

Project 1 Documentation

Crime Offence in Victoria

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Introduction & Aim

To analyse crime offences occurred in Victoria and answer the following questions:

1. Trends and tendency based on geographical regions
 - a. Has there been an increasing/decreasing trend on the number of offences?
 - b. Which regions do have the most/least number of offences?
 - c. Have the offences been concentrated in certain regions?
2. Age and Crime relation
 - a. What is the total number of crimes in each age group?
 - b. Comparison between the amount of crime committed by males and females.
 - c. What types of crime have more incidence?
3. Setting of Crime
 - a. How can we ensure enhanced security in residential areas?
 - b. How has the offence counts impacted the community?
 - c. Are there any other areas to keep an eye on considering the current situation?
4. Drug Offence
 - a. Has drug-related offences been increasing over the years?
 - b. What type of drug offence is the most popular?
 - c. What suburbs have the most drug-related offence?

Approach

Trends and tendency based on geographical regions

offences_per_lga.xlsx: Number of offences based on Police Region and Local Government Area (LGA) in Victoria across the years

Data source: Crime Statistics Agency (or CSA)

The data was grouped by the Police Region to provide a high-level view on trends and comparison between regions across the year. Analysis continues with identification of the LGA within each Police Region. Top & bottom 4 of LGA are chosen based on the total number of offences that took place from 2012 to 2021.

Heatmap is used to determine the geographical tendency. Latitude and longitude values of each LGA are plotted using the Google map. The heatmap is weighted based on the total number of offences from 2012 to 2021.

Fields	Field Information
Year	Year that the information was collected
Police Region	Name of each Police Region, which pools a number of Local Government Area
Local Government Area	Name of each local government area (also known as city council)
Offence Count	Number of offences recorded

Crime and Age Trends

Age Crime.csv: Details offence types based on each local government area in Victoria across the years.

Data source: Crime Statistics Agency (or CSA)

The data is cleaned by filtering the Age Group Totals and removing extra commas in Alleged Offender Incidents so the calculations can be performed.

Fields	Field Information
Year	Year that the information was collected
Year Ending	Month of year ending
Sex	Offender's gender
Age Group	Offender's age
Offence Division	Offence type
Alleged Offender Incidents	Number of incidences

Setting of Crime

Setting_of_Crime.csv: This describes the offence counts based on specific LGAs and also compared based on location division and subdivisions.

Data source: Crime Statistics Agency (or CSA)

The data is filtered towards the top 10 LGAs with the highest offence count, in which a closer look would be delivered onto those LGAs. They are then filtered towards their individual groups based on the location division: Residential, Community and Other, in which the questions which would be figured out would be based on each of them. Any NaNs are replaced with zero values.

Fields	Field Information
Year	Year that the information was collected
Year ending	The month in which the year ends
Local Government Area	The local government area name
Location Division	This refers to the division of the offence
Location Subdivision	This refers to the subdivision of the offence
Location Group	The group of the offence as part of the subdivision
Offence Count	The number of offences as part of the group

Drug Offence

Offences_Types_LGA.csv: Details offence types based on each local government area in Victoria across the years.

Data source: Crime Statistics Agency (or CSA)

The data is cleaned by filtering the offence division to the drug offences and removing the offence subgroup column since the data will be based on the offence division and subdivision to reduce the noise and show clearer pictures.

Fields	Field Information
Year	Year that the information was collected

Year Ending	Month of year ending
Local Government Area	Name of each local government area
Postcode	Postcode of the suburb
Suburb/Town Name	Suburb in Victoria
Offence Division	Main division of the offence type
Offence Subdivision	Subdivision of the offence type
Offence Subgroup	Subgroup of the subdivision of the offence type
Offence Count	Count of the offence

SuburbsData.csv: Details of Latitude and Longitude of each suburb in Victoria.

Data source: OpenWeatherAPI

The data is cleaned by dropping rows with N/A values and making sure that all the rows presented are populated with values.

Fields	Field Information
Suburbs	Suburbs in Victoria
Country	Country
Lat	Latitude data
Lng	Longitude data

Results & Analysis

Findings 1: Trends and tendency based on geographical regions

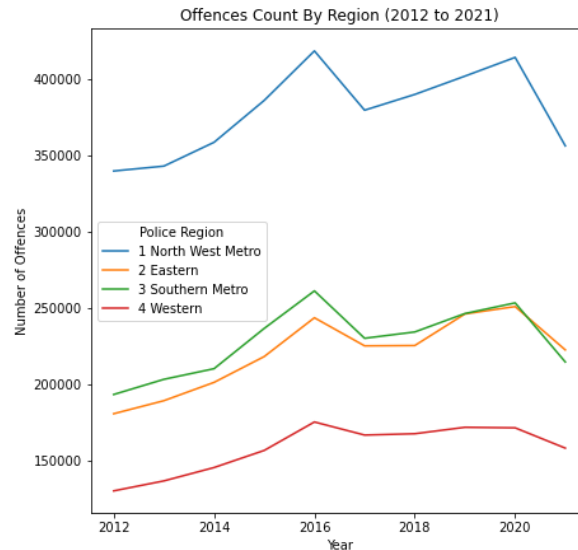


Figure 1: Comparison of Offence Counts across Police Region

Figure 1 demonstrates the number of total crimes committed in Victoria between from 2012 to 2021 grouped by Police Region. Overall, there has been an increasing trend on the number of crimes committed from the time period. The number of crimes peaked in 2016 and again in 2020. The pandemic management introduced in 2020 is suspected to be the driving factor of the increase. This may include fines issued for violating the pandemic management related rules.

