# Continuous Rise in Crime Cases Reported in Toronto Over Recent Years*

**An Analysis of Toronto's reported crime from 2014 to 2022**

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This study presents a comprehensive analysis of reported crime data in Toronto, as sourced from Open Data Toronto, to explore the trend of urban criminal patterns in Toronto over the past years. By examining reported incidents from 2014 to 2022, this paper identifies key trends in crime cases across different years and police divisions, highlighting possible key factors that may caused such results. In a word, the paper seeks to provide actionable insights for city planners, law enforcement, and community advocates, aiming to build a safer, more enjoyable urban living environment.

## 1 Introduction

Public safety, crucial for ensuring high-quality life, requires continuous evaluation and enforcement. The city of Toronto, with one of Canada's largest populations, is not immune to the challenges posed by crime. This paper takes a deep dive into the extensive reported crime data provided by Open Data Toronto(Gelfand 2020), covering the period from 2014 to 2022. The analysis is grounded in a methodical approach to identify and interpret crime trends across the past years, also within the city's diverse police divisions, offering a detailed chronicle of criminal activity over a selected time span. More specifically, this research analyzed and visualized how crime is distributed across different divisions and how it changes over the years. By dissecting the data year by year, division by division, this study uncovers patterns that could inform future urban planning and law enforcement strategies. The study considers the role of population growth, natural diseases, and urban development as potential factors influencing these patterns.

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*Code and data are available at: https://github.com/iJustinn/Totonto_Reported_Crimes.git

Moreover, the paper aims to go beyond merely displaying statistics. It endeavors to contextualize the numerical findings within the broader spectrum of Toronto's urban structure. This discussion is motivated by the observation that changes in crime rates often correlate with shifts in other city indicators, such as education level(Bell, Costa, and Machin 2022), unemployment rate(Phillips and Land 2012), economic level(Machin and Meghir 2004), and so on. By doing this, the study aims to offer useful advice that can help city officials and the police create plans to make the city safer and better for all residents. In this manner, the paper serves not merely as an exposition of data but as a roadmap towards a better living environment.

The subsequent sections of this paper are organized to facilitate a comprehensive understanding of the study and its implications. After this introduction, Section 2 outlines the methodology used in the analysis, emphasizing transparency and replicability. Section 3 presents the findings in detail, charting the trends in reported crimes over time and across Toronto's police divisions. Section 4 discusses these findings from various perspectives, including natural diseases, infrastructure construction, and the city's structure, among others. Finally, Section 5 concludes the paper, summarizing the key insights and findings of this research.

# 2 Data

## 2.1 Data Source

The data used in this paper was collected by the OpenDataToronto Library (Gelfand 2020). The specific data set used in this research is the 'police-annual-statistical-report-reported-crimes' (Data 2023).

Data used in this paper was downloaded, cleaned and analyzed with the programming language R (R Core Team 2022). Also with support of additional packages in R: `tidyverse` (Wickham et al. 2019), `ggplot2` (Wickham 2016), `janitor` (Firke 2023), `dplyr` (Wickham et al. 2023), `readr` (Wickham, Hester, and Bryan 2023), `knitr` (Xie 2014).

## 2.2 Data Processing

### 2.2.1 Data Cleaning

Table 1: Head of Raw Toronto Reported Crimes Data

| ID | Reported Year | Division | Category | Sub Type | Total Case | Cleared Case |
|----|------|----------|----------|----------|-------|--------|
| 1 | 2014 | D11 | Crimes Against the Person | Other | 22 | 9 |

| ID | Reported Year | Division | Category | Sub Type | Total Case | Cleared Case |
|----|---------------|----------|----------|----------|------------|--------------|
| 2 | 2014 | D11 | Crimes Against Property | Theft Over $5000 | 1 | 1 |
| 3 | 2014 | D11 | Crimes Against the Person | Other | 1 | 1 |
| 4 | 2014 | D11 | Crimes Against the Person | Robbery-Financial | 1 | 1 |
| 5 | 2014 | D11 | Crimes Against Property | Break & Enter-House | 23 | 13 |
| 6 | 2014 | D11 | Crimes Against Property | Theft Over $5000 | 1 | 1 |

Table 2: Head of Cleaned Toronto Reported Crimes Data

| Reported Year | Division | Total Case |
|---------------|----------|------------|
| 2014 | D11 | 22 |
| 2014 | D11 | 1 |
| 2014 | D11 | 1 |
| 2014 | D11 | 1 |
| 2014 | D11 | 23 |
| 2014 | D11 | 1 |

The raw data set, first few lines shown in Table 1, contains more than 30000 reported crime cases in Toronto from 2014 to 2022 in all police divisions, including reported crime types, case status, case ID, etc. Since this research only focusing on the division and reported year of each case, thus all other extra information in the data was cleaned as needed. Now the cleaned data only shows the number of reported crime cases in corresponding years and the police division to each case was reported. The first few lines of the cleaned data were shown in the Table 2.

### 2.2.2 Further Data Processing

In order to make it easier to draw the data in the future, the cleaned data has been further processed into data with only two variables, which are used to correspond to the x-axis and y-axis when drawing.

