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CUSTOM REPORT

ANALYSIS OF VIOLENT AND WEAPONS CRIME IN THE CITY OF OTTAWA, 2012-2016

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Executive Summary

The City of Ottawa experienced a spike in the number of violent and weapons related crimes reported between 2015 and 2016, including a concerning 242.9 per cent rise in the number of homicides. Crime Prevention Ottawa provided the Conference Board of Canada (CBoC) funding to undertake a quantitative analysis of violent and weapons crimes in the City of Ottawa over the past five years to try to identify trends or patterns that could help develop crime prevention strategies.

An analysis of the City of Ottawa's overall violent crime rates shows that over the past five years (2012-2016) it peaked in 2013. Thus, 2016 was not an exceptionally violent year for the City of Ottawa, despite the increase in the number of homicides and public perception of violence in the city. The severity of violent crime in the City of Ottawa, however, has steadily increased since 2014. A statistical analysis of selected crime and policing variables conducted as part of the study also did not offer any explanatory relationships or trends that could help to explain the rise in the number of homicides and other violent crimes in 2016. An examination of violent crimes across the city's twenty-three (23) Wards provided the most interesting insights about shifting patterns of violent crime in the City of Ottawa.

Ultimately, the five-year reporting period of crime statistics offers limited explanatory power in isolation, and a series of recommendations for further research are provided.

Recommendations

1. Conduct an in-depth qualitative study of 2016 violent and weapons crimes incidents to understand the specific context around each incident.
2. Conduct in-depth qualitative studies on a Ward-by-Ward basis to better understand the context for variations in violent crime across the city.
3. Analyse Wards which have been successful in reducing violent crime rates to identify potential insights for reducing violent crime.
4. Carry out a longer-term quantitative analysis of violent crime in the City of Ottawa.

Introduction

In 2016, the City of Ottawa experienced a spike in the number of violent and weapons related crimes reported, with the most drastic change being a 242.9 per cent increase in the number of homicides from 2015 to 2016.¹ Understanding the reason(s) behind this drastic increase in violent and weapons related crimes could provide insights into preventing these types of incidents in the future. Crime Prevention Ottawa (CPO) provided a grant to the Conference Board of Canada (CBoC) to undertake a quantitative analysis of violent crime and weapons crime in the City of Ottawa. The objective of the analysis was to identify any trends or patterns in crime and policing data in purely quantitative terms. This study did not explore the context around individual incidents and is meant to be used as a primer to help CPO and the Ottawa Police Service (OPS) identify further research questions that would be needed to fully contextualize the findings.

This study focused on municipal crime data. Where relevant, national crime data was used for context and comparison. The scope of the study covers five years (2012-2016), and is limited to publicly available data through Statistics Canada and the OPS.²

A statistical analysis software package (SPSS) was used to analyse relationships between a range of selected variables. Both Statistics Canada and the OPS maintain very complete databases of recorded crimes, otherwise known as police-reported crimes. Underreporting, however, remains a perennial problem in many areas, such as assault, sexual assault and harassment, and crimes between gangs or other organized crime units.³ Crime statistics, therefore, cannot be considered perfect data sets, so a 95 percent confidence interval was selected for the analysis.⁴ This means that if a relationship is found to be statistically significant, one in every twenty cases can reasonably be expected to be an outlier case that differs greatly from the average of all cases. Unless the research being conducted requires a higher degree of certainty (for example, pharmaceutical testing) or is comfortable with less certain relationship (for example, market research), a 95 percent confidence interval is commonly applied.⁵

¹ Statistics Canada. *Table 252-0051 - Incident-based crime statistics, by detailed violations, annual (number unless otherwise noted)*, CANSIM (database). (accessed: Nov 12 2017).

² Ottawa Police Service data was shared directly with the Conference Board of Canada by the Business Performance Unit.

³ Scott Newark. "Why Canadian crime statistics don't add up," *True North*. Macdonald-Laurier Institute, February 2011.

⁴ The most useful tests for determining correlation between variables in crime data, and for identifying relationships between variables in crime data, are Pearson R and regression analysis, respectively.

⁵ Andrea Wagner. *Quantitative Research Methods in Political Science*, First Canadian Edition, (Kendall Hunt: 2013).

The following variables were used to examine violent and weapons crimes in the City of Ottawa:

Ottawa Crime Variables	Ward Crime Variables	National Crime Variables
<ul style="list-style-type: none"> • Number of Police Officers • Policing Budget • Crime rates • Violent crime rates • Homicides • Assault, level 2 • Discharge of a weapon with intent • Weapon used in committing a crime • Persons injured by firearms⁶ 	<ul style="list-style-type: none"> • Crime rates • Violent crime rates • Homicide Rates • Assault Rates • Offensive weapons rates 	<ul style="list-style-type: none"> • Crime rate • Homicides • Assault, level 2 • Assault, level 1 • Discharge of a weapon with intent • Weapon used in committing a crime

This study reports on both the recorded number of crimes and the rates of crimes. It is important to note that crime rates consider incidents of criminal activity to be evenly spread across a given population, and therefore do not account for the possibility that individuals may be the victim of more than one crime over a given reporting period.⁷

Crime trends analysis

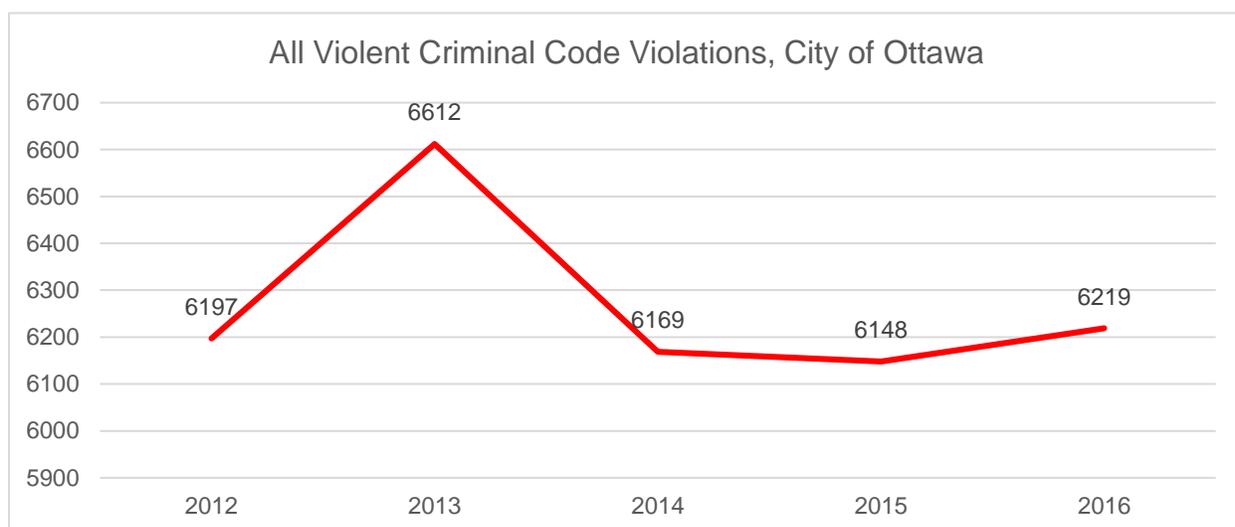
The peak in the overall violent crime rate for the City of Ottawa over the past five years (2012-2016) was reached in 2013, at 6612 violent crimes recorded, or a rate of 677.4 per 100,000 persons. There was a steep decline of almost 7 per cent in violent crime in 2014, it remained almost flat in 2015, and then slightly increased in 2016 by 1.2 per cent (613.6 per 100,000 persons), 5.9 per cent lower than in 2013 (see Figure 1). It is worth noting that the City of Ottawa's violent crime rate is significantly lower than the 2016 national rate of 1051.6 per 100,000 persons.⁸