Most crimes were committed in the North West Metro. Crimes recorded in the region are twice as many as the ones recorded in Eastern and Southern Metro region.

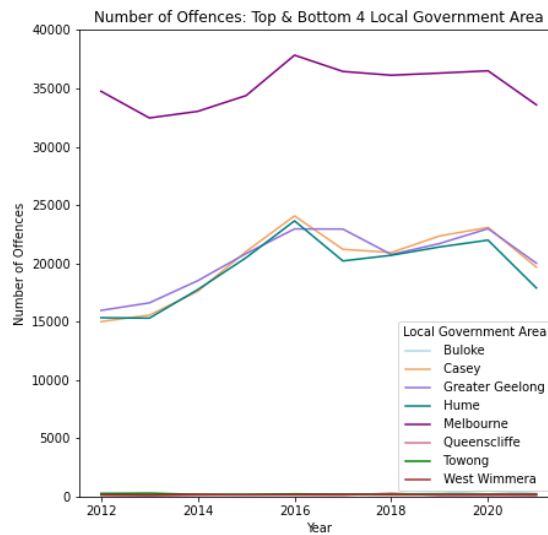


Figure 2: Comparison of Offence Counts across top & bottom 4 Local Government Areas

Figure 2 demonstrates the number of total crimes committed in Victoria between from 2012 to 2021 grouped by top & bottom 4 of Local Government Area (LGA). Two LGA of the North West Metro region are included in the top 4: Melbourne and Hume. Three LGA of the Western region are included in bottom 4: Queenscliffe, West Wimmera, and Buloke. This further supports the previous finding where North West Metro and Western regions have been identified to have the highest and lowest number of crimes.

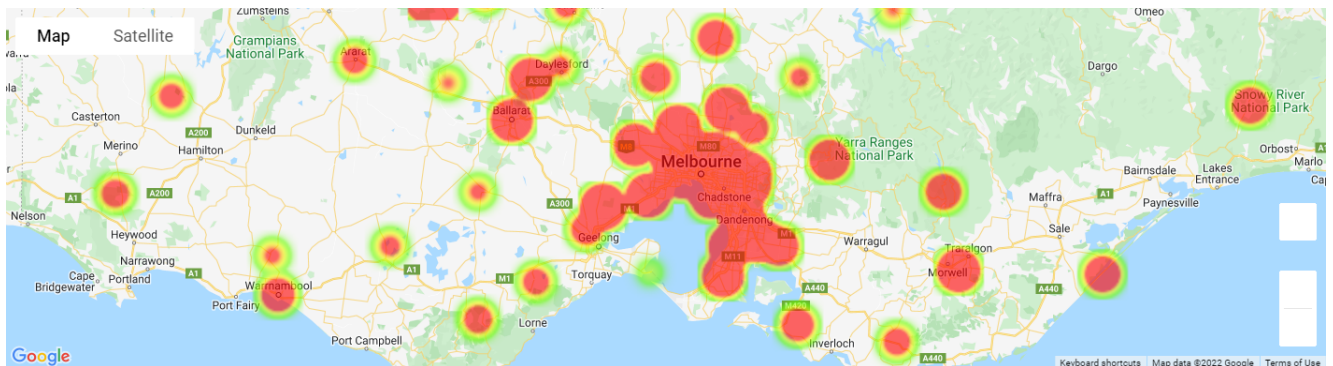


Figure 3: Tendency of crimes committed across Local Government Area

Figure 3 demonstrates the number of crimes committed in Victoria between from 2012 to 2021 for each LGA. The tendency is measured based on the total number of crimes within the time period. There is a high concentration of criminal activities within the metropolitan area. This may

suggest that population is the driving factor of the number of offences. Further examinations to look at this factor is recommended.

