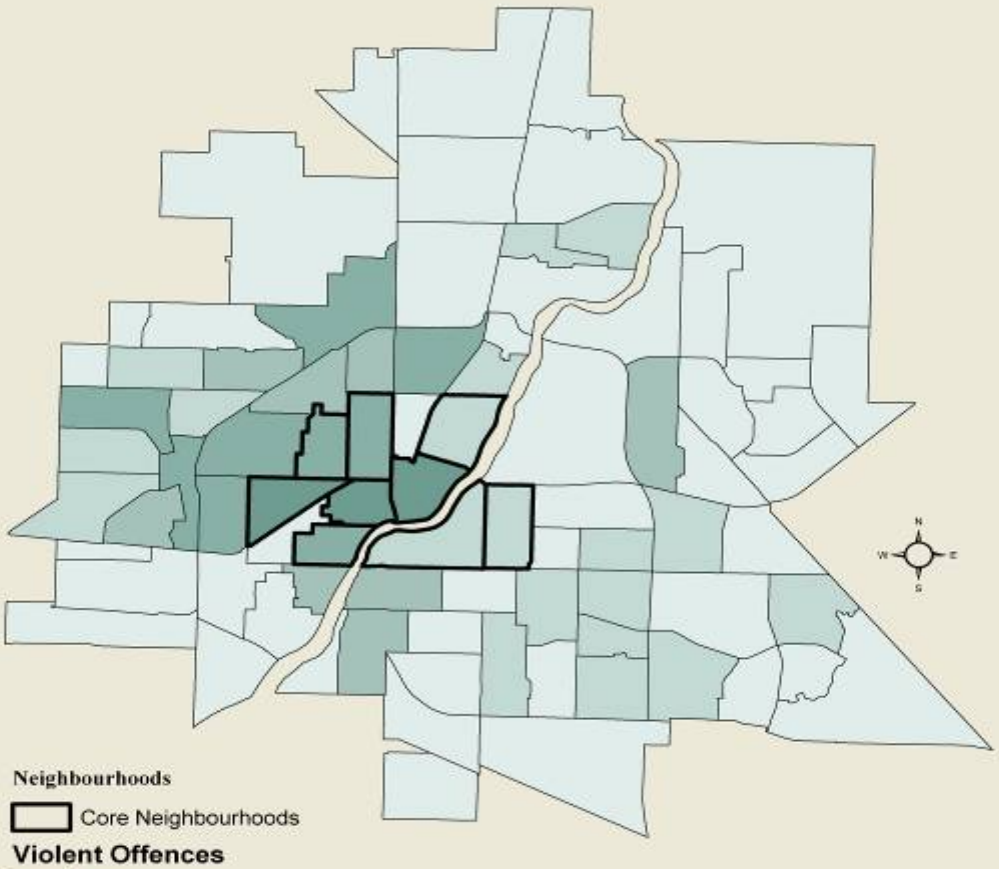


Figure 7.4
City of Saskatoon, Major Property Offences, 2003
Rate per 1,000 Population

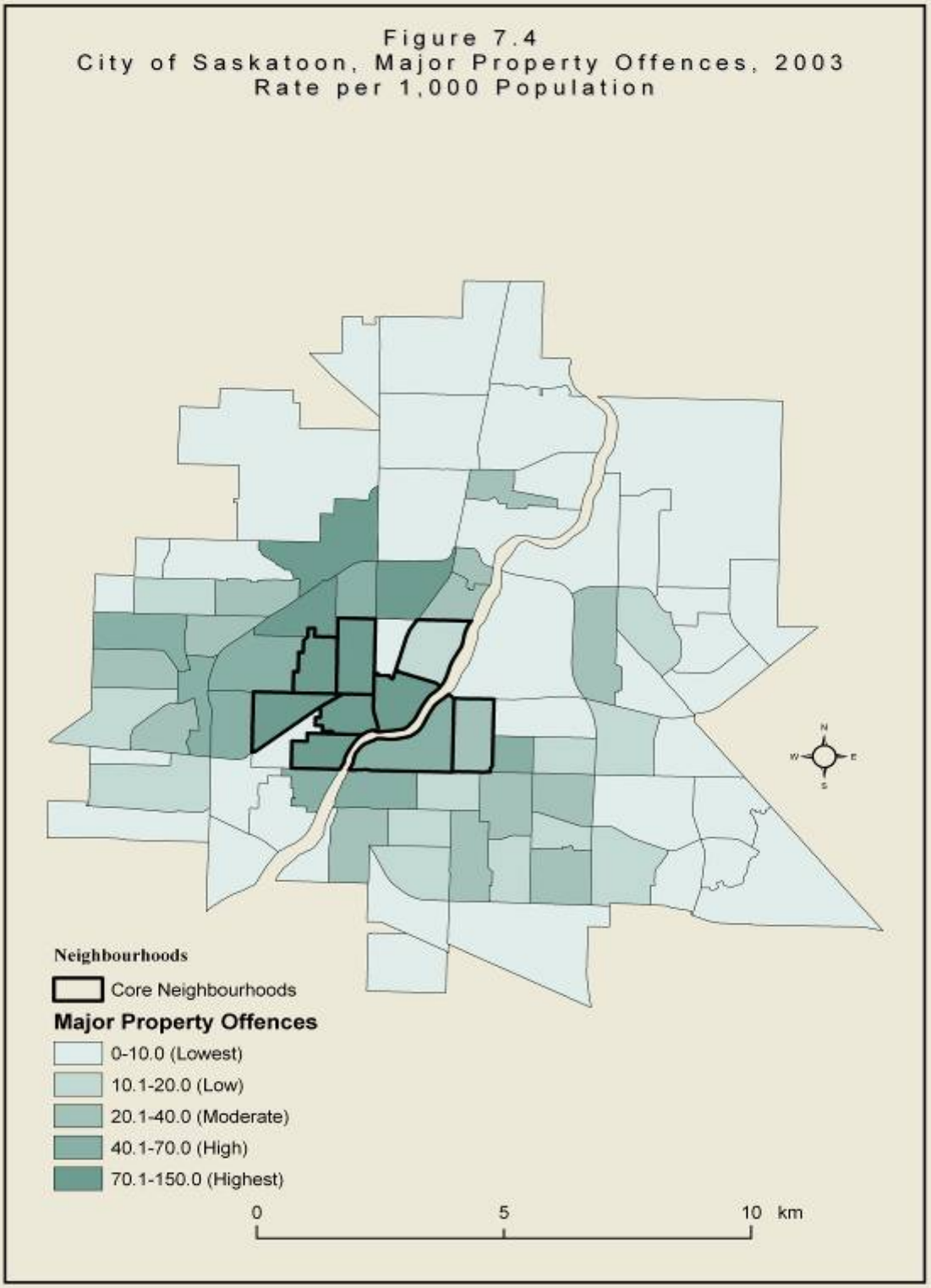


Figure 7.5
City of Saskatoon, Minor Property Offences, 2003
Rate per 1,000 Population