⁶ Data only available for 2015 and 2016.

⁷ Statistics Canada. *Trends in reporting criminal victimization to police, 1999 to 2009*. <https://www.statcan.gc.ca/pub/85-002-x/2015001/article/14198-eng.htm>. (accessed: Dec 4 2017).

⁸ Statistics Canada. *Table 252-0051 - Incident-based crime statistics, by detailed violations, annual (number unless otherwise noted)*, CANSIM (database). (accessed: Nov 12 2017).

Figure 1. Number of recorded violent crimes, City of Ottawa, 2012-2016

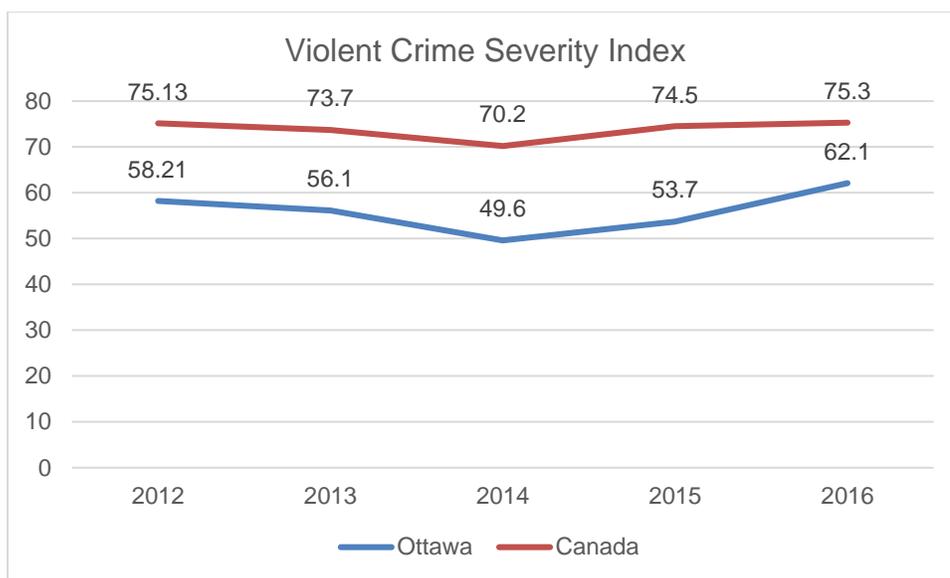


The Violent Crime Severity Index tracks the severity of police recorded crimes, rather than the number of recorded incidents. In order to calculate the index, crimes are weighted based on a score taken from two factors: incarceration rate for the type of offence and average prison sentence for the type of crime.⁹

The City of Ottawa follows the national trend for the Violent Crime Severity Index. The upward trend in crime severity for 2014 to 2016 also reflects the trend in the overall number of violent crimes. The two statistics differ most greatly around 2013: this was a peak year in violent crimes for the City of Ottawa, whereas 2016 is the severity index peak. Figure 2 displays a significant increase in the index from 2014 to 2015, and again from 2015 to 2016, indicating that while the number of violent crimes being committed in the City of Ottawa is lower than in 2013, the severity of these crimes overall is much worse. More granular and qualitative information would help to understand how incidents of violent crime are escalating to become more severe.

⁹ Statistics Canada. *Section 1: The Crime Severity Index*. <https://www.statcan.gc.ca/pub/85-004-x/2009001/part-partie1-eng.htm> (accessed Dec 15 2017).

Figure 2. Violent Crime Severity Index, City of Ottawa and Canada (2012-2016)¹⁰



Four *Criminal Code* violations were used as variables for this study: homicides¹¹, assault (level 2)¹², discharge of a firearm with intent, and using a firearm in the commission of a crime. All four variables saw an increase in the number of recorded incidents from 2015 to 2016. Only assault and discharge of a firearm with intent had increases in recorded incidents for two consecutive years, from 2014 to 2015, and 2015 to 2016 (see Table 1 and Figures 3 and 4)¹³.

Table 1. Number of selected recorded crime incidents, City of Ottawa, 2012-2016

	2012	2013	2014	2015	2016
Homicides	7	9	7	7	24
Assault (level 2)	539	556	439	491	571
Discharge with intent	5	4	19	28	49
Using firearm in commission	17	28	30	13	20

¹⁰ Statistics Canada. *The Crime Severity Index*. Reporting: 2012-2016. <http://www.statcan.gc.ca/pub/85-002-x/2013001/article/11854/c-g/desc/desc09-eng.htm>; <http://www.statcan.gc.ca/pub/85-002-x/2014001/article/14040/tbl/tbl03-eng.htm>; <https://www.statcan.gc.ca/pub/85-002-x/2015001/article/14211/tbl/tbl03-eng.htm>; <http://www.statcan.gc.ca/pub/85-002-x/2016001/article/14642/tbl/tbl03-eng.htm>; <http://www.statcan.gc.ca/pub/85-002-x/2017001/article/54842/tbl/tbl03-eng.htm> (databases). (accessed Dec 15 2017).

¹¹ Includes all murder, manslaughter, and infanticide charges.

¹² Includes weapon or bodily harm.

¹³ Assault numbers presented separated for legibility.