Findings 2: Trends based on Age Group

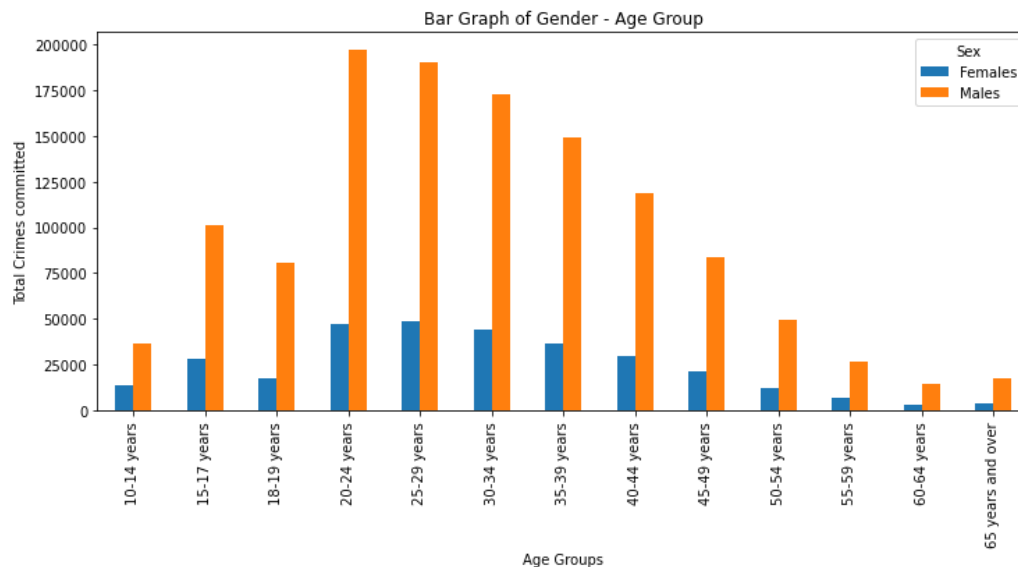
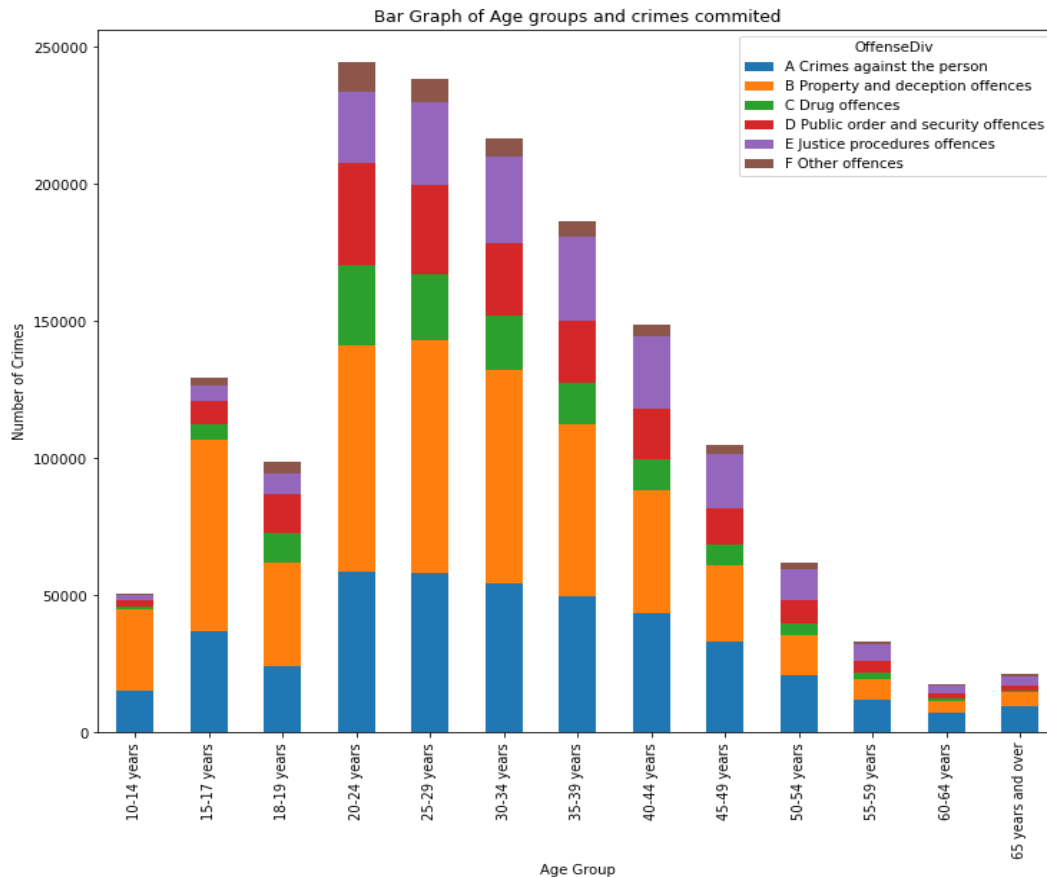


Figure 1 demonstrates the number of total crimes committed in Victoria between from 2012 to 2021 sorted by gender. Most crimes were committed by Males among all age groups with a total of 196700 incidents. **Top three age groups involved in crimes are 20-24, 25-29 and 30-34** age groups but after these three groups, crime patterns generally have a meaningful decrease among both males and females.

