

Preliminary Analysis of Crime in Selwyn District

Data analysis was conducted on data downloaded from the New Zealand [police data](#) portal. This dataset contains statistics for victimizations and includes information on crimes including the type of crime (assault, theft etc.) and the number of incidents, the suburb/area of occurrence, the date they were recorded, and the associated police station. However, it is important to note that homicides are not reported in this dataset. The timeframe of the dataset spans from 2014 till August 2023.

The dataset is comprehensive and covers all the police stations in New Zealand. The police station is the constituent unit of a grouping known as the *police area*, which is part of the larger *police district*. For instance, the police stations in rural Canterbury are grouped under the 'Canterbury Rural Area', which is a part of the Canterbury Police District. The geographical expanse and coverage of police districts differ from the administrative areas known as Territorial Authorities, which include regional councils (for e.g., the Selwyn District Council).

The data for Selwyn District was filtered out and analysed separately from the main dataset. The Selwyn District Council (SDC) is the Territorial Authority which includes the urban and rural parts of Darfield, Lincoln, Rolleston, West Melton, and Leeston. Notably, West Melton does not have its own police station; the available data covers the other four areas. It is quite possible that West Melton is covered by one of the other police stations and the data is aggregated accordingly. This is an aspect that needs clarification.

Residents of Selwyn district will have several pertinent questions regarding the crime data such as:

What is the general trend of reported victimizations/crime incidents in Selwyn district?

What types of crimes occur most frequently in Selwyn district?

What is the trend in different types of crimes over the years?

This short document tries to answer these questions and more based on publicly available data.

The rest of the report presents some of the preliminary results of the data analysis. All analysis and visualisations were done using the pandas, SciPy, NumPy, and Matplotlib packages in Python. Additionally, an open-source statistical analysis software, JASP, was used in conjunction with Python. This facilitated cross-checking results of tests such as chi-square and correlations. Good old Excel was also used for sanity checks on the results and organization of the data.

Geographical markers from the shapefiles for the police districts will be used to create interactive dashboards at a later stage. This document is a work-in-progress and will be updated periodically.

The Trend in Reported Crime Incidents in Selwyn District

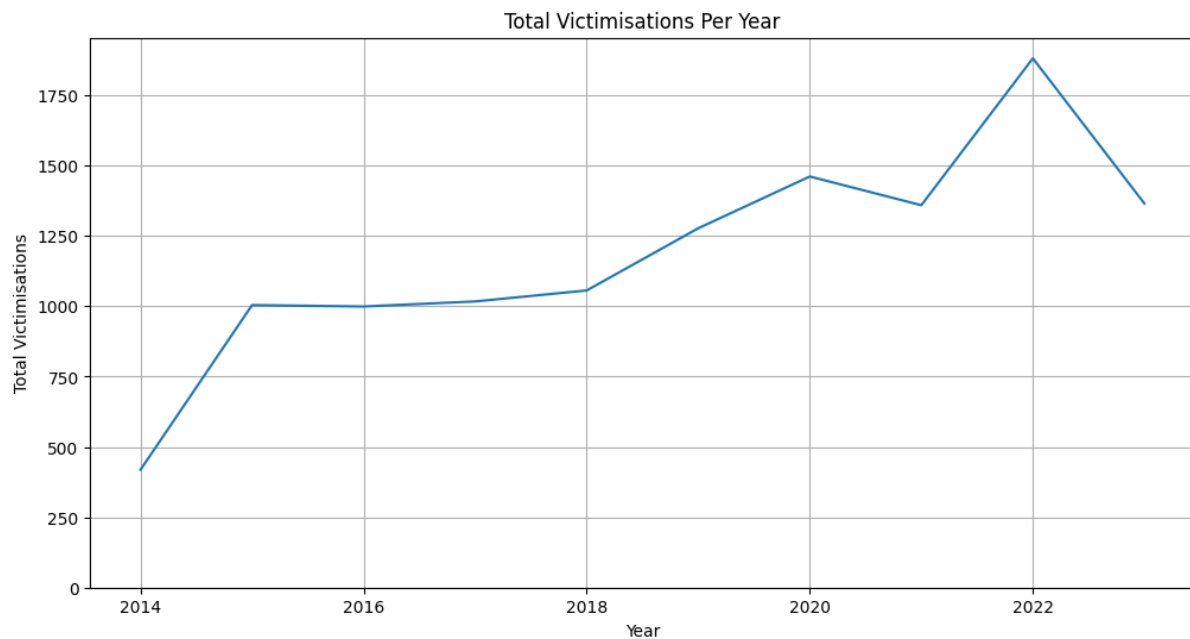


Figure 1 Victimisations per year in Selwyn district for the period 2014-2023.