Figure 3. Number of selected recorded crime incidents, City of Ottawa, 2012-2016

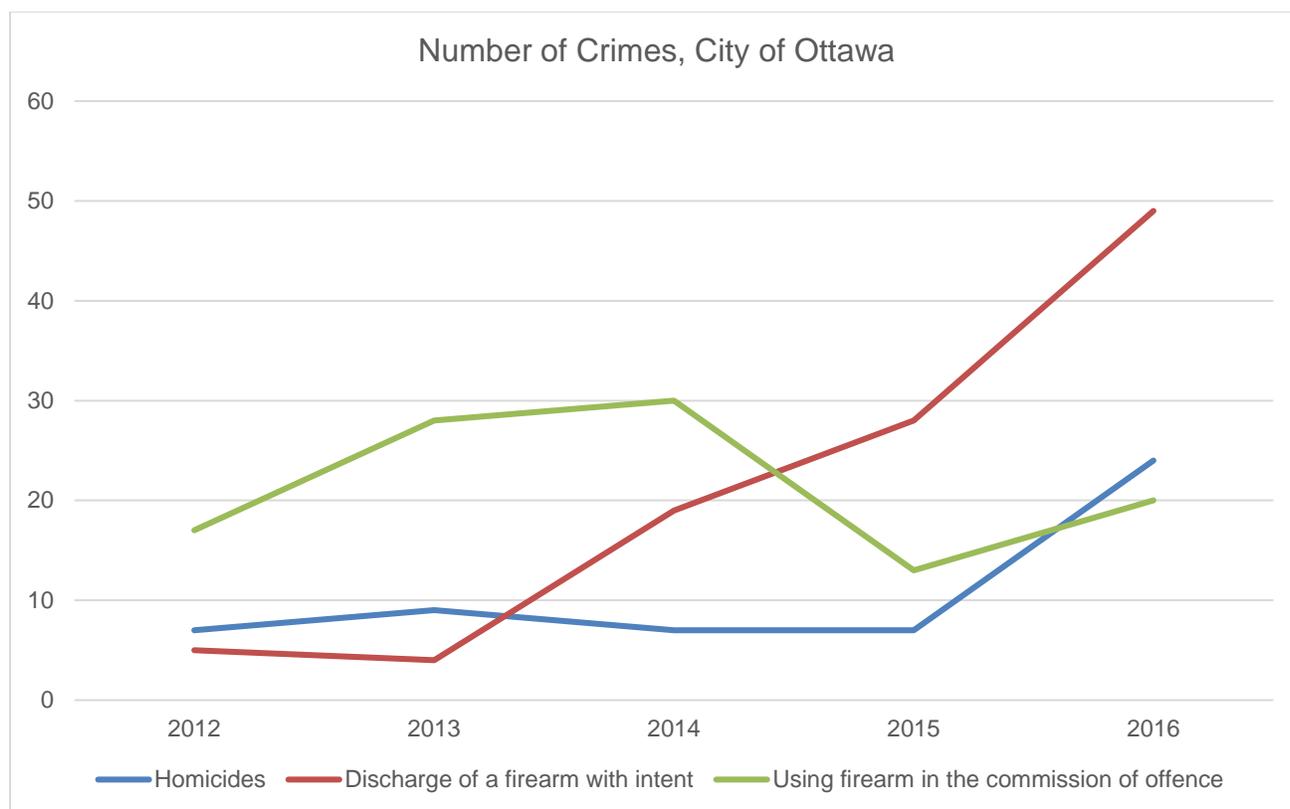


Figure 4. Number of recorded assaults (level 2), City of Ottawa, 2012-2016

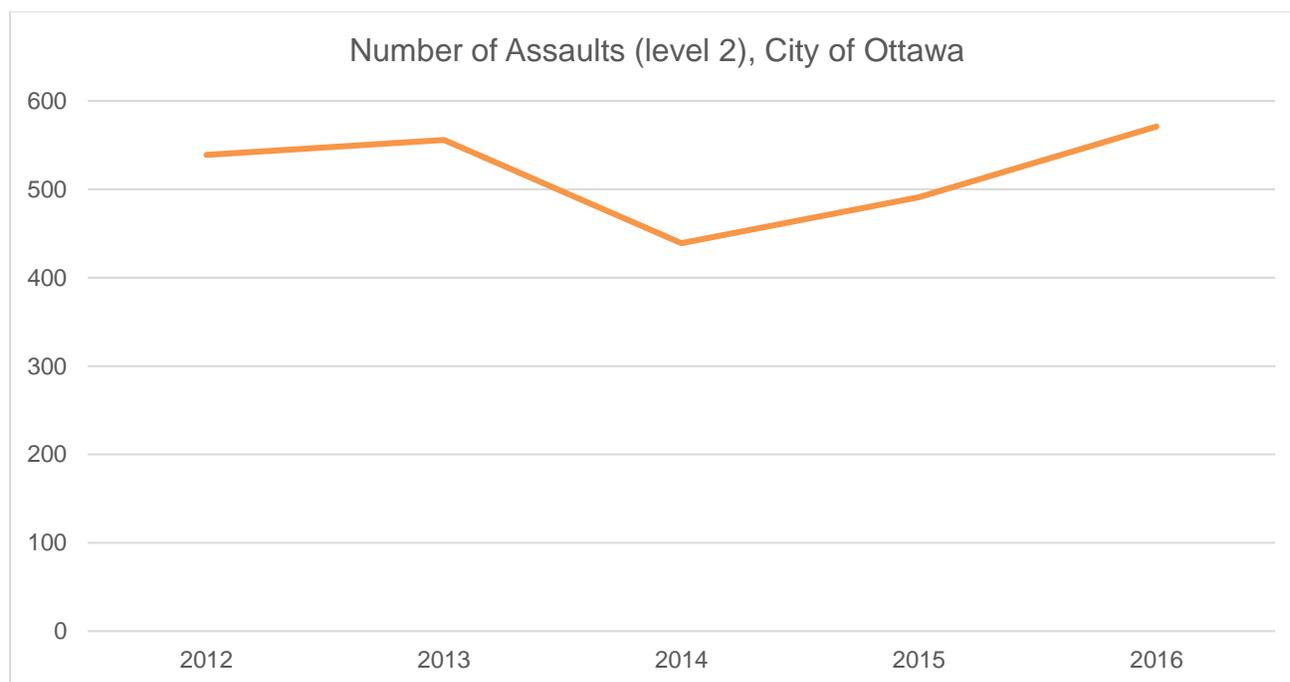
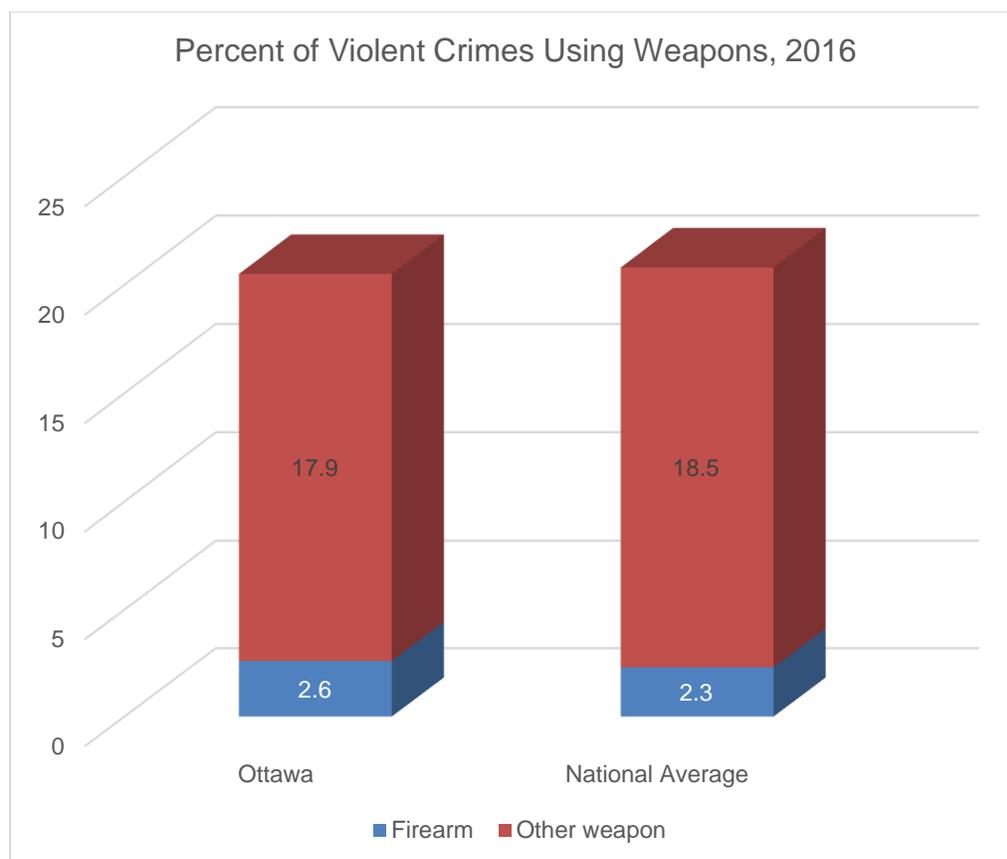