Females between the age group of 25-29 are most involved in crimes. As is shown by the graph, overall, **females are much less involved** in crimes when compared to males in all age groups over the years.



In Figure 2, overall, most committed crimes are 'B - Property and Deception' offences followed by 'Crimes Against a Person' and 'Justice Procedures' offences.

However, among 20-24 and 25-29 age groups, the third most committed crime is 'Public Order and Security' offences (37,178 and 32,415 incidents).

People in the age groups of over 55 are less involved in crimes compared to the other age groups.

What is noteworthy is an unexpected higher crime rate among teenagers of 15-17 years of age in comparison with other under 19 age groups.

This age group, despite being younger than other age groups(except for ages of 10-14), the number of 'B - Property and Deception' (69,657 incidents) is more than that of every age group over the age of 35.

Findings 3: Setting of Crime

Based on the table provided, the top ten local government areas with the highest offence counts (based on descending order) would include Melbourne, Greater Geelong, Hume, Greater Dandenong, Brimbank, Casey, Frankston, Darebin, Wyndham and Whittlesea.

Local Government Area	Offence Count
Melbourne	122035.0
Greater Geelong	89354.0
Hume	88567.0
Greater Dandenong	85218.0
Brimbank	82973.0
Casey	72900.0
Frankston	69949.0
Darebin	69286.0
Wyndham	65099.0
Whittlesea	64196.0

If we were to consider the setting of residential areas within the top 10 LGAs, a suitable area to ensure the safety of the general public in those areas, the safest bet would be to keep an eye on the exterior and outside areas. This is based on the pie chart in Figure 2 (next page) that the grounds and the surrounding lands have the highest offence counts compared to inside the dwelling/non-dwelling areas.

Based on the pie chart in Figure 1, the areas with the two areas with the highest offence counts include the front yard and the driveway/carports. This considers the fact that this is a very common area that offences would occur compared to other areas.

This indicates that the priority should be aimed on the front yards and driveways/carports compared to other areas based on the grounds and surrounding lands.

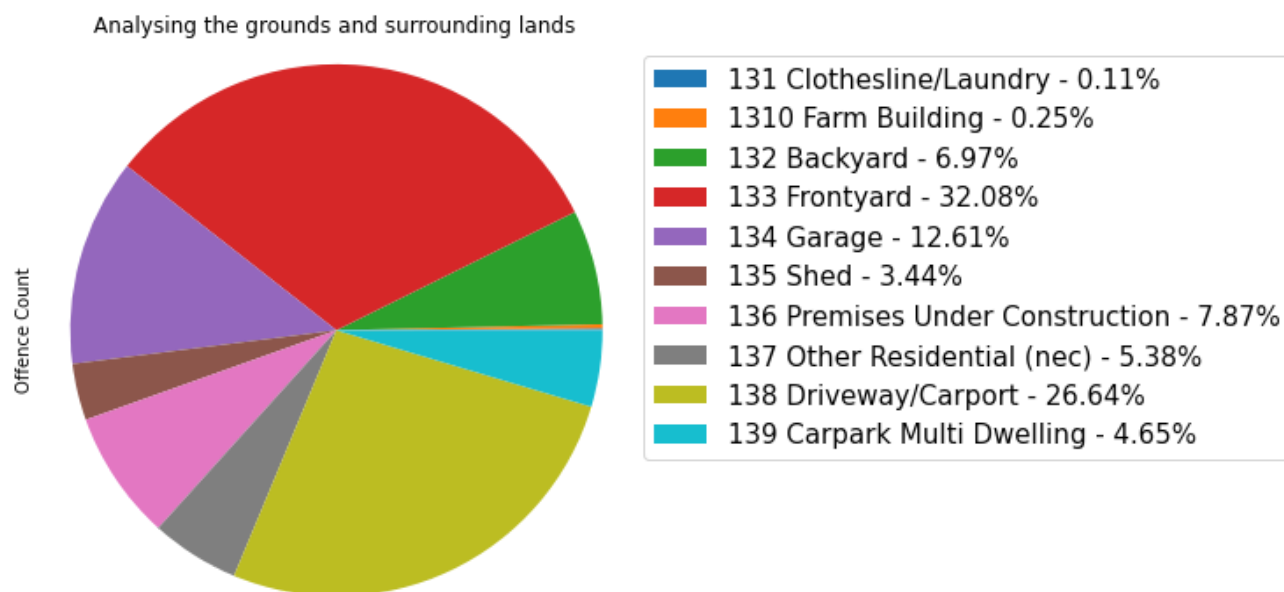


Figure 1: Comparison of offence counts on the areas of the grounds and surrounding lands

With a higher number of offence counts on private dwellings (24.8%) compared to non-private dwellings (10%) as per Figure 2, there should be enhanced security on private dwellings, since non-private dwellings including have a low offence count probably due to security being stationed in those areas already.