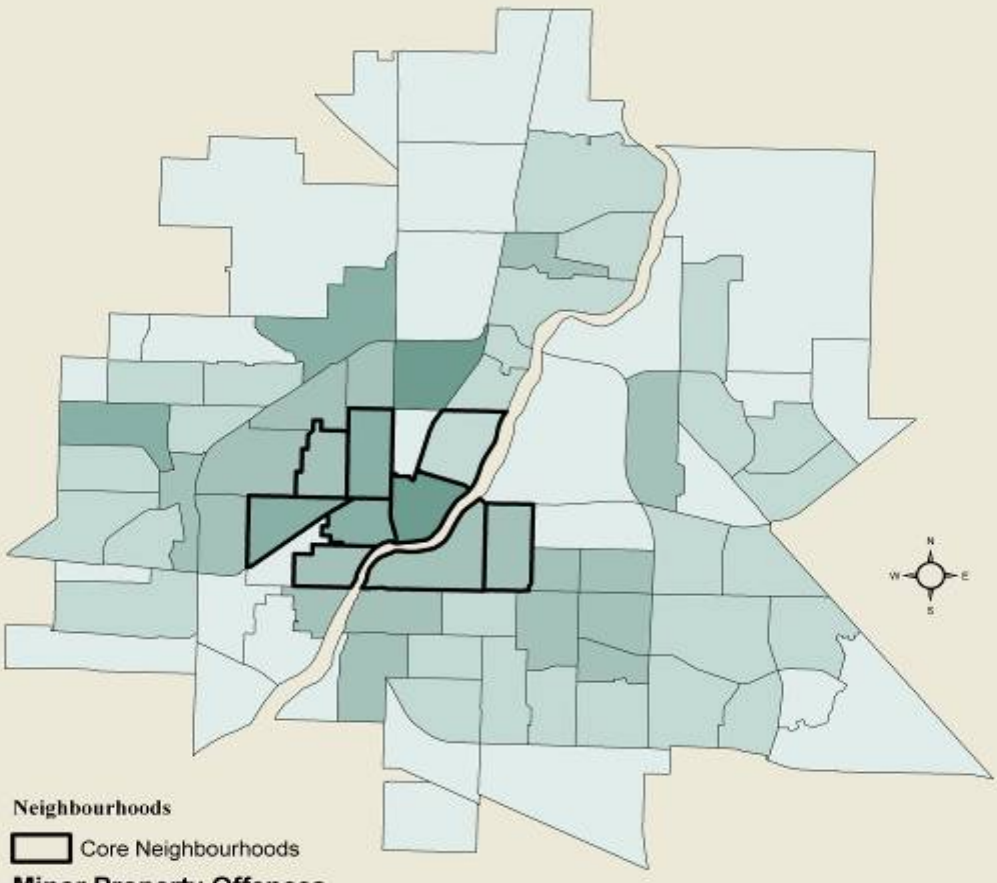


Figure 7.6
City of Saskatoon, Drug Offences, 2003
Rate per 1,000 Population

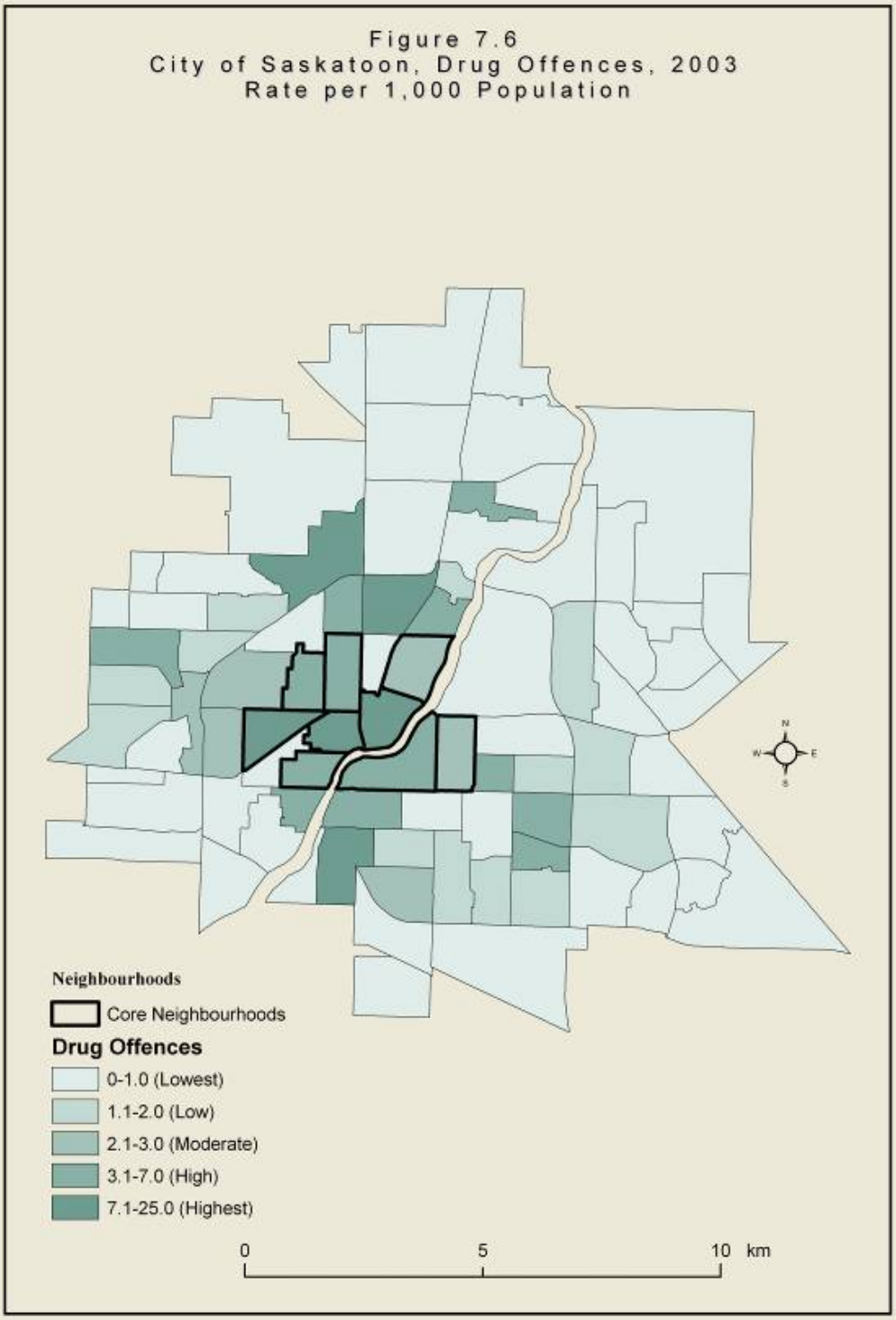


Figure 7.7
Saskatoon, Percentage of Low-Income Familes
2001 Census