Figure 5. Percent of violent crimes committed using a weapon, City of Ottawa and Canada, 2016



The variables of discharge with intent and using a firearm in the commission of a crime only capture a small number of the actual incidents of weapons being used in the commission of violent crimes. In 2016, 20.5 per cent of all recorded violent crimes in the City of Ottawa involved weapons: 2.6 per cent involved firearms, while 17.9 per cent involved other weapons. The City of Ottawa fares slightly better than the national average overall for violent crime, but slightly worse when it comes to the number of firearms related violent crimes (see Figure 5). However, at only 0.3 per cent less than the national average, the City of Ottawa still closely reflects national trends in weapons use in violent crimes.

The City of Ottawa's crime rates, particularly violent crimes, were hotly debated in the wake of the spike in homicides in 2016. Public perception seemed to be that the City of Ottawa was becoming a much more dangerous city, and that violent crimes were becoming more severe. Given that the City of Ottawa does not differ significantly from

the national average in weapons use during crimes, and that the overall violent crime increase was relatively small, what contributed to this perception?¹⁴

While the actual number of recorded incidents are an important indicator of crime patterns, the percentage change from year to year, and the change in the crime rate can help contextualize the raw numbers. For example, while twenty charges of using a firearm in the commission of a crime in 2016 is only an increase of seven recorded incidents from 2015, this is a 53.9 per cent increase in that category. The number of homicides rose from seven in both 2014 and 2015 to twenty-four in 2016, a significant increase of 242.9 per cent (see Figure 6). The only comparable increase seen in the past five years is in the number of recorded incidents of discharging of a weapon with intent, which surged by 375.0 per cent from 2013 to 2014.¹⁵

The rate of the violent crime variables, or the number of people affected by the crime out of every 100,000 persons in the City of Ottawa, also increased significantly from 2015 to 2016 (see Table 2). Of particular note is the rise in the homicide rate, from less than 1 to 2.4.

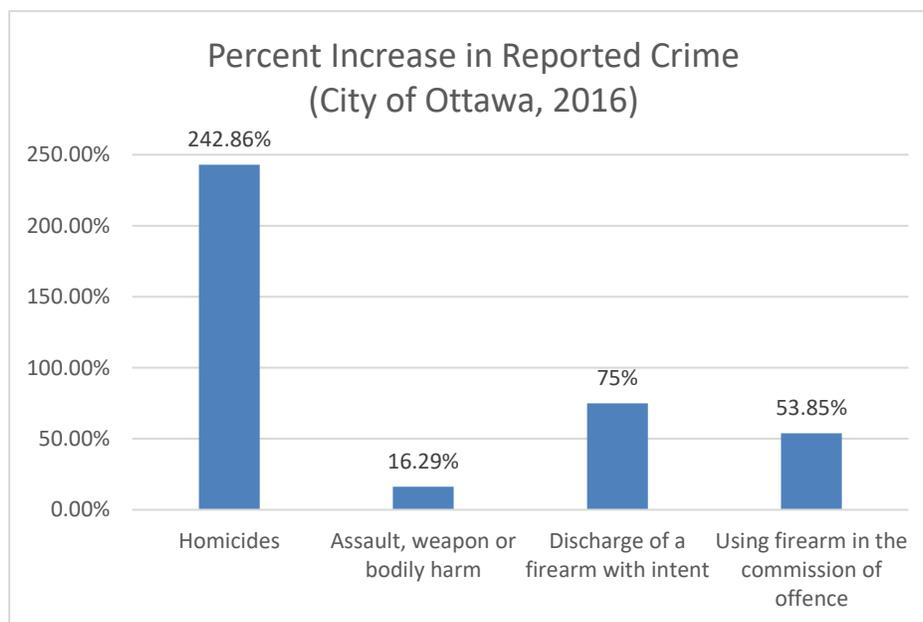
Table 2. Violent Crimes per 100,000 population, City of Ottawa, 2012-2016

	2012	2013	2014	2015	2016
Homicides	0.73	0.92	0.71	0.7	2.37
Assault (level 2)	55.9	56.97	44.49	49.25	56.33
Discharge with intent	0.52	0.41	1.93	2.81	4.83
Using firearm in commission	1.76	2.87	3.04	1.3	1.97

¹⁴ Joanne Laucius. "What is going on in Ottawa? 2016 shatters shooting record, approaches new homicide mark," *The Ottawa Citizen*. <http://ottawacitizen.com/news/local-news/what-is-going-on-in-ottawa-2016-shatters-shooting-record-approaches-new-homicide-mark>, December 12, 2016. Ted Raymond. "Overall crime rate in Ottawa up in 2016: report," *CTV News Ottawa*. <http://ottawa.ctvnews.ca/overall-crime-rate-in-ottawa-up-in-2016-report-1.3470261>, June 21, 2017.

