

# VICTORIA'S BLOODY ROAD TRAUMA

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# GLOBALLY



**A road user dies every  
23 sec**

Low- and middle-income countries have only half of the world's vehicles but have 90% of the world's road traffic deaths.



**An estimated  
1.35 million  
road traffic deaths  
occur every year.**

More people now die from road traffic injuries than from HIV/AIDS, tuberculosis or diarrheal diseases.



**#1  
cause of death  
among those aged  
5-29 years.**

Road traffic injuries are the 8th leading cause of death for all age groups.



**3 out of 4  
road deaths are  
among men.**

Top causes of fatal road trauma are usually speeding and alcohol consumption





**high-income countries  
bear the greatest  
burden with a total  
economic loss of**

**\$963 billion**

**VICTORIA**

Cost in 2017-2018

**\$1.4B**



Expected to be

**\$300B**



over next 10 years

**USA has the largest economic  
burden of road injuries of**

**\$487 billion  
per year**

**The human and economic cost of  
road traffic accidents in Britain is**

**\$25 billion  
per year**

**Road crashes cost Australia**

**\$27-30 billion**

**per year which is the same as the  
National Defense Budget**



In 2019, Victoria had the highest spike in road trauma in 3 years with  
**263 fatalities.**

There is now an ongoing parliamentary enquiry into the increase in Victorian road crashes and fatalities.



## BUSINESS GOAL

Develop an overview of the nature of crashes that would assist relevant authorities deploy appropriate legislations and solutions to tackle the crisis.

More specifically answer



**WHO**



**WHEN**



**WHERE**



**WHY**



# DATA PIPELINE



# DATA ACQUISITION

SOURCE

<https://discover.data.vic.gov.au/dataset/crash-statistics/resource/7dc849e1-ee56-45d8-96d1-5281711c4248>

# DATA PROCESSING

WHEN

Time based features

WHERE

Geography based features

WHO

People based features

WHY

Description based features

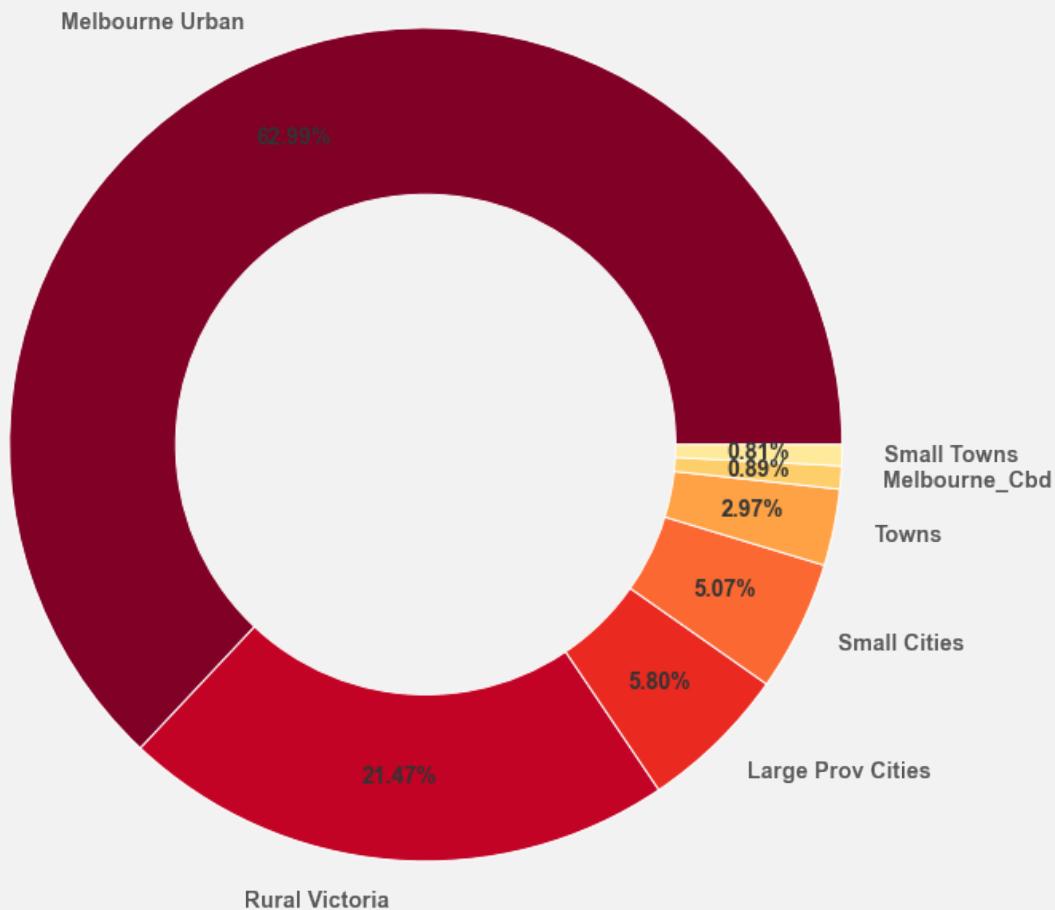
TABLE 1 >>> ‘Accident\_Main’ >>> 77187 Observations , 57 Features

Time based	‘date’ , ‘time’ , ‘day’
Description based	‘event type’ , ‘severity’ , ‘speed’ , ‘road geometry’ , ‘vehicle types’
People based	‘number of people’ , ‘injury levels’ , ‘gender’ , ‘age groups’ , road user groups’
Geography based	Iga’s’ , ‘regions’ , ‘road names’ , latitude’ , ‘longitude’

TABLE 2 >>> ‘Accident\_People’ >>> 184288 Observations , 10 Features

People based	‘age’ , ‘age groups’ , seating positions’ , road user type’ , ‘severity type’
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## Crashes by Region