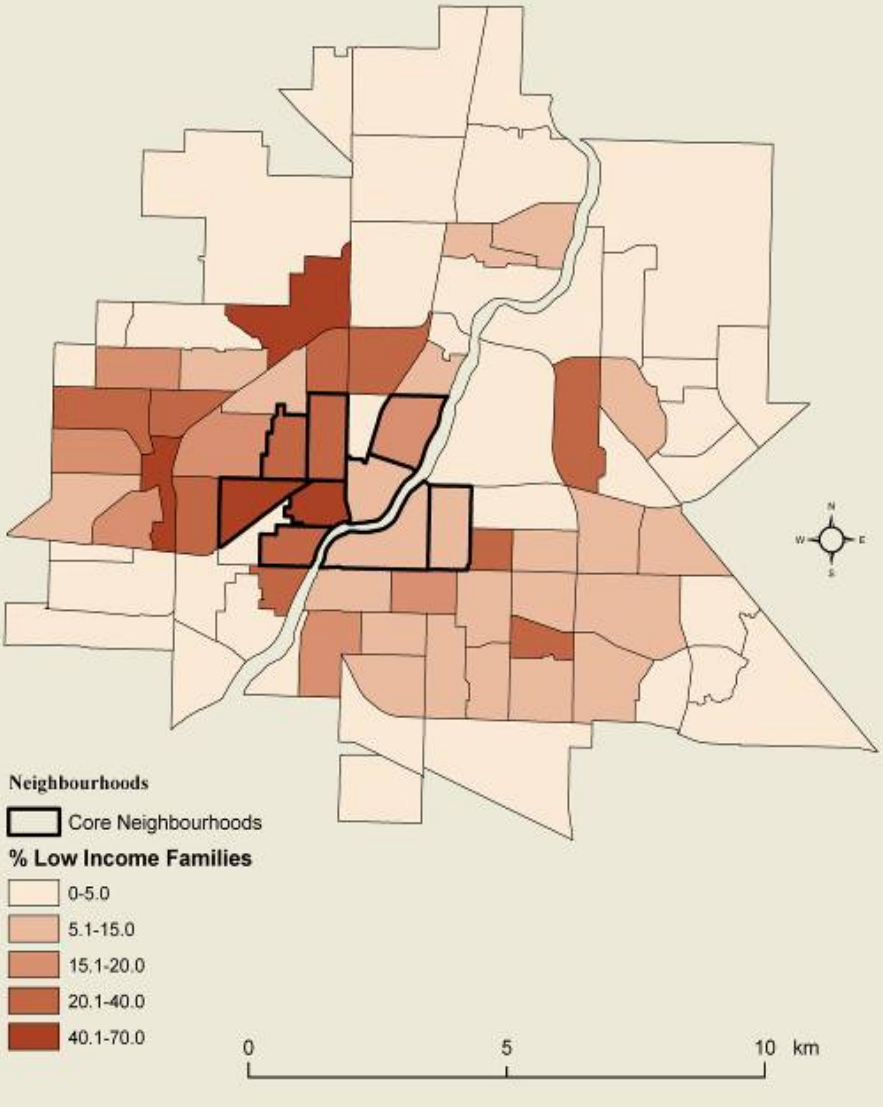


Figure 7.8
Aboriginal Residents by Identity
2001 Census

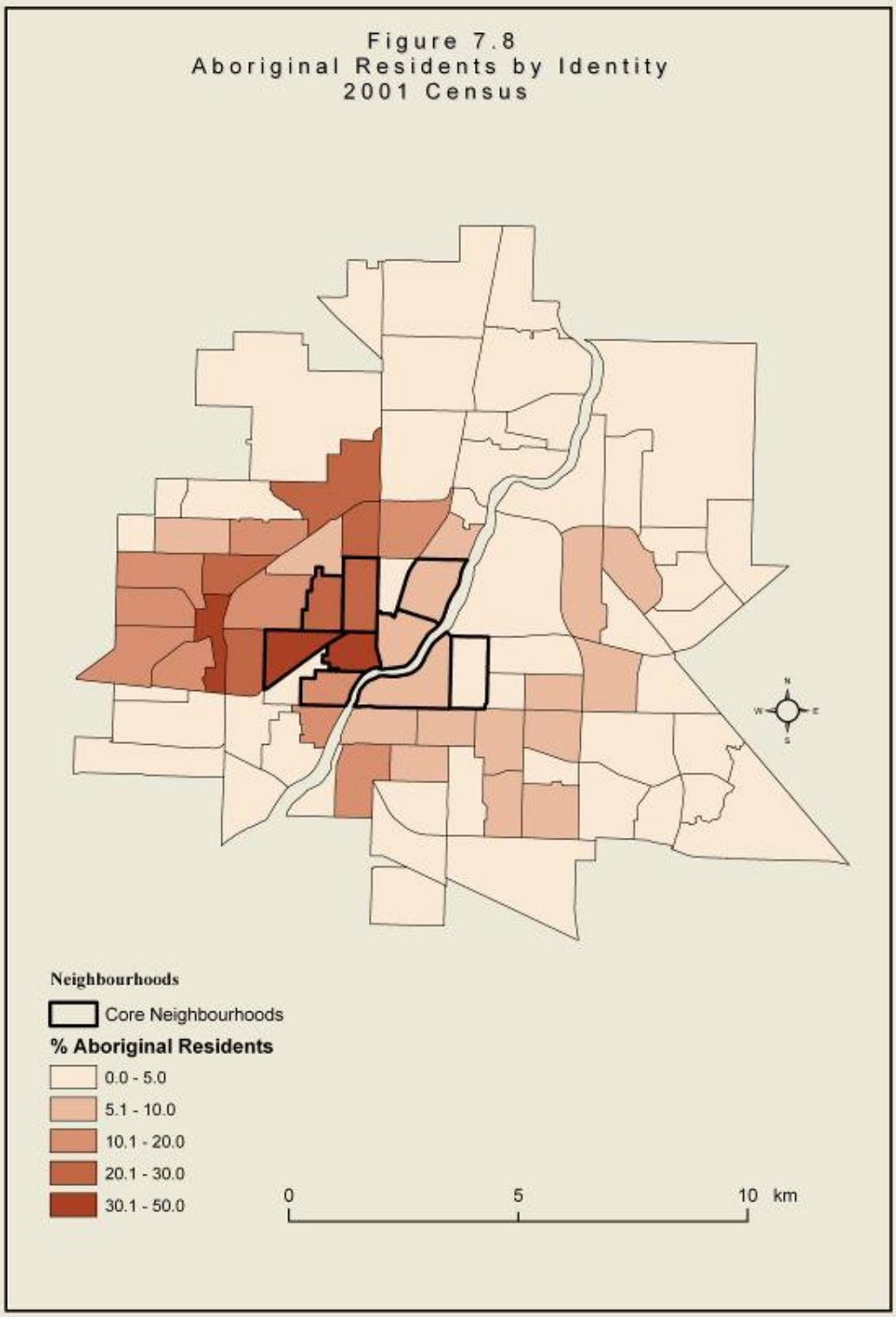


Table 7.5 - Spatial Autocorrelation
Calculated Moran's "I" by Crime Type and Selected Neighbourhood Characteristics