The rate of victimizations has been steadily increasing over the decade from 2014 to the present. The average annual rate of increase is 26%, with the sharpest rise observed in 2015, showing a jump of nearly 140% over 2014. This significant increase might be attributed to changes in the data collection and reporting methods by the NZ Police. In 2021, there was a decrease of 7% with 1,359 reported incidents, compared to 1,461 incidents in 2020. However, this decrease was more than offset in 2022, when incidents spiked by 38%, resulting in 1,881 victimizations. The data for the current year is incomplete, but with 1,365 victimizations recorded until August, it is possible that the year will conclude with numbers lower than those of 2022 but still higher than in previous years.

Most Common Crime Types in Selwyn District

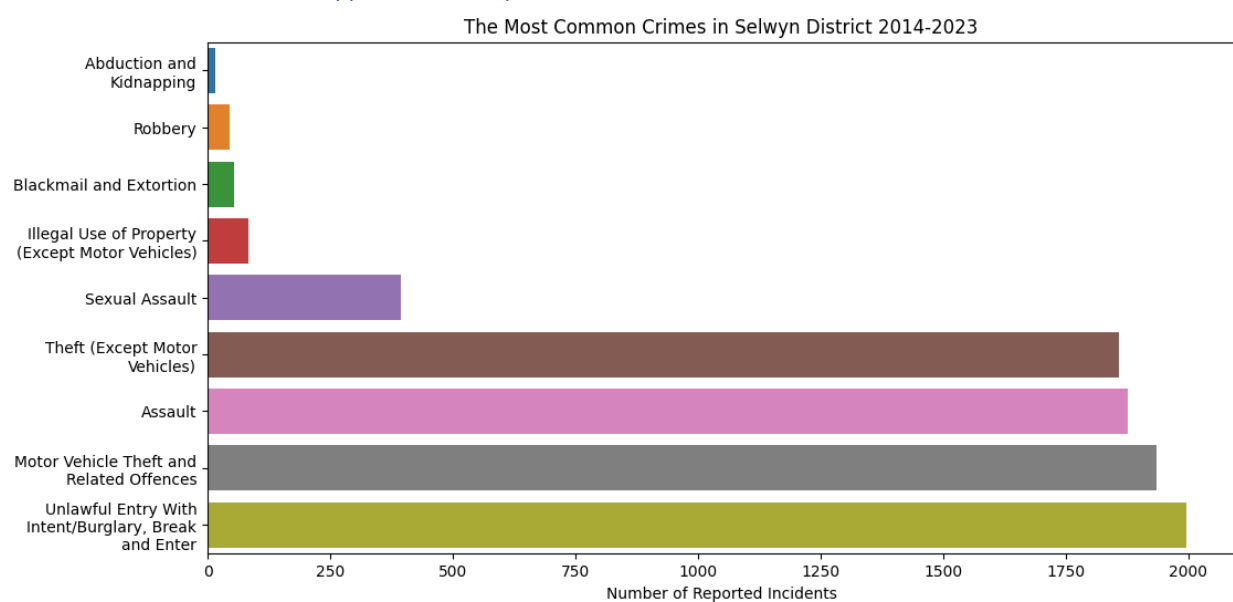


Figure 2 The most frequently occurring crimes in Selwyn District 2014-2023.

The most frequently occurring crime in Selwyn District involved offenders breaking into homes for burglary with 1,995 reported incidents over the decade. This is classified under the ANZSOC category of “*Unlawful Entry with Intent/Burglary, Break & Enter*”. Closely following this are theft of motor vehicles with 1,934 offences. Assault ranks third with 1,877 victimizations.

To determine the statistical significance of the observed frequencies, a chi-square test of independence was performed. The chi-square test result ($\chi^2 = 281.48$) with a p-value < 0.001 indicates that the relationship observed between the year and the number of victimizations is statistically significant.

While the yearly aggregated data does provide an overview of the most common types of crime, it does not shed light on a more interesting aspect: *the trend in the different crime types over the period*.