### Melbourne Urban

9,992 sq. km

~ 5.0 million population

### Rural Victoria

~ 1.5 million population

### Provincial Cities

Geelong, Ballarat, & Bendigo

< 0.25 million population

### Small Cities

Mildura, Shepparton,..etc

< 50,000 population

### Towns

Horsham, Moira,..etc

< 25,000 population

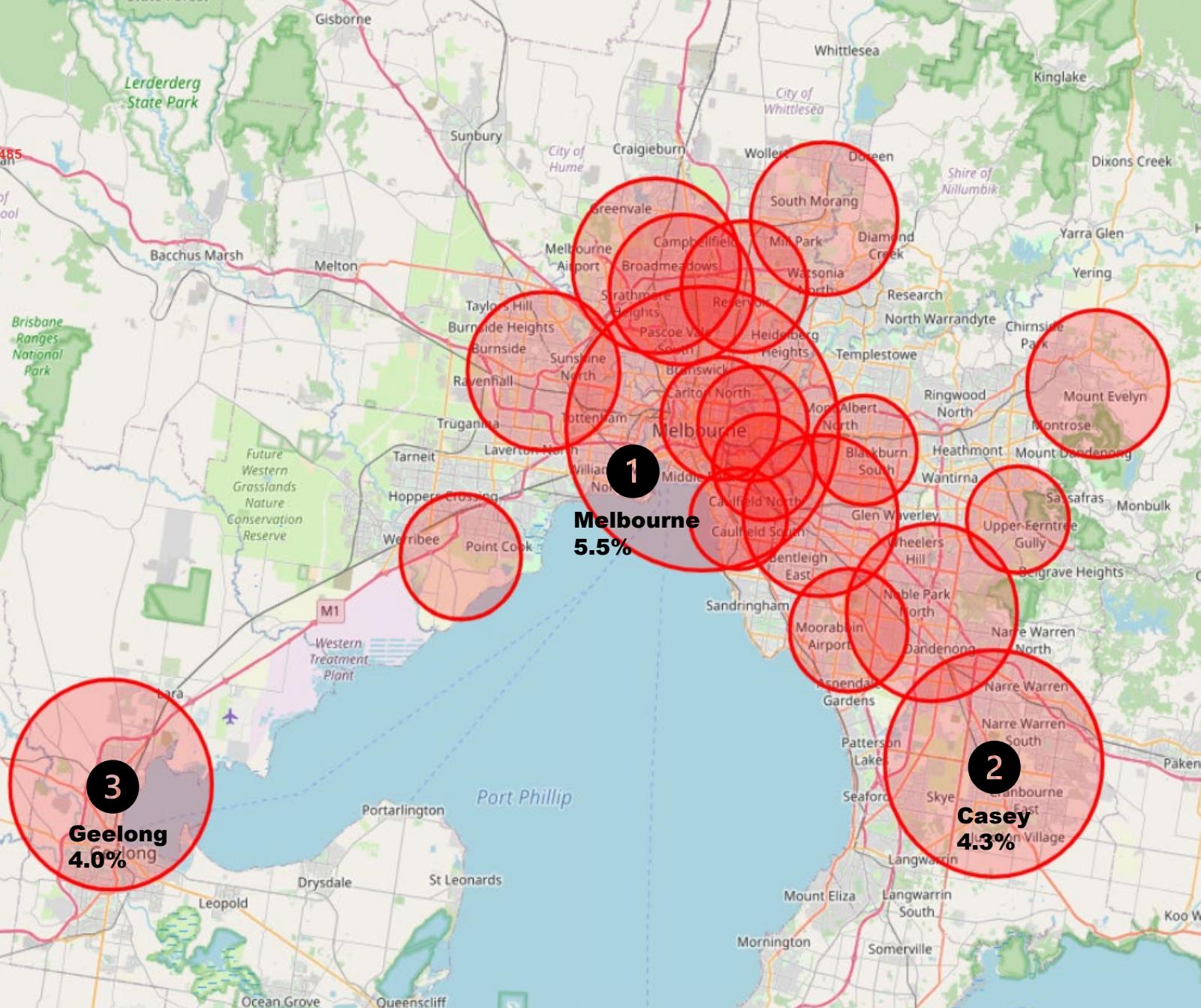
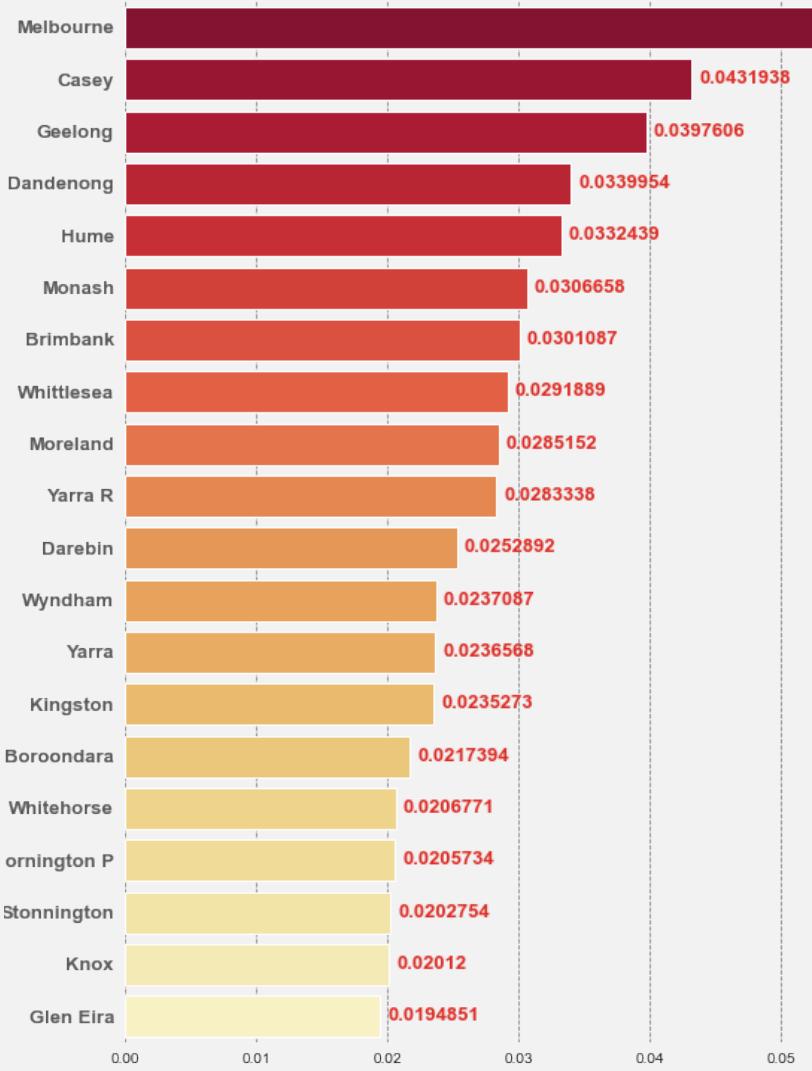
### Small Towns