	Original		Adjustment for small distances	
Variable	**Moran's I**	**Z**	**Moran's I**	**Z**
Total Offences	0.118	5.20 **	0.060	3.72 **
Violent	0.125	5.49 **	0.063	3.87 **
Major Property	0.188	7.90 **	0.105	5.81 **
Minor Property	0.065	3.21 **	0.029	2.23
Drugs	0.064	3.15 **	0.027	2.17
Low-Income Families	0.112	4.99 **	0.062	3.80 **
Aboriginal Residents	0.185	7.78 **	0.108	5.98 **
Total Population	0.011	1.13	-0.003	0.71

** p< .01

Table 7.6 - Mean Values for Crime and Neighbourhood Variables

Variable	All Saskatoon Neighbourhoods (n=55)	High Crime Areas (HCAs)Total Offences (n=10)	High Crime Areas (HCAs) Violent Offences(n=12)
TOTAL_OFF	128.9	321	294
VIOLENT	19.4	63	59
MAJOR_PROP	35.5	86	80
MINOR_PROP	70.8	163	147
DRUGS	3.2	9	8
POP_DENS	25.0	23	22
SINGLE	35.9	46	45
MOVERS	21.1	29	30
ABORIGINAL	10.9	25	26
YOUTH_NO_SC	42.2	55	53
NO_HS_DIP	26.7	41	41
COLLEGE_DIP	15.6	14	13
UNIV_DEGREE	18.6	8	8
GOVT_TRANSFER	15.4	25	26
LONE_PARENT	20.2	32	34
LOW_INC_FAM	16.7	35	36
LOW_INC_IND	36.5	49	49
HOUSE	65.4	63	56
APT_HIGH_RISE	4.4	10	9
DWEL_OWNED	63.1	47	44
DWEL_RENTED	36.8	53	56
MAJOR_REPAIRS	6.7	14	13
OLD_HOUSE	30.4	61	51
$DWELLING	$123,477	$91,129	$92,232
LFP_RATE	66.7	58	57
UNEMP	8.1	14	15
YOUTH_UNEMP	13.2	20	21
AVG_SELL_PRICE	$119,830	$78,720	$79,730
PARK_ACRES	8.2	8	9
PERS_PARK_ACRE	189.3	193	162
VEH_PERS	0.6	1	1

Table 7.7
Mean Values for Selected Neighbourhood
Characteristics in 5 High Crime Areas

Variable	Pleasant Hill	Kelsey-Woodlawn	Riversdale	Caswell Hill	King George
SINGLE	52.9	50.0	51.2	46.4	43.7
YOUTH_NO_SC	51.1	75.9	58.7	47.8	61.4
NO_HS_DIP	50.4	45.9	51.8	29.4	43.9
UNIV_DEGREE	5.8	1.5	9.5	13.8	5.0
GOVT_TRANSFERS	38.2	22.6	37.1	18.1	24.6
LOW_INC_FAM	56.4	29.2	51.1	25.6	34
LOW_INC_IND	70.2	34.1	63.9	43.8	45.1
OLD_HOUSE	39.1	82.1	80.5	82.0	76.5
$DWELLING	69065	72816	84053	85541	71699

8. Study # 3 Findings: A Comparison of Neighbourhoods in Ottawa and Saskatoon

Section 8.1 - Principal Components Analysis

As explained in Chapter 4, the dissemination area data for Ottawa (Study # 1) was re-aggregated to match the larger neighbourhood boundaries of the city. Again, the variables used in the analysis were transformed into Z-scores ($\mathbf{Z_i = (xi - x) / sd_x}$) in order to render the various indicators (crime, census and planning) statistically compatible. A principal components analysis (PCA) was performed on the Ottawa neighbourhood dataset to examine the degree of inter-relationship among the variables and to assess the association between crime and socio-economic/ neighbourhood characteristics (Tables 8.1 and 8.2). As seen in Table 8.1, the PCA produced a 6-component solution accounting for 86% of the total variance in the dataset. Similarly, the Saskatoon PCA (Table 7.2) produced a 6-component solution representing 84% of the total variance. These high variances indicate significant inter-correlation in the two datasets.

Table 8.3 shows the loadings on the first two components for each city and clearly indicates that in Ottawa there are separate axes for crime and neighbourhood characteristics. Component 1 loads highly on variables related to mobility and low-income while the loadings on Component 2 signify that the 5 crime variables are highly inter-correlated with one-another and significantly

associated with only one of the 26 socio-economic variables - youth not attending school. However, Table 8.3 reveals that in Saskatoon there is a strong association between crime and neighbourhood characteristics. Component 1 loads highly and positively on violent and major property crimes and a number of socio-economic dimensions most notably Aboriginal residents, lone-parent families and low-income families. Component 2 highlights the association between minor property and drug offences in neighbourhoods with high-rise apartments and low rates of labour force participation.

Section 8.2 - Multiple Regression Analysis

A series of stepwise multiple regression analyses were performed on the Ottawa and Saskatoon datasets to examine the strength and intensity of the relationship between crime (the dependent variable) and socio-economic conditions (the independent variables). With respect to Ottawa's neighbourhooods (n=50), Table 8.4 provides a summary of the results by showing the coefficients of multiple determination (R^2) and the significant independent variables for each regression model. It reveals several differences in the relationship between crime and socio-economic conditions in the two cities. In Ottawa, at the neighbourhood level, there is a moderate statistical association between the two dimensions with the crime variables having R^2 values ranging from a low of 0.269 for drug offences to a high of 0.638 for major property offences. Several of the independent variables have significant beta coefficients. Most notably, the variables 'youth not attending school' and 'single' appear to be the best predictors of overall rates of crime as well as certain types of offences. The table shows that 'youth not attending school' is a significant independent variable for each of the 6 crime variables and is the only significant predictor of violent crime. In addition, the variable 'average household income' is a significant predictor of crime related to total offences, major property offences and disturbance/other offences.