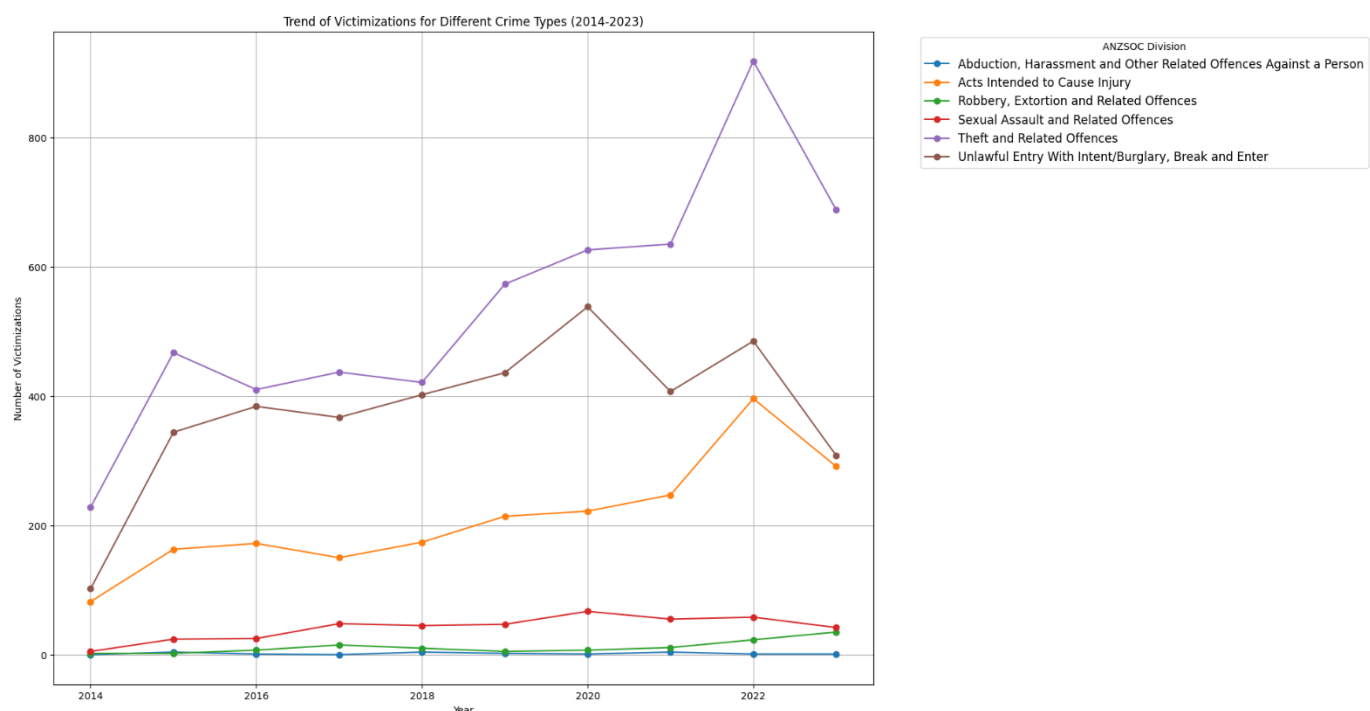


Figure 3 Trend of the different crime types for Selwyn District 2014-2023.

Figure 3 illustrates the trend for different crime types from 2014 till date. As mentioned previously, the near doubling of reported incidents in several crime categories in 2015 suggests a change in the reporting process. Taking 2015 as the baseline year to calculate percentage changes, “*Theft & Related Offences*” dominated numerically with 2022 registering the highest number of thefts (918) for the period. In terms of percent change this was a surge of 45% compared to 2021. However, the category with the highest percent change was “*Robbery, Extortion and Related Offences*” which showed an average upwards trend of 70%. Sexual offences, while smaller in number, also exhibit a marked growth with an average year-on-year increase in victimizations of 18%.

Distribution of the Crimes by Police Station

Due to the geographic and population diversity of Selwyn District it is natural for there to be variations in the frequency of different crime types in the constituent police stations. The results

of the cross tabulation of the number of victimizations categorised by the type of crime and classified under the reporting police station is presented in Table 1 below.

Table 1 The percentage distribution of crimes types reported by police stations in Selwyn District.

		Police Station			
Anzsoc Division		Darfield	Leeston	Lincoln	Rolleston
Abduction, Harassment and Other Related Offences Against a Person	% of total incidents	0.126 %	0.074 %	0.260 %	0.120 %
Acts Intended to Cause Injury	% of total incidents	13.317 %	18.718 %	13.375 %	21.217 %
Robbery, Extortion and Related Offences	% of total incidents	0.565 %	0.811 %	1.269 %	0.997 %
Sexual Assault and Related Offences	% of total incidents	3.643 %	5.158 %	3.189 %	3.267 %
Theft and Related Offences	% of total incidents	40.013 %	38.172 %	46.079 %	48.693 %
Unlawful Entry with Intent/Burglary, Break and Enter	% of total incidents	42.337 %	37.067 %	35.828 %	25.705 %
Total Reported Incidents/Victimizations		1592	1357	3073	5816

Unsurprisingly, two categories, “*Theft and Related Offences*” and “*Unlawful Entry with Intent/Burglary, Break and Enter*” constituted between 70-82% of the crimes being committed under each police jurisdiction. However, Rolleston stands out with a low percentage (25%) of crimes associated with unlawful entry/burglary in contrast to the other three police stations. Additionally, Rolleston had a relatively higher rate of assaults (classified under “*Acts Intended to Cause Injury*”) compared to the rest.

To determine the statistical significance of the observed frequencies, a chi-square test of independence was performed. The chi-square test result ($\chi^2 = 302.34$) with a p-value < 0.001 indicates that the relationship observed between the police station and the number of victimizations for a specific type of crime is statistically significant.