¹⁵ Statistics Canada. *Table 252-0051 - Incident-based crime statistics, by detailed violations, annual (number unless otherwise noted)*, CANSIM (database). (accessed: Nov 12 2017).

Figure 6. Percent increase in selected reported crimes, City of Ottawa, 2015-2016



The relationship between the increase in the number of recorded incidents of each of the selected variables for this study in 2016 and decrease in the overall violent crime rate may seem incongruous. Because three of the four variables chosen for this study necessarily involve the use of weapons in the commission of the crime they only capture a small percent of all violent crimes committed in the City of Ottawa. In reality, only a small percent of violent *Criminal Code* crimes recorded in the City of Ottawa involve weapons (see Figure 5). For example, assault level 1 charges represent an average of 36.2 per cent of all violent crimes recorded over the past five years (see Table 3), and are not weapons related crimes. The four variables in this study only make up an average of 2.3 per cent of all violent *Criminal Code* crimes for the City of Ottawa between 2012 and 2016 (see Table 4).¹⁶

¹⁶ Ibid.

Table 3. Assault level 1 Charges, City of Ottawa, 2012-2016

	2012	2013	2014	2015	2016
Total violent Criminal Code violations	6197	6612	6169	6148	6219
Assault, level 1	2233	2427	2261	2252	2162
Percentage of Assault, level 1 charges out of total number of violent Criminal Code charges	36.0%	36.7%	36.7%	36.6%	34.8%

Table 4. Five-year Averages of Percentage of Violent Crime Charges and Graphic Representation of Rate Changes of Violent Crimes, City of Ottawa, 2012-2016

	Average % of Violent Crime Charges	Rate Change Direction				
		2012	2013	2014	2015	2016
Homicide	0.2%	↓	↑	↓	↓	↑
Assault, level 2	8.3%	↓	↑	↓	↑	↑
Firearm in Commission of Crime	0.3%	↓	↓	↑	↑	↑
Discharge with Intent	0.3%	↓	↑	↑	↓	↑
Assault, level 1	32.6%	↓	↑	↓	↓	↓

Therefore, the year-over-year rate decrease of assault level 1 charges since 2013 (see Table 5) has greatly impacted the overall violent crimes statistics for the City of Ottawa. The relatively steady increases in weapons related crimes, while representing a small percentage of the total number of crimes recorded in Ottawa, impacted the crime severity index, which increased in 2016.¹⁷

Table 5. Rate of Assault level 1 Charges, City of Ottawa, 2012-2016

	2012	2013	2014	2015	2016
Rate (/100,000 population)	231.6	248.7	229.1	225.9	213.3
Rate Change	-1.2	7.4	-7.9	-1.4	-5.6

¹⁷ Ibid.

Statistical Analysis

In this section, tests are run to try to identify relationships between variables that can be generalized to the larger population. The results of analyses are considered statistically significant when the tests consider that observed correlations or relationships are not due to random chance.

Interestingly, there were no statistically significant relationships found between any of the variables used in this study over the five year period. In some instances, data from 2011-2015 was also tested as a five year reporting period to control for the possibility that 2016 was an outlier. In these cases, both five year periods were reported on (the 2011 to 2015 data, and the 2012 to 2016 data).

There was no statistically significant relationship or generalizable correlation between the number of violent crimes in the City of Ottawa and the number of incidents of the four crime variables (homicides, assault (level 2), discharge of a firearm with intent, and using a firearm in the commission of a crime).¹⁸ Given that all four crime variables increased in number from 2015 to 2016, and so too did the overall number of violent crimes in the City of Ottawa, further examination of the detailed data from previous years may help to shed light on why a relationship may not be present in the five year data set used for this study.

Tests looking for relationships between the four crime variables found no statistically significant relationship between any combination of the four variables. The test was run using both 2012 to 2016 data, as well as 2011 to 2015 data, in order to isolate 2016 given that it may be an outlier case.¹⁹ The same test was also run using the four crime rate variables (incidents per 100 000 persons), again with the result of no statistically significant relationships discovered for either time period.²⁰ This means that over the five year reporting period there was no statistically significant connection between the rise or fall in the number of recorded incidents of our selected variables. However, it is possible that statistically significant relationships may still exist. Indeed, an expanded data set consisting of additional variables may bring relationships to light. In addition, a larger sample period (more years of data) may reveal relationships by controlling for spikes such as homicides in 2016 and discharge with intent in 2014. A review of literature should also be undertaken to see if other cities historically see connections between these types of violent crimes.

¹⁸ See outputs 1 in Annex.

¹⁹ See outputs 2 and 3 in Annex.

²⁰ See outputs 4 and 5 in Annex.

Tests looking for relationships between crime variables and policing variables, such as the number of officers and policing budget similarly found no statistically significant relationships:

- No statistically significant correlations between the number of officers and the number of homicides, assaults, discharges of weapons, weapons used in committing crime;
- No statistically significant correlations between the police budget and the number of homicides, assaults, discharges of weapons, weapons used in committing crime;
- No statistically significant relationship between the combination of three variables: the number of police officers employed, the police budget, and the number of homicides.²¹

This finding is particularly interesting as it seems to show that police budget and the number of officers do not have an impact on violent crime, which may be misleading. A more granular breakdown of policing statistics, such as patrol hours, should be included in future studies. Furthermore, it is possible that relationships may exist between the crime variables and the number of persons injured by firearms, but only two years of reporting data was available, which was not found to be sufficient to establish a relationship. This analysis would also benefit from additional variables and a larger sample period.