By comparison, Table 8.5 shows that in Saskatoon there is a stronger association between crime and socio-economic conditions with each of the 5 regression analyses yielding relatively high R^2 values (ranging from a low of 0.618 for minor property offences to a high of 0.726 for violent offences). The variable measuring government transfers, which reflects the level of social assistance received by residents, was found to be the most important predictor of overall crime in

the city's neighbourhoods. Similar to the situation in Ottawa, the regression models for Saskatoon reveal that the variable denoting 'youth not attending school' is a significant predictor of overall crime as well as minor property and drug offences. However, as indicated in Study # 2, perhaps the most troubling finding to emerge from the Saskatoon analysis is the strong association between violent crime and Aboriginal people. The high R^2 value (.726) and the high beta coefficient in the model suggest that Aboriginal people are most likely to be the victims in neighbourhoods with high rates of violent crime.

Section 8.3 - Geographic Patterns of Crime in Ottawa and Saskatoon's Neighbourhoods

ArcGIS was used to produce a series of maps showing the spatial distribution of crime and neighbourhood characteristics in Ottawa. As displayed in Figures 8.1 and 8.2, High Crime Areas (HCAs) are concentrated within the built-up central core and suburbs, with no HCAs visible in the outer and rural parts of the city. (HCAs are defined as neighbourhoods with crime rates in the 'High' and 'Highest' categories on the maps). However, it is also apparent that within the urban core, there is a fairly dispersed pattern of HCAs. The four communities with the 'Highest' crime rates (above 100 offences per 1,000 population) are the inner city neighbourhoods of Centre Town, Lower Town and Overbrook as well as Clementine located just west of Alta Vista. A number of neighbourhoods with 'High' crime rates are located within and immediately surrounding the inner city, including Vanier, Riverview/Hawthorne, Carleton Heights, Ottawa West and Dalhousie. Figure 8.1 also reveals a band of suburban neighbourhoods in the western part of the city with 'High' crime rates including Glencairn, Nepean West, Nepean North, Bells Corners and Pinecrest/Queensway. Figure 8.2 shows that violent HCAs in the city have a similar geographic pattern. The three neighbourhoods with the 'Highest' rates of violent offences are in the inner city – Vanier, Lower Town and Centre Town. HCAs in Ottawa exhibit certain socio-economic characteristics. Table 8.6 indicates that they have significantly higher population densities, greater proportions of visible minorities, single people, renters, residents living in high and low-rise apartments and people living in low-income.

As seen in Study # 2 of Saskatoon, HCAs are clustered in the core area. They are particularly visible in the inner city on the west side of the South Saskatchewan River and also correspond

with socio-economically disadvantaged neighbourhoods. A distinguishing geographic feature of Saskatoon is a tight clustering of violent HCAs all located in the west side of the city with most having high proportions of Aboriginal residents, including Pleasant Hill, Riversdale, Confederation Suburban Centre and Meadowgreen. However, as was emphasized in the Saskatoon study, only three of the city's neighbourhoods have Aboriginal populations greater than 30% and none have more than 50%. This fact suggests that ethnic segregation is not a major feature of Saskatoon and that issues of crime and victimization effect a wider segment of the city's population. Several of the neighbourhood characteristics of HCAs are similar to those found in Ottawa including larger proportions of singles, renters and low-income residents. One important difference, however, is the presence of older and lower quality housing in Saskatoon's HCAs, particularly those in the inner city.

Section 8.4 - Discussion

This study provided a brief comparison of crime and neighbourhood characteristics in Ottawa and Saskatoon. It found that Saskatoon has a substantially higher rate of crime than Ottawa and, overall, has a higher incidence of socio-economic disadvantage. The initial Ottawa analysis (Study # 1) employed data at the level of the dissemination area and found that there is a weak association between crime and socio-economic status in the city. The re-analysis of the data at the neighbourhood level in Ottawa demonstrated that a change in geography does have an impact on the statistical 'strength' of this relationship. Several indicators were found to have a significant effect on crime levels in the city's neighbourhoods including higher proportions of single people and youth not attending school as well as lower average household incomes. The geographic analysis showed a fairly dispersed pattern of High Crime Areas (HCAs) within Ottawa's urban core including a noticeable presence in several of the city's western suburban neighbourhoods.

By comparison, in Saskatoon, there appears to be a stronger and more direct link between crime and socio-economically disadvantaged neighbourhoods, particularly those with higher proportions of low-income families and Aboriginal residents. Saskatoon's neighbourhoods, on average, have much higher rates of crime. In addition, HCAs (particularly violent HCAs) are located primarily in the inner city with very few in suburban neighbourhoods.

Table 8.1
Explanatory Power of the Principal Components
Ottawa Neighbourhoods

Component	Eigenvalue	% Total Variance	Cumulative %
1	13.3	42.9	42.9
2	4.7	15.1	58.1
3	3.8	12.2	70.3
4	2.0	6.5	76.8
5	1.7	5.4	82.3
6	1.1	3.6	85.8

Table 8.2
Component Loadings
Ottawa Neighbourhoods – Crime and Census Data (n=50)
Rotation Method: Varimax with Kaiser Normalization