Mornington Peninsula, Wellington,..etc

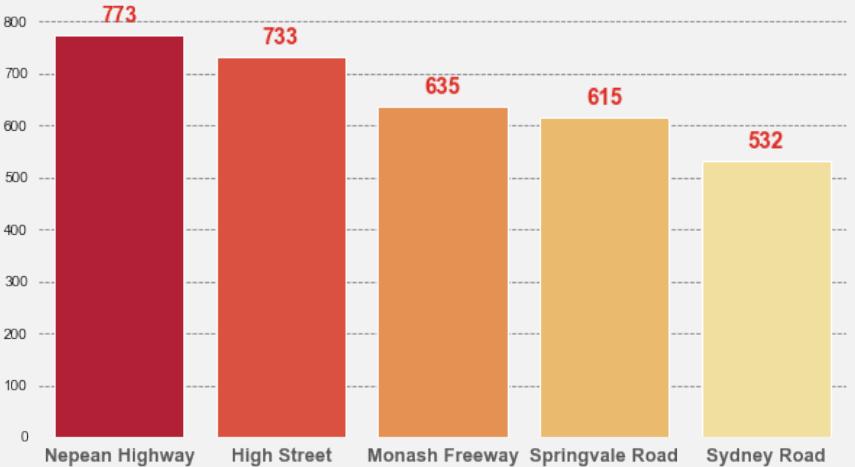
~ 10,000 population



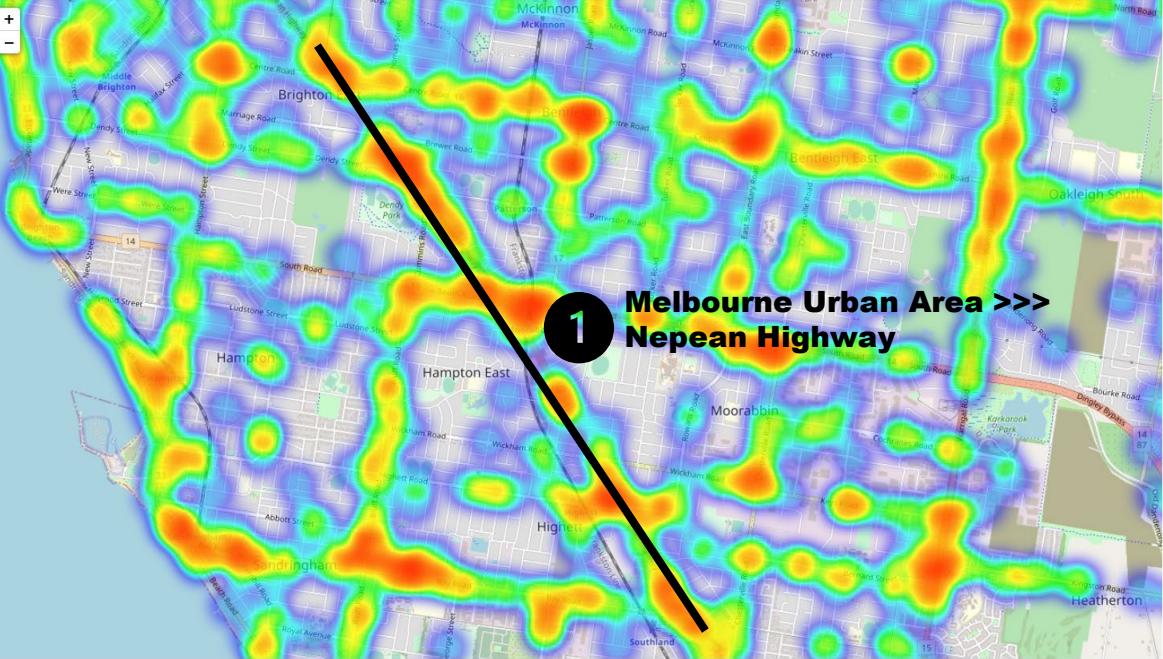
## Top 20 crash areas by LGA



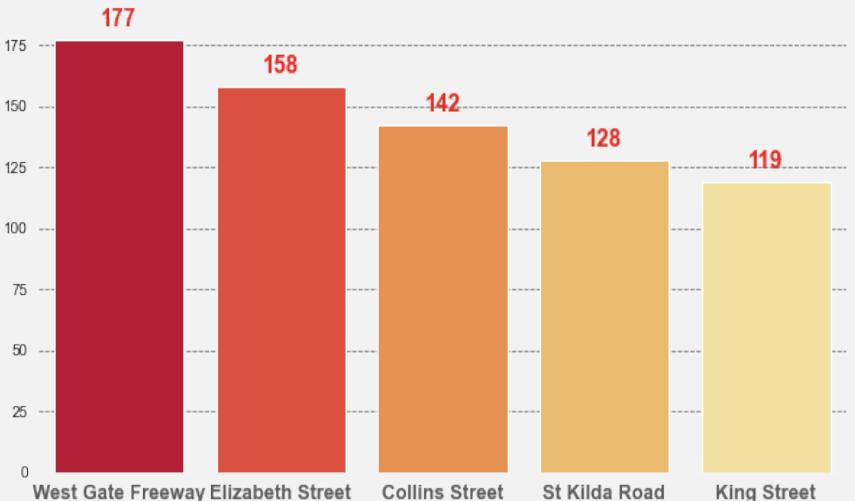
## Top 5 crash sites in Melbourne Urban region