Ward data analysis

In the absence of statistical relationships for violent crime trends in the City of Ottawa, looking more closely at the distribution of crimes becomes increasingly important to provide information around where the upward trends in certain variables are occurring. What is very clear is that violent crime in the City of Ottawa is not evenly distributed across the twenty-three wards (see Figure 7)²². Ward 12 (Rideau-Vanier) was 3.5 times the city average rate for violent crime, while Ward 14 (Somerset) was 2.4 times the average. Ward 8 (College) saw the biggest increase in the violent crime rate in 2016, while Ward 4 (Kanata North) saw the biggest decrease (see Figure 8). It is important to note that these crime statistics only report on crimes committed in a Ward; they do not provide any information regarding the number of crimes perpetrated by individuals who live in the Wards.

The breakdown of specific crime variables is also very informative for examining the distribution of crime in the City of Ottawa. Given the sharp increase in the number of

²¹ See outputs 6, 7, and 8 in Annex.

²² Ward data rates based on recorded incidents per 100,000 persons.

homicides, a closer examination of the past five years of ward homicide data was conducted. Figure 9 shows the number of homicides recorded per ward from 2012 to 2016. Ward 16 had the highest number of recorded homicides in 2016 at six, and also had the highest rate of homicide that same year. Ward 8 had the second most homicides of 2016 with four. (For rates, see Figure 10.)

Because population density varies greatly, reporting by rates can be misleading. For example, one homicide in Ward 10 equals a rate of 2.1, whereas in Ward 15 (Kitchissippi) one homicide equals a rate of 2.3. Comparing ward homicide rates to the overall City of Ottawa rate can help add context (see Figure 10).

Several Wards would make for interesting and valuable case studies. For example, Ward 16 saw a drop in its overall violent crime rate in 2016 by 11.0 per cent, but had the greatest number and the highest rate of homicides. Ward 8, with the second highest number of homicides in 2016, experienced an increase in its rate of violent crimes (22.2 per cent), while still remaining below the city average. Ward 4 on the other hand had no homicides and a massive drop in its violent crime rate by 35.1 per cent in 2016. The scope of this project did not include a more in depth analysis on a Ward by Ward basis, which could provide interesting insights into the reasons behind the variations observed.