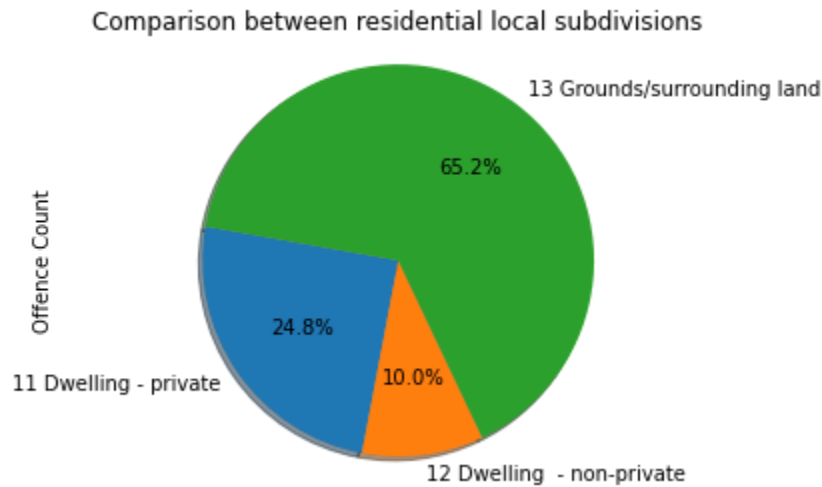


Figure 2: Comparison of offence counts between residential areas.

To ensure the community of Victoria is safe, we need to analyse how these subdivisions have been impacted through the effect of offence counts. We can observe from the pie chart in Figure 3 that the highest offence counts are in the “other transport” subdivision (30.29%). This could be possible due to cars speeding and the lockdown restrictions (for example, breaching the 5km/10km rule) during the long lockdowns as the result of the COVID-19 pandemic.

Public transport also has a quite high offence count (19.67%) since this is shared by a variety of people from the general public. The reason why this could be high is probably due to people not wearing masks when they enter these transportation types, or it could even be other forms of offensive behaviour towards others.

Street or footpath has no offence counts. This could be because the lockdown has resulted in less movement outdoors with rules applying limiting them.

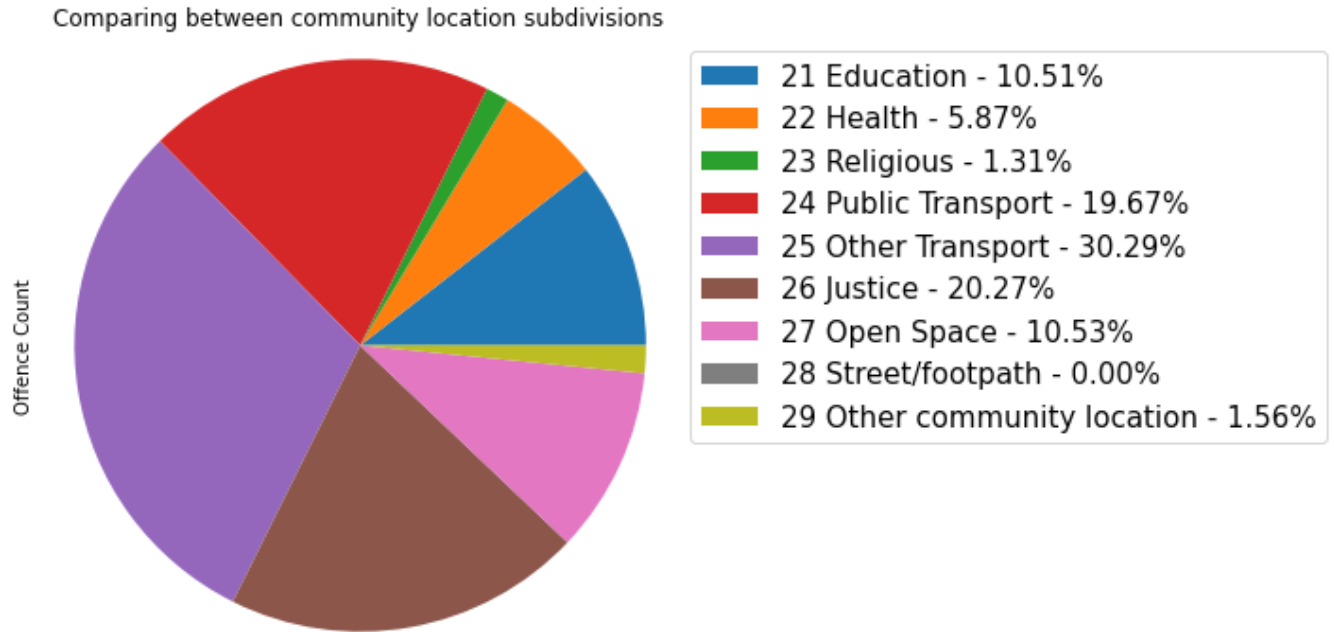


Figure 3: Comparison of Offence Counts of community subdivision between the top 10 LGAs.