Variable	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5	Comp. 6
VIOLENT	0.037	**0.933**	0.055	0.027	-0.199	0.109
MAJOR_PROP	0.296	**0.759**	0.044	0.257	-0.072	0.292
MINOR_PROP	0.439	**0.795**	0.042	0.064	0.089	0.002
DRUGS	0.273	**0.775**	-0.072	-0.003	0.101	-0.096
DIST_OTHER	-0.104	**0.859**	0.060	-0.064	-0.273	0.146
POP_DENS	**0.865**	0.002	0.152	0.018	0.061	0.060
TOT_YOUTH	0.336	0.219	0.178	-0.185	0.449	-0.296
REC_IMM	0.286	0.104	**0.901**	-0.035	-0.011	-0.070
VIS_MIN	0.350	-0.075	**0.718**	0.290	0.168	-0.350
SINGLE	**0.891**	0.340	0.133	0.100	0.027	0.173
MARRIED	**-0.893**	-0.325	-0.139	-0.143	-0.015	-0.159
LONE_PARENT	**0.648**	0.013	0.257	**0.586**	0.009	-0.127
DWEL_OWNED	**-0.818**	-0.284	-0.380	-0.205	0.051	-0.168
DWEL_RENTED	**0.813**	0.296	0.382	0.203	-0.057	0.170
MAJOR_REPAIRS	**0.844**	0.360	0.226	0.042	0.028	0.073
OLD_HOUSE	0.462	0.131	-0.207	0.014	0.208	0.763
HOUSE	**-0.851**	-0.013	-0.362	-0.148	-0.058	0.207
ROW_HOUSE	-0.066	-0.189	0.025	-0.001	0.109	**-0.842**
APT_HIGH_RISE	**0.634**	0.066	**0.679**	0.057	-0.034	0.108
APT_LOW_RISE	**0.825**	0.170	-0.287	0.170	0.049	0.278
MOVERS_1_yr	**0.794**	0.051	0.265	-0.154	-0.004	-0.016
LFP	-0.165	0.024	**-0.504**	**-0.540**	-0.352	-0.308
UNEMP	0.452	0.023	**0.659**	0.380	0.268	-0.053
YOUTH_UNEMP	0.017	-0.214	0.125	0.030	**0.856**	-0.040
YOUTH_NO_SC	0.213	**0.590**	0.026	0.186	**-0.642**	0.032
NO_HS_DIP	0.205	0.145	0.087	**0.907**	-0.228	0.083
COLLEGE_DIP	**-0.531**	-0.107	-0.286	0.107	-0.456	**-0.519**
UNIV_DEGREE	0.221	-0.185	0.019	**-0.703**	**0.517**	0.287
LOW_INC_FAM	**0.636**	0.015	**0.506**	**0.541**	0.042	0.000
LOW_INC_IND	**0.686**	-0.119	0.348	0.478	0.031	0.045
DWELLING$	-0.161	-0.073	-0.076	-0.434	**0.649**	0.454

Table 8.3
Principal Components Analysis: Ottawa and Saskatoon
(Loadings on the first two components)

Ottawa Study Neighbourhoods (n = 50) PCA (Rotation: Varimax with Kaiser Normalization)				**Saskatoon Study Neighbourhoods (n = 55) PCA (Rotation: Quartimax with Kaiser Normalization)**		
Variable	**Comp. 1**	**Comp. 2**		**Variable**	**Comp. 1**	**Comp. 2**
VIOLENT	0.037	**0.933**		VIOLENT	**0.792**	0.428
MAJOR_PROP	0.296	**0.759**		MAJOR_PROP	**0.789**	0.329
MINOR_PROP	0.439	**0.795**		MINOR_PROP	0.517	**0.726**
DRUGS	0.273	**0.775**		DRUGS	0.492	**0.756**
DIST_OTHER	-0.104	**0.859**				
POP_DENS	**0.865**	0.002		POP_DENS	-0.107	-0.044
TOT_YOUTH	0.336	0.219		SINGLE	**0.762**	-0.098
REC_IMM	0.286	0.104		ABORIGINAL	**0.916**	-0.038
VIS_MIN	0.350	-0.075		LONE_PARENT	**0.916**	-0.170
SINGLE	**0.891**	0.340		DWEL_RENTED	**0.706**	0.437
MARRIED	**-0.893**	-0.325		MAJOR_REPAIRS	**0.818**	-0.093
LONE_PARENT	**0.648**	0 .013		OLD_HOUSE	0.468	0.029
DWEL_OWNED	**-0.818**	- 0.284		HOUSE	-0.344	-0.550
DWEL_RENTED	**0.813**	0.296		APT_HIGH_RISE	-0.032	**0.906**
MAJOR_REPAIRS	**0.844**	0.360		MOVERS	**0.786**	0.133
OLD_HOUSE	0.462	0.131		LFP_RATE	-0.379	**-0.632**
HOUSE	**-0.851**	-0.013		UNEMP	**0.889**	0.098
ROW_HOUSE	-0.066	-0.189		YOUTH_UNEMP	**0.706**	-0.222
APT_HIGH_RISE	**0.634**	0.066		YOUTH_NO_SC	**0.621**	0.082
APT_LOW_RISE	**0.825**	0.170		NO_HS_DIP	**0.663**	0.355
MOVERS_1_yr	**0.794**	0.051		COLLEGE_DIP	-0.467	-0.523
LFP	-0.165	0.024		UNIV_DEGREE	-0.568	0.034
UNEMP	0.452	0.023		GOVT_TRANSFER	**0.701**	0.439
YOUTH_UNEMP	0.017	-0.214		LOW_INC_FAM	**0.969**	-0.048
YOUTH_NO_SC	0.213	**0.590**		LOW_INC_IND	**.765**	0.138
NO_HS_DIP	0.205	0.145		DWELLING$	**-0.686**	0.065
COLLEGE_DIP	**-0.531**	-0.107		AVG_SELL_PRICE	**-0.759**	-0.098
UNIV_DEGREE	0.221	-0.185		PARK_ACRES	0.030	0.086
LOW_INC_FAM	**0.636**	0.015		PERS_PARK_ACRE	0.059	-0.062
LOW_INC_IND	**0.686**	-0.119		VEH_PERS	**-0.771**	0.088
DWELLING$	-0.161	-0.073				

Table 8.4
Results of Multiple Regression – Ottawa Neighbourhoods (n=50)*

Regression # 1			**Regression # 2**	
Dependent Variable	Total Offences		**Dependent Variable**	Violent Offences
R R^2 Adjusted R^2	0.783 0.613 0.588		R R^2 Adjusted R^2	0.704 0.495 0.484
Independent Variables (beta coefficients)			**Independent Variables (beta coefficients)**	
YOUTH_NO_SC SINGLE AVG_HSLD_INC	0.669 0.562 0.406		YOUTH_NO_SC	0.704
Regression # 3			**Regression # 4**	
Dependent Variable	Major Property Offences		**Dependent Variable**	Minor Property Offences
R R^2 Adjusted R^2	0.799 0.638 0.606		R R^2 Adjusted R^2	0.707 0.500 0.478
Independent Variables (beta coefficients)			**Independent Variables (beta coefficients)**	
SINGLE YOUTH_NO_SC AVG_HSLD_INC NO_HS_DIP	0.688 0.453 0.570 0.371		SINGLE YOUTH_NO_SC	0.569 0.252
Regression # 5			**Regression # 6**	
Dependent Variable	Drug Offences		**Dependent Variable**	Disturbance/ Other Offences
R R^2 Adjusted R^2	0.519 0.269 2.238		R R^2 Adjusted R^2	0.721 0.519 0.499
Independent Variables (beta coefficients)			**Independent Variables (beta coefficients)**	
SINGLE YOUTH_NO_SC	0.325 0.297		YOUTH_NO_SC AVG_HSLD_INC	0.851 0.320

* $p<0.01$, all beta coefficients are significant at the 99% confidence level.