Table 3: Head of Toronto Reported Crimes Data by year

| Reported Year | Total Cases |
|---|---|
| 2014 | 113432 |
| 2015 | 117365 |
| 2016 | 122626 |
| 2017 | 129970 |
| 2018 | 143204 |
| 2019 | 144532 |

As mentioned earlier, this paper will first analyze the trends of reported crimes in different years. Therefore, the first further processed data will add up all data from different policy divisions in each year to form a total number of reported crimes for a specific year. The head of these data was shown in Table 3.

Table 4: Head of Toronto Reported Crimes Data by police division

| Division | Total Cases |
|---|---|
| D11 | 52546 |
| D12 | 43158 |
| D13 | 38712 |
| D14 | 88678 |
| D22 | 72300 |
| D23 | 56343 |

Then, this paper will analyze the total number of reported crimes received for different policy divisions disregard of the year. Therefore, the process of this data ignores the year and adds up all the data received by each policy division in the cleaned data set to form the data set shown in Table 4.

## 3 Results

### 3.1 Across years

The bar chart (Figure 1) displays the total number of reported crime cases in Toronto for each year from 2014 to 2022 with the vertical axis indicates the number of cases. From a visual inspection, the following trend can be observed: starting in 2014, there appears to be a relatively steady or slight increase in the number of cases, reaching a peak around 2017 and
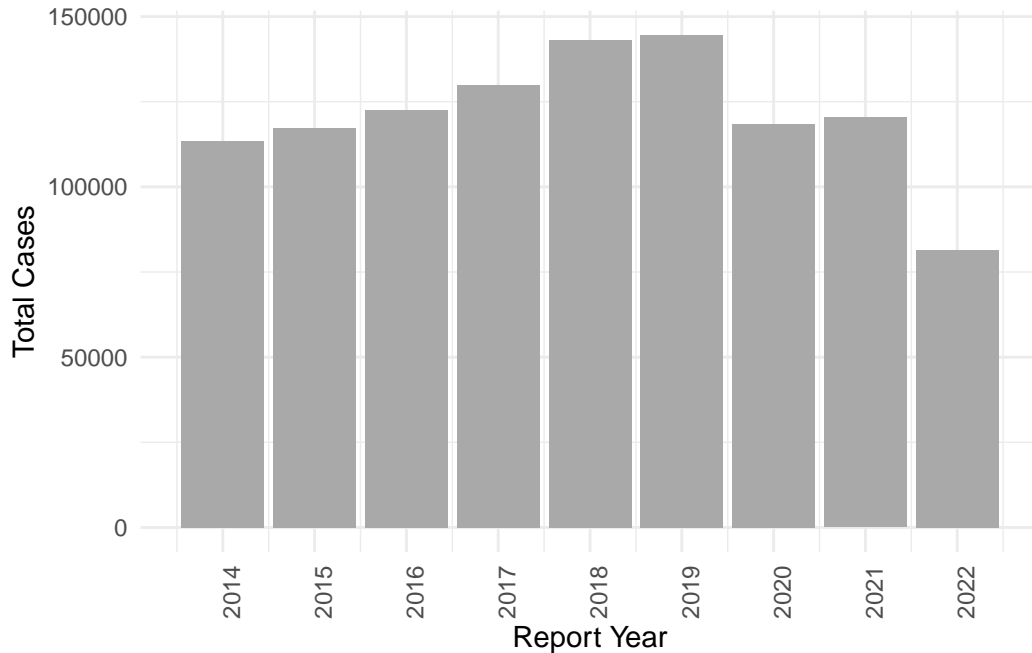
Figure 1: 2014 to 2022 Toronto Total Reported Crime Cases by Year

2018. After this peak, there is a significant decrease in the number of reported crime cases, showing almost no upward trend up to 2021.

Notably, there are two significant drops in the total reported crime cases in 2020 and 2022 compared to their previous years. These declines could be of particular interest and are worth further investigation to understand the underlying factors contributing to these changes.

## 3.2 Across divisions

The bar chart ((**by_division?**)) provides a visual representation of the total reported crime cases in Toronto from 2014 to 2022, broken down by police division. Each bar corresponds to a specific division, labeled D11 through D55, along with an 'NSA' category at the end. The vertical axis quantifies the total cases.