**NOTE:**  
High Street is the name of several streets all over Victoria and hence should not be considered



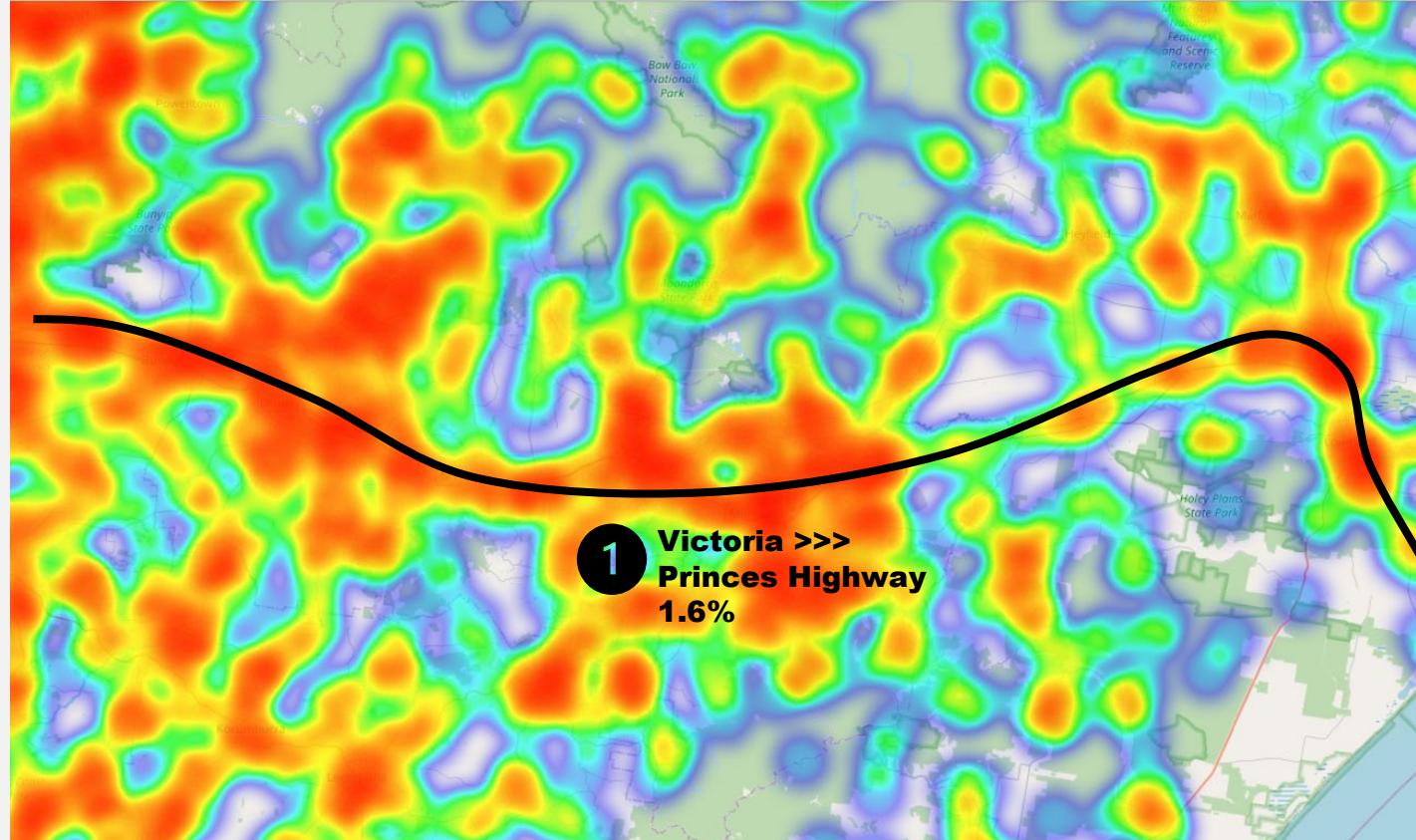
## Top 5 crash sites in Melbourne LGA



## Top 5 crash sites overall in Victoria



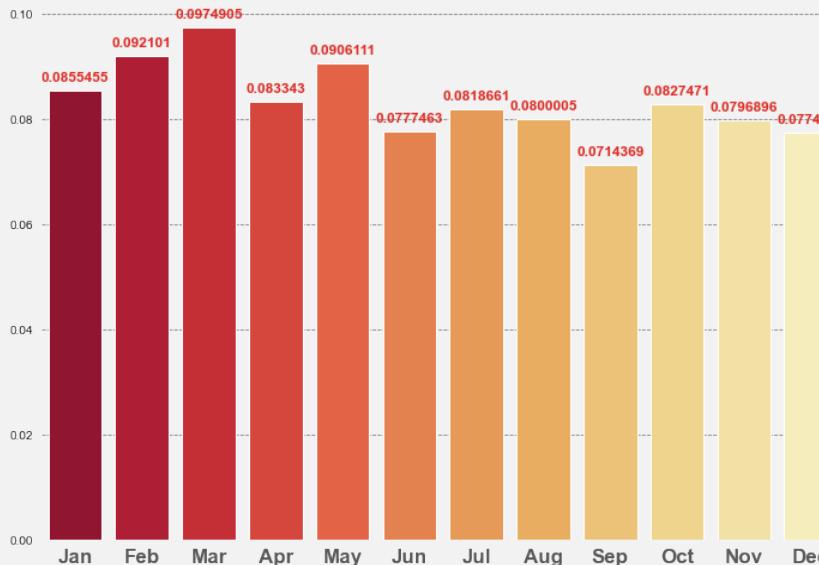
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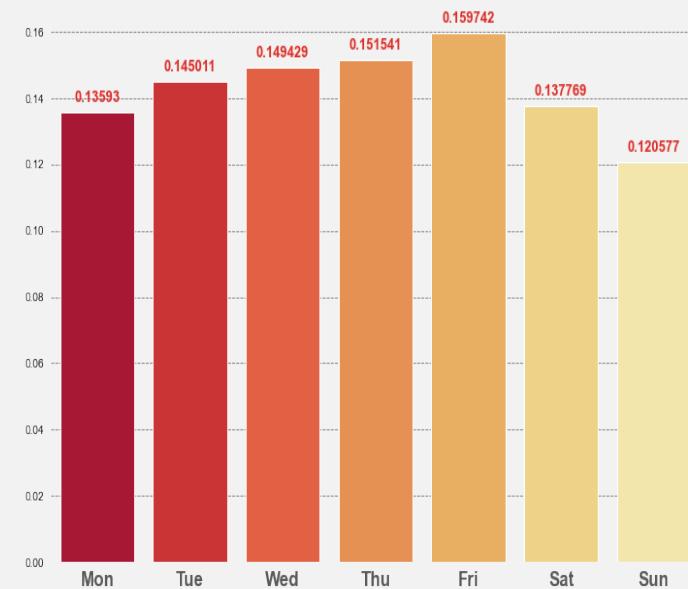
- ◀ **Princes Highway :** 955 kilometres (Victoria) >>> extends from Sydney to Adelaide via the coast. While, it has clocked the highest number of crashes, the crashes are just **1.35 crashes / km**
- ◀ **Nepean Highway :** 95.1 kilometres >>> is the primary road route to central Melbourne from Melbourne's southern suburbs. It, on the other hand, had **8.13 crashes / km**
- ◀ **West Gate Freeway :** 14 kilometres >>> is a major freeway in Melbourne, the busiest urban freeway and the busiest road in Australia. It links Geelong (via the Princes Freeway) and the Western suburbs to the Melbourne CBD. Not surprisingly, it has the worst crash ratio of the 3 major roads at **12.64 crashes / km**.