Figure 8.1
City of Ottawa, Total Criminal Code Offences, 2001
Rate per 1,000 Population

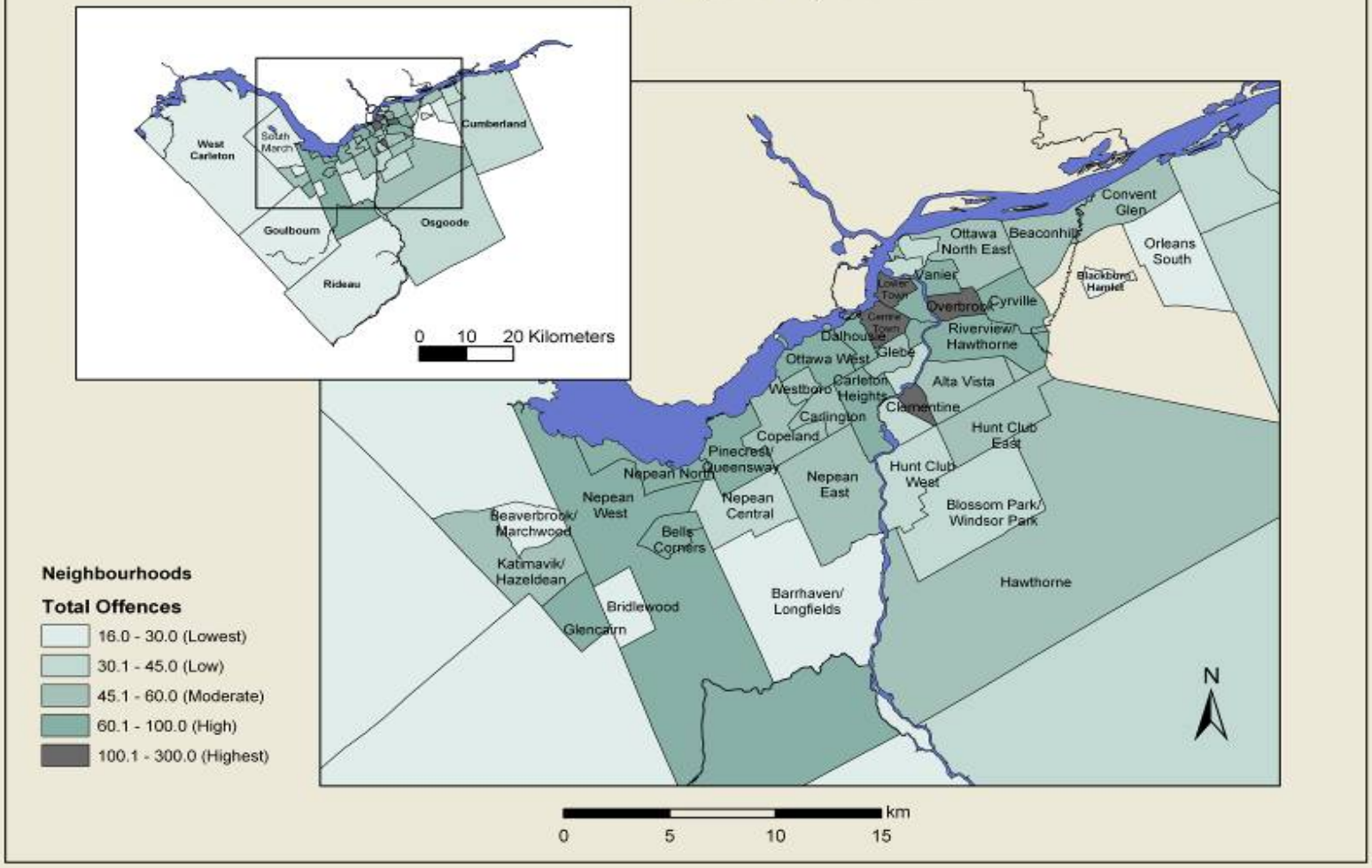


Figure 8.2
City of Ottawa, Violent Offences, 2001
Rate per 1,000 Population

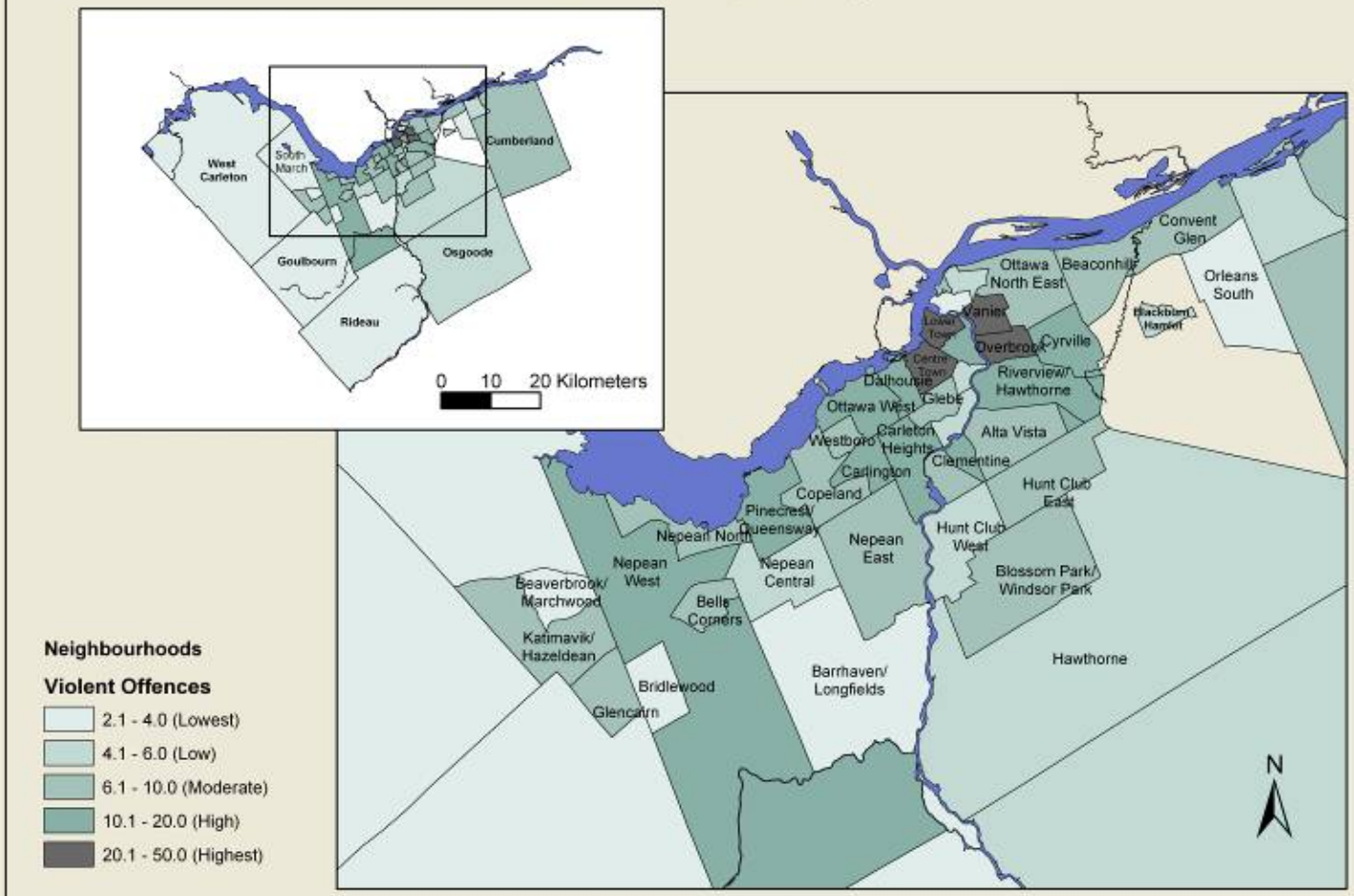


Table 8.5
A Summary of the Multiple Regression Analyses - Ottawa and Saskatoon

Ottawa Neighbourhoods (n=50)						
Dependent Var.	**TOTAL_OFF**	**VIOLENT**	**MAJOR_PROP**	**MINOR_PROP**	**DRUGS**	**DIST_OTHER**
R^2	0.613	0.495	0.638	0.500	0.269	0.519
Independent Vars. **(significant betas)**	YOUTH_NO_SC SINGLE AVG_HSLD_INC	YOUTH_NO_SC	SINGLE YOUTH_NO_SC AVG_HSLD_INC NO_HS_DIP	SINGLE YOUTH_NO_SC	SINGLE YOUTH_NO_SC	YOUTH_NO_SC AVG_HSLD_INC

Saskatoon Neighbourhoods (n=55)					
Dependent Var.	**TOTAL_OFF**	**VIOLENT**	**MAJOR_PROP**	**MINOR_PROP**	**DRUGS**
R^2	.690	.726	.710	.618	.688
Independent Vars. (significant betas)	YOUTH_NO_SC SINGLE GOVT_TRANSFER APT_HIGH_RISE	ABORIGINAL GOVT_TRANSFER	AVG_SELL_PRICE* MOVERS OLD_HOUSE	APT_HIGH_RISE YOUTH_NO_SC DWEL_RENTED	APT_HIGH_RISE LOW_INC_FAM YOUTH_NO_SC

* Negative beta coefficients indicating inverse relationship.

Table 8.6
Mean Values for Crime and Neighbourhood Variables - Ottawa

Variable	All Ottawa Neighbourhoods (n=50)	High Crime Areas (HCAs) Total Offences (n=17)	High Crime Areas (HCAs) Violent Offences (n=15)
TOTAL_OFF	66.5	98.4	101.3
VIOLENT	11.3	15.3	17.0
MAJOR_PROP	12.8	18.0	18.8
MINOR_PROP	34.0	54.5	53.8
DRUGS	1.8	3.2	3.5
DIST_OTHER	6.7	7.4	8.1
POP_DENS	24.4	34.9	39.4
TOT_YOUTH	13.4	14.4	14.2
REC_IMM	4.8	6.5	6.4
VIS_MIN	17.1	22.2	24.0
SINGLE	47.2	56.4	58.5
MARRIED	49.3	39.8	37.3
LONE_PARENT	15.9	19.0	21.0
DWEL_OWNED	62.8	44.0	38.8
DWEL_RENTED	37.2	55.9	61.2
MAJOR_REPAIRS	6.9	8.0	8.8
OLD_HOUSE	26.3	31.7	36.1
HOUSE	53.7	36.7	32.8
ROW_HOUSE	16.8	13.9	11.6
APT_HIGH_RISE	17.8	30.3	33.5
APT_LOW_RISE	9.3	15.1	17.9
MOVERS_1_yr	16.5	19.9	20.2
LFP_RATE	69.6	67.3	65.0
UNEMP	5.8	7.2	7.7
YOUTH_UNEMP	12.8	13.1	13.2
YOUTH_NO_SC	30.2	33.3	33.5
NO_HS_DIP	15.3	18.7	21.1
COLLEGE_DIP	17.7	16.5	15.7
UNIV_DEGREE	32.7	30.7	29.0
LOW_INC_FAM	11.4	17.2	20.9
LOW_INC_IND	26.5	34.1	38.7
AVG_HSLD_INC	81,581	65,284	59,948
$DWELLING	209,097	198,130	193,280

9. Summary

This publication presents the findings of three studies that examined crime and neighbourhood characteristics in Ottawa and Saskatoon. The studies reveal that there are marked differences in the level and nature of crime in the two cities. Saskatoon has one of the highest crime rates in Canada and there are several clear predictors of crime in its neighbourhoods. By comparison, Ottawa has one of the lowest crime rates and, overall, there is a weaker association between crime and socio-economic status. However, with respect to geographic patterns, high crime areas in both cities are found largely in the inner and central city.