The location subdivision that is the highest in the “other” category between these ten LGAs is the retail sector, with an offence count of close to 250,000.

The reason why the retail offence count is very high is because of specific crimes including shoplifting and even violence towards retail staff members who are doing their job, which could be a result of the introduction of the COVID-19 pandemic and any related lockdowns and other restrictions.

On the other hand, at periods during the COVID-19 pandemic, panic buying has resulted which could also be one of the major reasons why the retail offence count has increased. This panic buying could have also resulted in violence between consumers due to demand of these affected goods being very high and the supply being as normal, resulting in a shortage of those goods including toilet paper.

Recreation on the other hand, is also considered to be the second highest. The main point here is that retail and recreation are the location subdivisions on this “other” location division that have customers flowing in and out. This could possibly be the reason why the offence counts are the highest in this subdivision.

Comparison of Offence Counts of location subdivision between the top 10 LGAs excluding residential and community

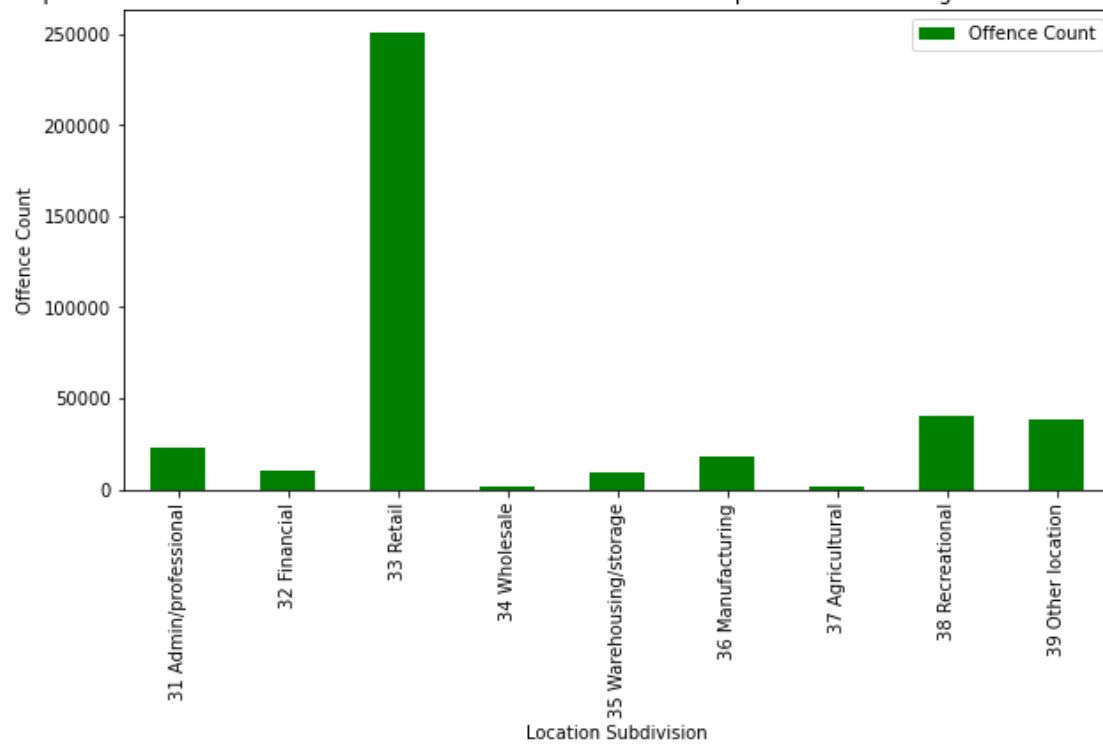
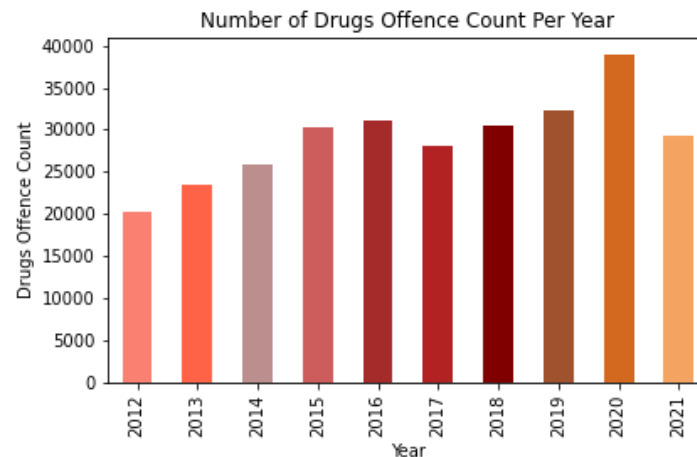
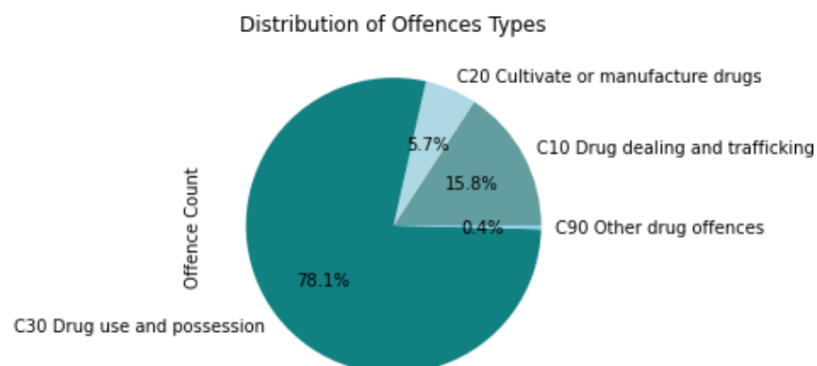