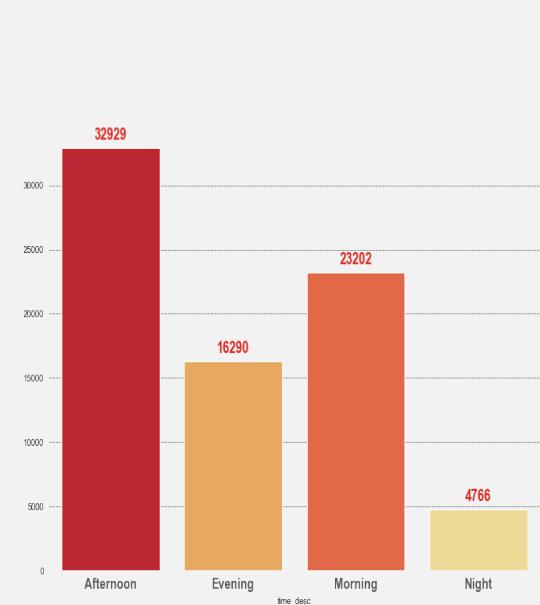
# WHEN



### Month wise distribution of crashes



### Day wise distribution of crashes



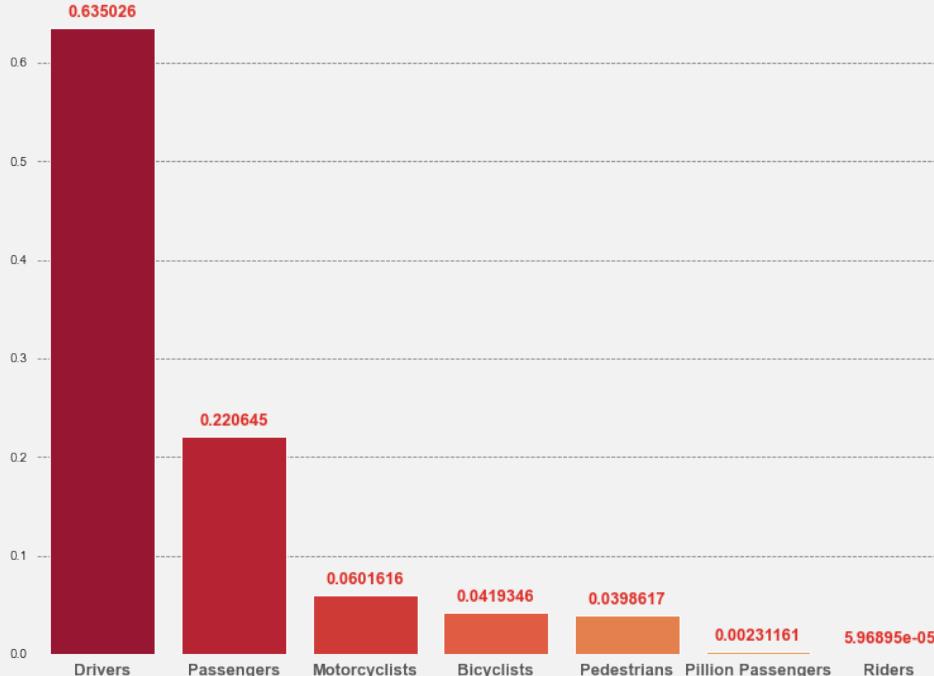
### Time of crashes

- ⌚ The highest number of crashes occur in the first 5 months of the year. The month of **March has the highest number of crashes ~ 10%** - probably due to Easter holidays. The least crashes occur in September.
- ⌚ The highest number of crashes occur on **Friday ~ 16% (start of weekend)** and lowers down on Saturday and Sunday, perhaps due to minimal work-related mobility.
- ⌚ Surprisingly, most crashes occur during the **Afternoon (12:00 pm – 18:00 pm) @ 5.5 crashes / hr** – it would be prudent to check whether crashes between 16:00 pm – 18:00 pm (rush hour) take the bulk of the weight. The least crashes occur between 0:00 am – 6:00 am at Night