The methodologies developed in the three studies can be employed as a guide for further research into the geography of crime in other Canadian cities. Of particular interest would be a comparison of patterns and trends in cities with varying social and economic conditions and different population profiles. For example, large cities in Western Canada, such as Edmonton and Vancouver, have higher crime rates and a notable presence of disadvantaged residents such as Aboriginal peoples. Also, further research could focus more specifically on certain types of offences. For example, the geographic distribution of violent crimes could be analyzed in relation to the location of public places such as commercial areas, parks and transit-way stations. At the same time, crime prevention policies can be studied in an effort to make these public places safer for vulnerable groups such as youth, seniors and women.

It is apparent that the Canadian urban system is characterized by important regional variations and thus the geography of crime can also be expected to vary considerably not only within cities but between cities as well. A fuller accounting of these differences is needed in order to develop appropriate strategies for crime prevention and social upgrading that deal specifically with local circumstances. For example, study # 2 of Saskatoon found a strong link between the incidence of violent crime and the presence of Aboriginal peoples in certain inner city neighbourhoods. The study proposed a number of strategies to deal with this issue, including improving social

services, education and housing opportunities for Saskatoon's Aboriginal residents. As the literature in Canadian criminology has demonstrated there are numerous other examples of individual and local conditions influencing crime.

Finally, from a methodological perspective, more research needs to be conducted on how the level of geography used in the analysis affects the relationship between crime and socio-economic conditions. The research in this publication found that a change in the unit of geography used in the analysis of Ottawa (dissemination areas and neighbourhoods) did have an important effect on the findings. Data could be attained for additional cities for geographic units including DAs, census tracts and neighbourhoods to conduct further tests on the effects of geographic aggregation on crime trends.

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