Figure 4: Comparison of Offence Counts of location subdivision between the top 10 LGAs (excluding residential and community local divisions).

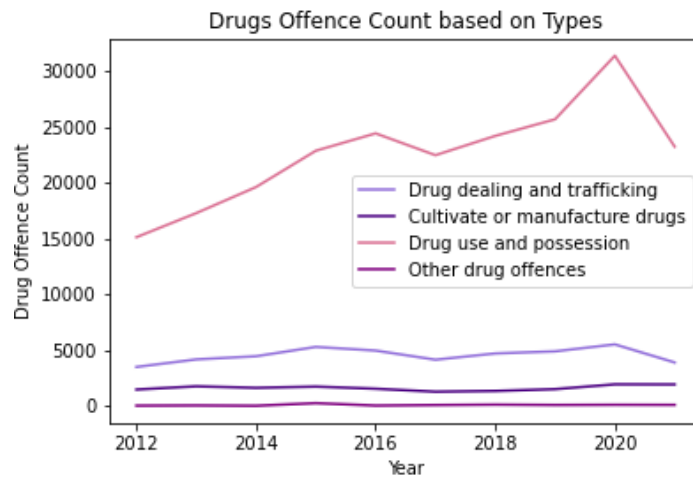
Findings 4: Drug Offence



The bar chart shows that the number of drug offences seems to be increasing over the years with a decline from 2016 to 2017 and then spiked to almost 40,000 count in 2020. The harsh lockdown restriction in Victoria imposed starting from 2020 could relate to the increase in the drugs offence in 2020. There is a decrease in drug offences from 2020 to 2021. This could be due to a higher number of first time offenders charged in 2020 and not repeated the crime in 2021.

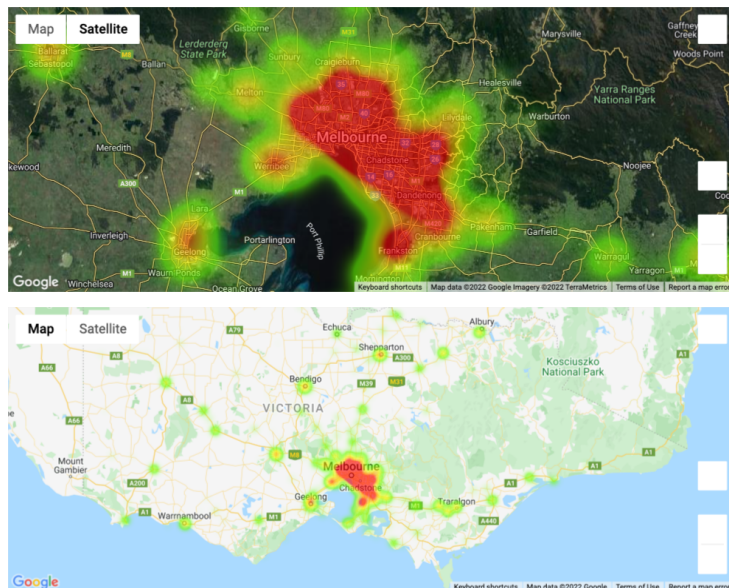


The pie chart above shows that 78.1% of the drug related offences are in relation to drug use and possession. Drug dealing and trafficking makes 15.8% of drug offence types. This shows that there is an issue of substance usage and possibly addiction in Victoria.



Across the years, for drug use and possession, it seems that there is an increasing trend with a spike in 2020 and is going into a decline from 2020 to 2021. In relation to drug dealing and trafficking offences, overall, there is a slight fluctuation of both increasing and decreasing trend. Most notably, it seems to decrease from 2020 to 2021. For both cultivate or manufacture drugs and other drugs offences, they are quite steady over the years.