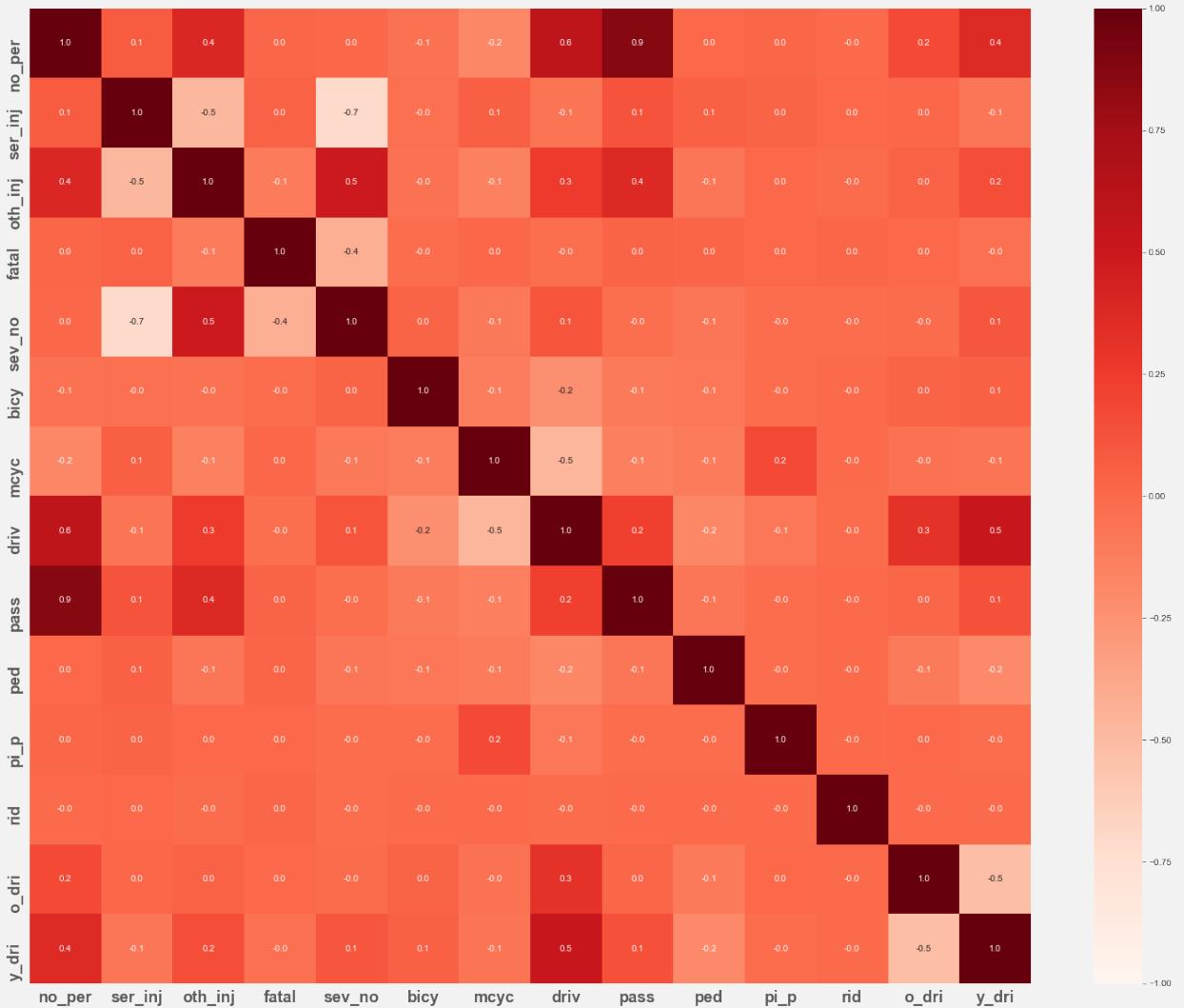




# WHO



## Representation of road user by type



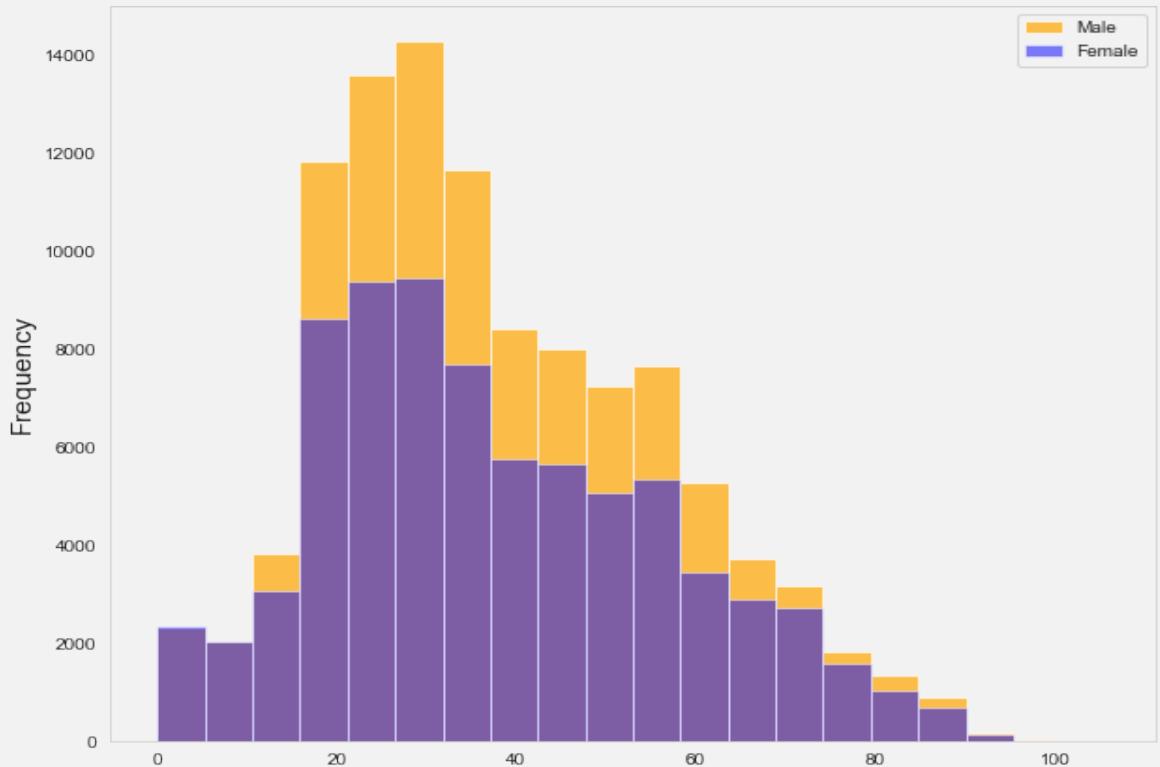
## Correlation heatmap of different