The divisional data shows variability in the number of reported crimes, with some divisions displaying notably higher totals than others. For instance, certain divisions such as D14, D32, D51, D52, and D55, exhibit particularly tall bars, indicating a higher total of reported cases. Conversely, divisions like D12, and D13, show considerably fewer reported cases, as reflected by their shorter bars.
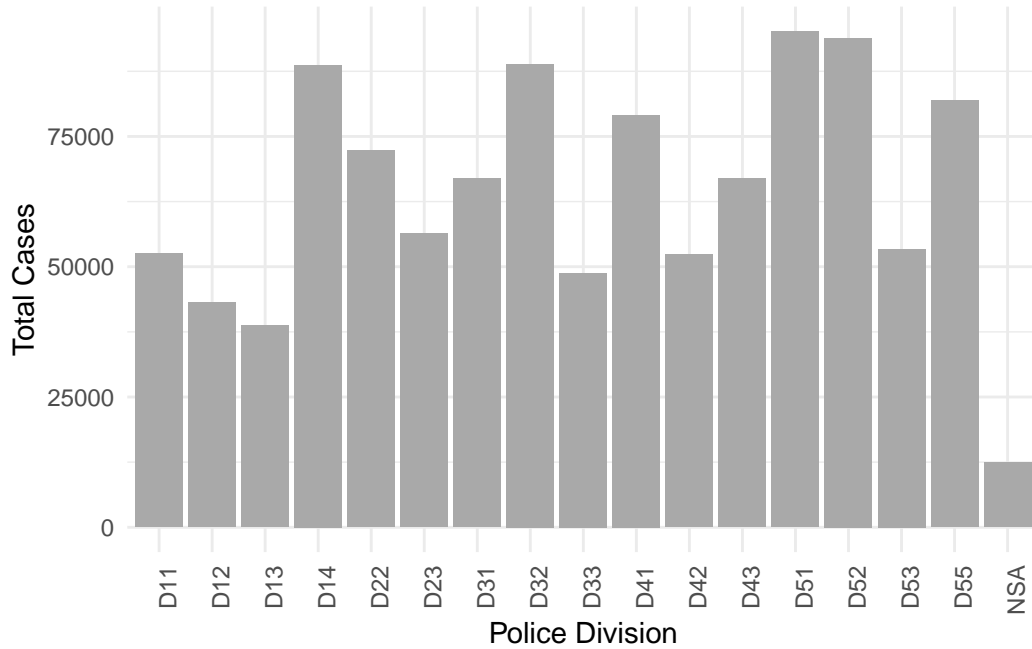
Figure 2: 2014 to 2022 Toronto Total Reported Crime Cases by Division

# 4 Discussion

## 4.1 Across years

Continuing with the analysis of the chart (Figure 1), as mentioned in the Results section, there were two major drops in the trend line. To begin with, the drop in 2020 appears to have an obvious cause. Starting from the end of 2019(Ryan 2021), the world entered a period of over two years of the pandemic. Public health measures such as lockdowns, physical distancing, and restrictions on gatherings drastically changed social behaviors and daily activities. This unprecedented situation has had a ripple effect across various sectors, impacting public safety and crime rates.

As communities went into isolation and businesses either temporarily closed or shifted to remote operations, the opportunities for certain types of crimes, such as burglaries and thefts in commercial areas, may have diminished(Abrams 2021). Conversely, there have been concerns about a potential rise in domestic incidents and cybercrimes, as more people stayed at home and activities shifted online.

The impact of the pandemic on mental health(Semo and Frissa 2020), driven by prolonged social isolation and economic stress, cannot be understated. These factors have influenced community dynamics and possibly crime patterns(Peay 2010). Law enforcement agencies and

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social services have had to adapt, sometimes shifting their focus to community support and online safety initiatives. The extended period of the pandemic has also challenged traditional approaches to crime prevention and response, prompting a reevaluation of resource allocation and policing methods.

## 4.2 Across divisions

The bar chart (Figure 2) illustrates the total reported crime cases in Toronto by police division from 2014 to 2022. Upon examining specific divisions, certain patterns emerge. The map(Esri(OpenStreetMap contributors) 2024) provided by the Toronto Police Service (TPS) shows that downtown Toronto, particularly Division 51, has a significant number of reported cases. Notably, Division 51 has one of the highest counts of total crime cases on the chart. This finding strongly suggests a correlation between the high population density and activity levels in downtown areas and the rates of crime(Battin and Crowl 2017).

Not only in downtown Toronto but also in areas hosting large shopping malls, such as North York's Division 32, the total crime cases exceed those of other divisions significantly. Additionally, divisions characterized by high population density, such as Division 52—where the CN Tower and Scotiabank Arena are located—and Division 14, known for its numerous train stations, also report a high number of crime cases.

Conversely, Scarborough's Division 43, while reporting a considerable number of cases, does not reach the high levels observed in the aforementioned divisions. This may reflect the predominant house type (town houses rather than condos) and development situation in the area. Once again, this suggests that population density may be a factor influencing crime rates(Battin and Crowl 2017). While other factors such as socioeconomic status, community engagement, and policing strategies are also significant, further information is necessary for a more comprehensive assessment.

## 5 Conclusion

"In conclusion, this paper reflects on the significant findings from the analysis of reported crime data in Toronto between 2014 and 2022. The data reveal fluctuating crime rates, with notable peaks and troughs that correspond to various factors and events, most prominently the COVID-19 pandemic. This period notably witnessed changes in crime patterns due to altered social behaviors and shifts in policing strategies. The division-specific analysis highlighted the impact of population density and the level of development on crime distribution. By leveraging detailed crime data, Toronto can continue to refine its urban safety strategies, aiming to create a city that is not only safer but also more equitable and responsive to the needs of its rapidly growing population("Toronto, Canada Metro Area Population 1950-2024" 2024).

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