Figure 7. Violent crime rates, City of Ottawa Wards, 2016

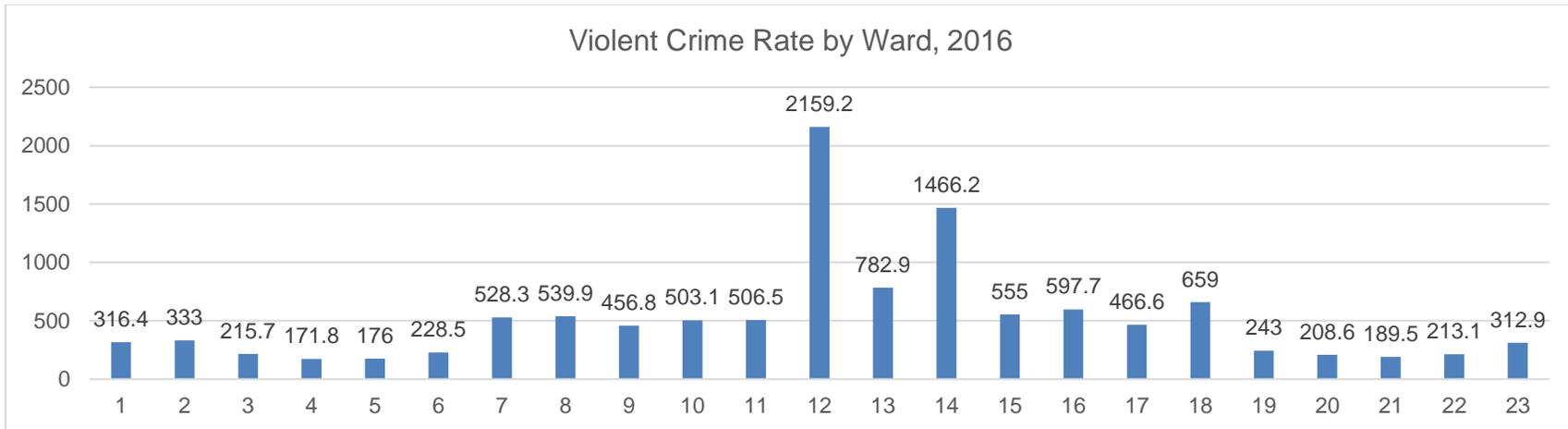


Figure 8. Change in violent crime rates, City of Ottawa Wards, 2015-2016

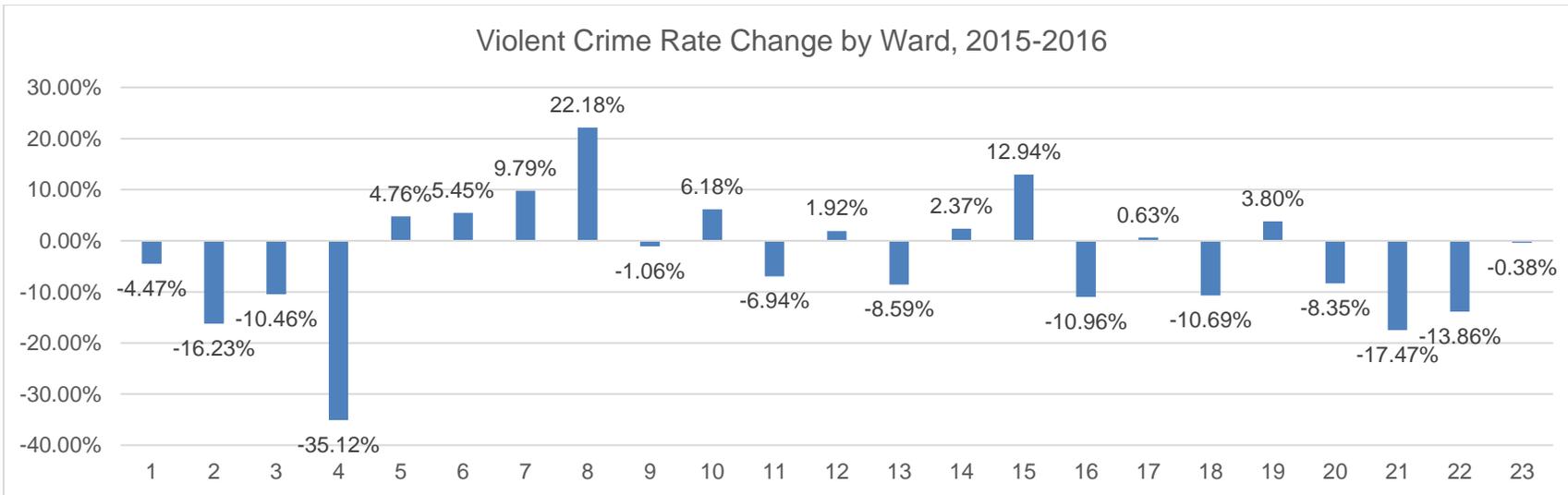


Figure 9. Number of homicides, City of Ottawa Wards, 2012-2016

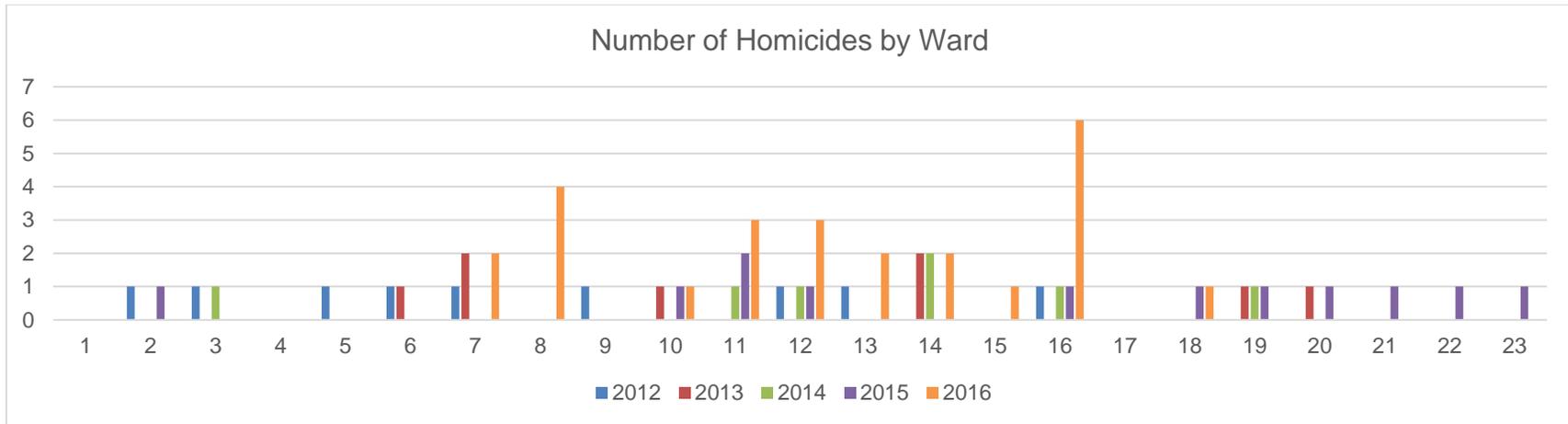
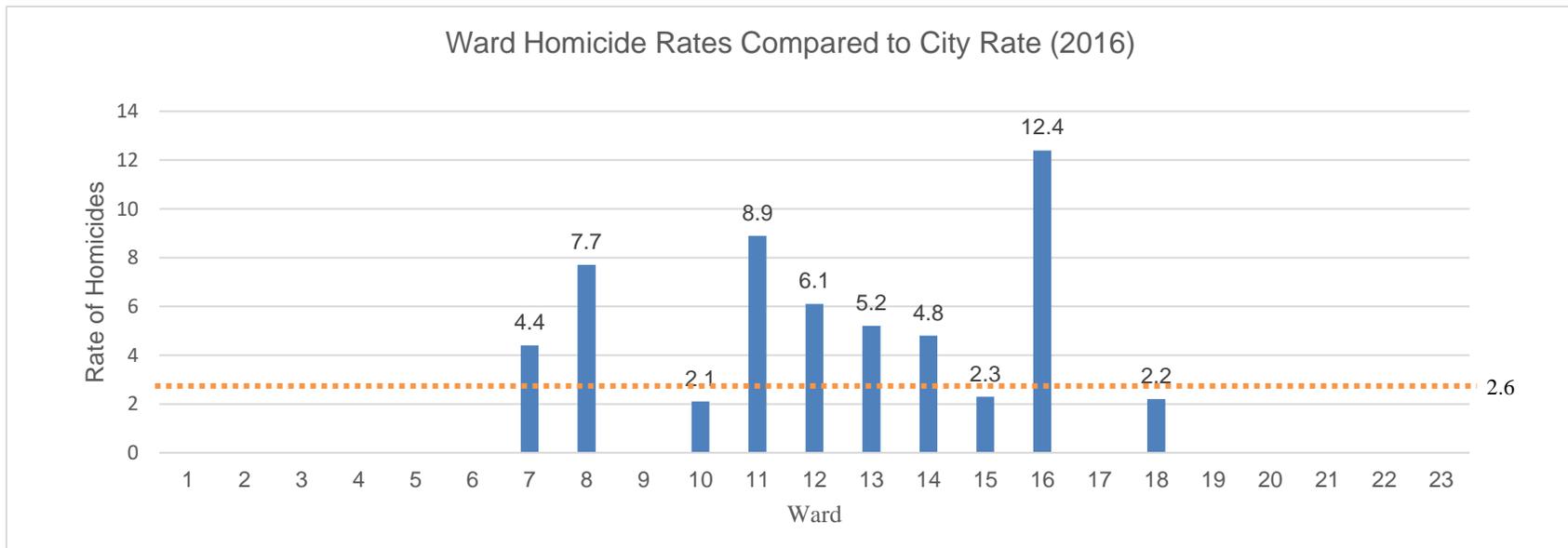


Figure 10. Homicide rates, City of Ottawa and Wards, 2016



Conclusion and recommendations

Within the City of Ottawa, all four violent and weapons crimes variables examined increased in number from 2015 to 2016, and both assault numbers and discharge with intent numbers also increased from 2014 to 2015. While overall violent crime for the City of Ottawa only increased by 1.2 per cent from 2015 to 2016 and remained below the peak observed in 2013, the increase in the severity of violent crime experienced in the City of Ottawa points to a different and concerning trend. Despite this, it is worth noting that the City of Ottawa's overall violent crime rate and violent crime severity index in 2016 was still significantly below the national average.

The data also indicates that the increase in violent and weapons crimes did not have a major impact on the number of overall violent crimes in the City of Ottawa, which is backed up by the absence of a statistically significant relationship between the number of violent crimes in the City of Ottawa and the four violent and weapons crime variables. The violent crimes that are occurring, however, are clearly more severe in nature, which calls for further exploration.