user types



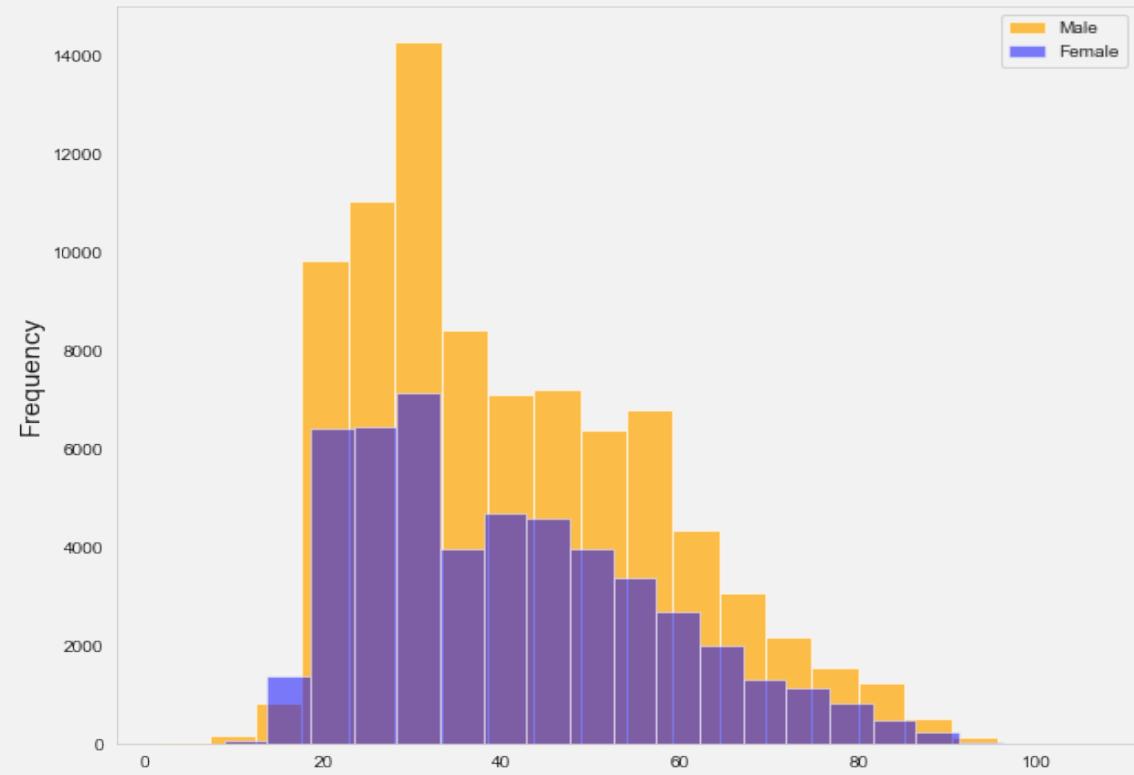
Drivers make up 63.5% of road users, while horse riders make the least number of road users involved in crashes.