	Suburbs	Offence Count
872	Melbourne	8885.0
372	Dandenong	5157.0
502	Frankston	4909.0
1152	Richmond	4502.0
1255	St Kilda	3919.0
1216	Shepparton	3554.0
901	Mildura	3521.0
1250	St Albans	3475.0
1149	Reservoir	3061.0
1242	Southbank	2722.0



The table shows the top 10 suburbs with the most drug crimes where most of the suburbs are within the Melbourne metropolitan area. Melbourne CBD has the highest offence count. The heatmap visualises that most drug offences occurred in the Melbourne metropolitan area. A higher number of police force and higher number of population in these areas may contribute to the higher number of drug offence counts.

Conclusion & Suggestions

Trends and tendencies based geographical regions

Data on the number of offences from 2012 to 2021 shows there is an increasing trend on the number of crimes in Victoria. Based on the Local Government Area and their geo-location, there is a concentration of crimes within the metropolitan area. This may suggest that population is one of the driving factors. Based on the findings, it is suggested that crime management should be included in the planning, particularly in Local Government Area with increasing population.

Age Groups

Initially, given the higher crime incidents by males, it is worthwhile to do an analysis on the reasons for higher crime occurrences among males to better address the problem. The Victorian government needs to put more focus on educating males from early ages by implementing programs to raise awareness about consequences of committing crime and how it changes individuals' lives.

Also considering an unusually higher crime rate in the 15-17 age group, setting up mental health sessions in schools and addressing that age group's mental health or age-related problems can help prevent crime among that age group. Additionally, providing behavioral intervention programs, proper personalised and group support and guidance to teenagers in school can positively prevent first-time crimes happening and repeat-offenders from committing again. Another approach can be tackling youth gangs problems with a combination of care, punitive, educational and employment measures.

To prevent crime among adults, an approach could be updating laws and regulations and strictly enforcing them. Furthermore, policing crime hotspots and increasing focused deterrent police presence can prevent crime.

Softer long-term approaches would be:

1. Eliminating the crime means (weapons controls, limiting alcohol consumption)
2. Using surveillance, increasing property security and residence access control (using fences, CCTV cameras, secure locks and doors)
3. Making environmental changes (improving street lighting, utilizing urban planning policies in street lighting design, facilities architecture and combining residential, workplace and commercial spaces).

Setting of Crime

Based on the graphs provided, to ensure that the residential areas are safe, we need to ensure security cameras are placed along residential roads to ensure that the glimpse of the front yards of the houses around are under surveillance and thus the fear between the general public staying at their homes would be much less. The Victorian government could organise some campaigns or speeches to provide encouraging advice on how to keep their houses/apartments/etc safe from offences like robberies and car thefts. This could include residents having security cameras at their front yards as well as where their cars are parked (where the offence counts are the highest).

If we were to consider the community, more surveillance cameras should be placed on high speed roads and also on main roads, where speeding is more prominent, to ensure that speeding offences are reduced or detected. If lockdowns are to be imposed, surveillance can also help, but there should also be police patrols in certain areas to ensure that the 5km/10km radius rule would not be breached from those staying in the lockdown areas. For public transport, officers should be inside the transportation to ensure that there are no passengers breaking the rules and also to ensure that if mask-wearing is compulsory, to ensure that masks are always worn.

Considering that the retail has a very high offence count, it is advised that there should be security on the outside and also the inside of these retail stores to ensure offence counts remain low. This can include having security cameras around the entrance of the retail stores and around the stores, and also to ensure that there is a high police presence around these stores to prevent any kind of violence against staff especially when there are COVID-19 restrictions applied. If there is a chance of panic buying resulting, there should be security personnel stationed around these goods to ensure panic buying does not affect the supply of the specific goods, as an example, toilet paper. The retail stores could apply restrictions to those specific goods to avoid this problem of running out of stock.

Drug offence

There has been an increase in drug offences across the years where the main offence is drug use and possession. This shows that Victoria has an issue of illicit substance usage and addiction. The Victoria State Government could place more focus in educating Victorians in relation to harm and penalties of illicit substance use to keep the offence count low. The spike of drug possession and use in 2020 could result from Victorians battling depreciating mental health from harsh lock down restrictions. The state government could look into providing more support with mental health and education in relation to safe drug use targeting the Melbourne Metropolitan Area which has a higher offence count. The Victorian Police could also place more police force in the outer region such as Shepparton and Geelong as there seem to be higher counts of offence.

Limitations

The data may exclude recorded offences where the geographic location is unknown.

Further, the data is based on the offence that occurred in that area regardless of where the offender resides. This analysis does not provide insights based on the offender's nationality or location of residence, only shows the insights based on offence occurred in the suburbs. Melbourne may have the highest offence count due to Victorians from the suburbs travelling into the city.

OpenWeather API is used to retrieve data of latitude and longitude of each suburb in Victoria. Some suburbs are excluded due to a lack of latitude and longitude data. Some suburbs are excluded due to the data retrieved belonging to suburbs of another Australian State with the same suburb name.

Data could be biased from a higher number of police force and higher number of population in Melbourne Metropolitan Area which may contribute to the higher number of offence counts.

There may be inaccuracy in terms of collecting data from a police report from a variety of local government areas.