At the ward level, there are clear differences in homicide rates across wards, but the correlation with overall violent crime rates was not consistent. For example, Ward 16 experienced a decrease in overall violent crime from 2015 to 2016 but at the same time it experienced a significant increase in the homicide rate. Ward 8, on the other hand, experienced a rise in overall crime rate during the same period with a concurrent rise in homicides.

The findings above suggest that there is a lot more that needs to be done to understand the reasons behind the increase in the four violent and weapons crimes incidents in 2016. Analysis of the data alone does not provide enough insights to fully understand the issue. Further qualitative analysis on the detailed circumstances surrounding the four violent and weapons crimes incidents needs to be carried out to provide a deeper context, particularly in Wards where significant increases were observed in 2016. This may yield additional insights into the issue and identify potential solutions for crime prevention. There may also be some useful crime prevention insights arising from a more in-depth qualitative analysis around the drastic drop in the violent crime rate in Ward 4.

Finally, while a five-year view may not have resulted in any statistically significant findings in terms of violent crime patterns, a sample of tests run on the 1998-2016 Statistics Canada data yielded some potentially useful findings (i.e., correlations between assault rates and discharge of weapons rates; correlations between the number of homicides, assaults, and weapons crimes; and the relationship between the number of police officers, policing budget, and the number of homicides.) It is also

recommended that a longitudinal study of violent crime in the City of Ottawa be undertaken to identify patterns and relationships between crime and policing variables.

Summary of Recommendations

1. Conduct an in-depth qualitative study of 2016 violent and weapons crimes incidents to understand the specific context around each incident.
2. Conduct in-depth qualitative studies on a Ward-by-Ward basis to better understand the context for variations in violent crime across the city.
3. Analyse Wards which have been successful in reducing violent crime rates to identify potential insights for reducing violent crime.
4. Carry out a longer-term quantitative analysis of violent crime in the City of Ottawa.

Annex: SPSS Outputs

Output 1. Output for crime variables test for relationships between total number of violent crimes and number of separate violent crime incidents, 2012-2016 (n= 5). s

Correlations

	Violent_Crime_Number	
	Pearson Correlation	Sig. (2-tailed)
Homicide	-.028	.964
Assault	.479	.414
Discharge_weapon	-.467	.428
Used_weapon	.501	.390

Output 2. Output for crime variables test for relationships between number of violent crime incidents, 2012-2016 (n= 5).

Correlations

		Homicide	Assault	Discharge_weapon	Used_weapon
Homicide	Pearson Correlation	1	.595	.800	-.067
	Sig. (2-tailed)		.290	.104	.915
Assault	Pearson Correlation	.595	1	.117	-.237
	Sig. (2-tailed)	.290		.851	.701
Discharge_weapon	Pearson Correlation	.800	.117	1	-.292
	Sig. (2-tailed)	.104	.851		.634
Used_weapon	Pearson Correlation	-.067	-.237	-.292	1
	Sig. (2-tailed)	.915	.701	.634	

Output 3. Output for crime variables test for relationships between number of violent crime incidents, 2011-2015 (n= 5)

Correlations

		Homicide	Assault	Discharge_we apon	Used_weapon
Homicide	Pearson Correlation	1	.596	-.496	-.037
	Sig. (2-tailed)		.288	.396	.953
Assault	Pearson Correlation	.596	1	-.755	-.287
	Sig. (2-tailed)	.288		.140	.639
Discharge_weapon	Pearson Correlation	-.496	-.755	1	-.247
	Sig. (2-tailed)	.396	.140		.689
Used_weapon	Pearson Correlation	-.037	-.287	-.247	1
	Sig. (2-tailed)	.953	.639	.689	

Output 4. Output for crime variables test for relationships between rates of violent crime incidents, 2012-2016 (n= 5)

Correlations

		Homicide_Rat e	Assault_Rate	Discharge_Rat e	Weapon_used _rate
Homicide_Rate	Pearson Correlation	1	.455	.783	-.102
	Sig. (2-tailed)		.442	.117	.871
Assault_Rate	Pearson Correlation	.455	1	-.085	-.195
	Sig. (2-tailed)	.442		.892	.754
Discharge_Rate	Pearson Correlation	.783	-.085	1	-.340
	Sig. (2-tailed)	.117	.892		.575
Weapon_used_rate	Pearson Correlation	-.102	-.195	-.340	1
	Sig. (2-tailed)	.871	.754	.575	

Output 5. Output for crime variables test for relationships between rates of violent crime incidents, 2011-2015 (n= 5)

Correlations

		Homicide_Rate	Assault_Rate	Discharge_Rate	Weapon_used_rate
Homicide_Rate	Pearson Correlation Sig. (2-tailed)	1	.667 .219	-.519 .371	-.019 .976
Assault_Rate	Pearson Correlation Sig. (2-tailed)	.667 .219	1	-.800 .104	-.243 .694
Discharge_Rate	Pearson Correlation Sig. (2-tailed)	-.519 .371	-.800 .104	1	-.284 .644
Weapon_used_rate	Pearson Correlation Sig. (2-tailed)	-.019 .976	-.243 .694	-.284 .644	1

Output 6. Output for test for relationships between number of police officers and number of violent crime incidents, 2012-2016 (n= 5)

Correlations

	Officers	
	Pearson Correlation	Sig. (2-tailed)
Homicide	.405	.499
Assault	.821	.088
Used_weapon	-.174	.779
Shots_Fired	-.064	.918

Output 7. Output for test for relationships between police budget and number of violent crime incidents, 2012-2016 (n= 5)

		Budget
Homicide	Pearson Correlation	.734
	Sig. (2-tailed)	.158
	N	5
Assault	Pearson Correlation	.091
	Sig. (2-tailed)	.884
	N	5
Discharge_weapon	Pearson Correlation	.953
	Sig. (2-tailed)	.012
	N	5
Used_weapon	Pearson Correlation	-.191
	Sig. (2-tailed)	.758
	N	5

Output 8. Output for test for relationships between number of police officers, police budget, and homicides, 2012-2016 (n= 5)

		Officers	Budget	Homicide
Officers	Pearson Correlation	1	-.278	.405
	Sig. (2-tailed)		.651	.499
	N	5	5	5
Budget	Pearson Correlation	-.278	1	.734
	Sig. (2-tailed)	.651		.158
	N	5	5	5
Homicide	Pearson Correlation	.405	.734	1
	Sig. (2-tailed)	.499	.158	
	N	5	5	5