There is some correlation between other injury and severity, drivers, and passengers. There is also some correlation between young and old drivers and drivers



**Age distribution Male vs Female: Total population**



**Age distribution Male vs Female: Drivers**



There doesn't seem to be any difference between the age distribution between male and female crash population or among the drivers.



There is more male representation than female representation in both the total crash population and the driver population.



Most of the population is between **18 – 55 years**

# HYPOTHESIS 1

The RACV's parliamentary inquiry submission calls for an urgent review of speed limits across the state, starting with low-traffic secondary roads with 100km/h speed limits.

## Is slowing down the answer?

$H_0$  = there is no difference between severity rate and speed

$H_1$  = severity rate is higher at higher speed

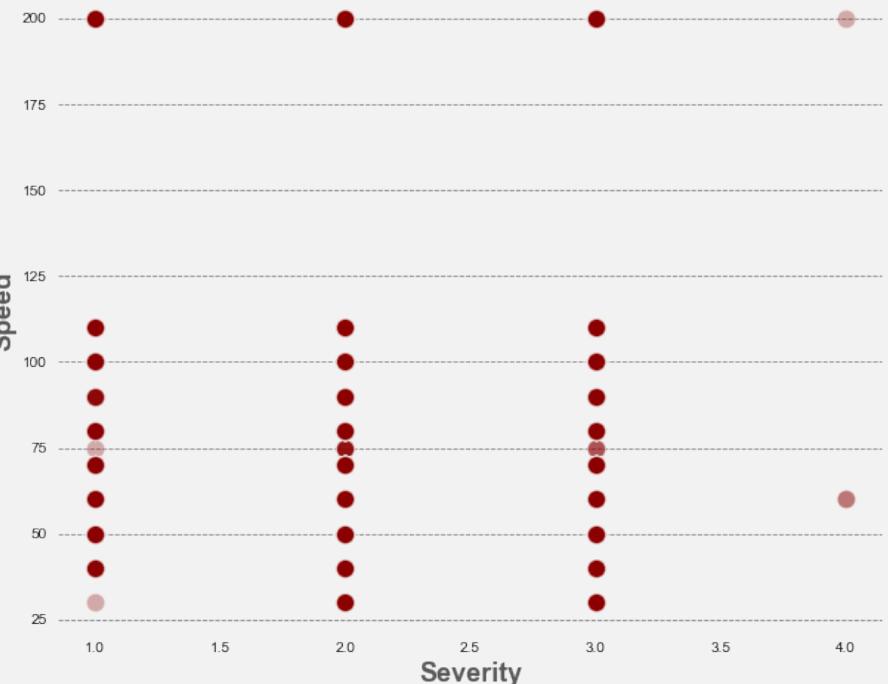
Sample size = 1000

High severity rate = 1

Low severity rate > 1

Alpha = 0.05

p- value = 0.99



**Speed vs. severity**

**“We fail to reject the null hypothesis –  
There is no difference between severity rate and speed**



## HYPOTHESIS 2

Young drivers are over-represented in the trauma toll, with 18 to 25-year-olds accounting for almost a quarter of drivers killed over the past 10 years.

### Are young drivers really an increased crash risk?

H<sub>0</sub> = there is no difference in the severity rate between young and old drivers

H<sub>1</sub> = there is a difference in the severity rate between young and old drivers

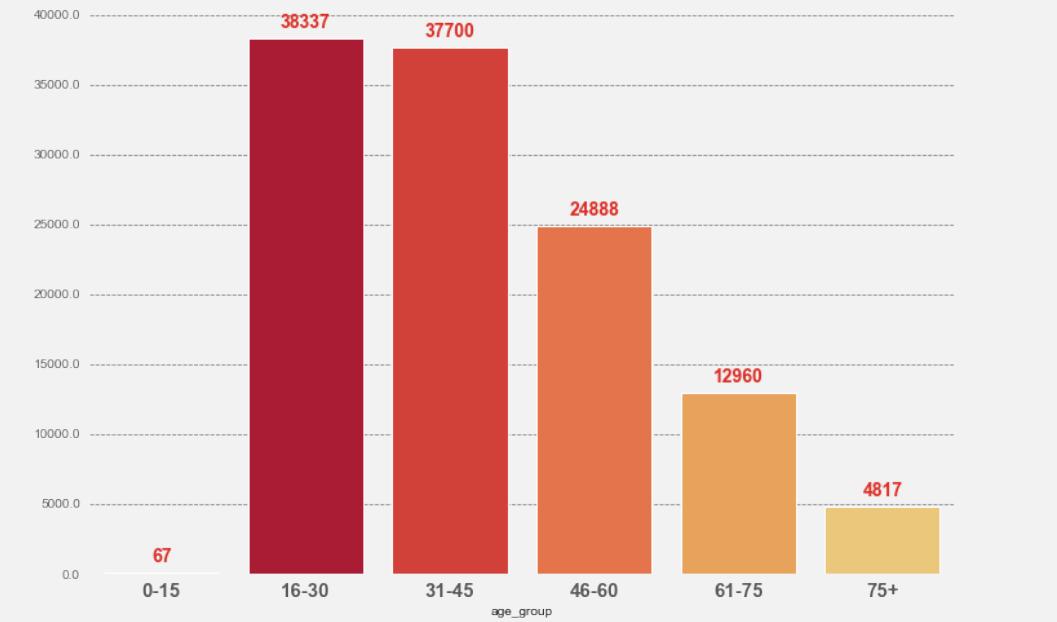
Sample size = 1000

Younger drivers <= 45 yrs

Older drivers > 45

Alpha = 0.05

p-value = 0.28



**Age group representation of total population**

**“ We fail to reject the null hypothesis –  
There is no difference in the severity rate between young and old drivers**



## HYPOTHESIS 3

Male road users made up 72% of people who lost their lives in 2018.

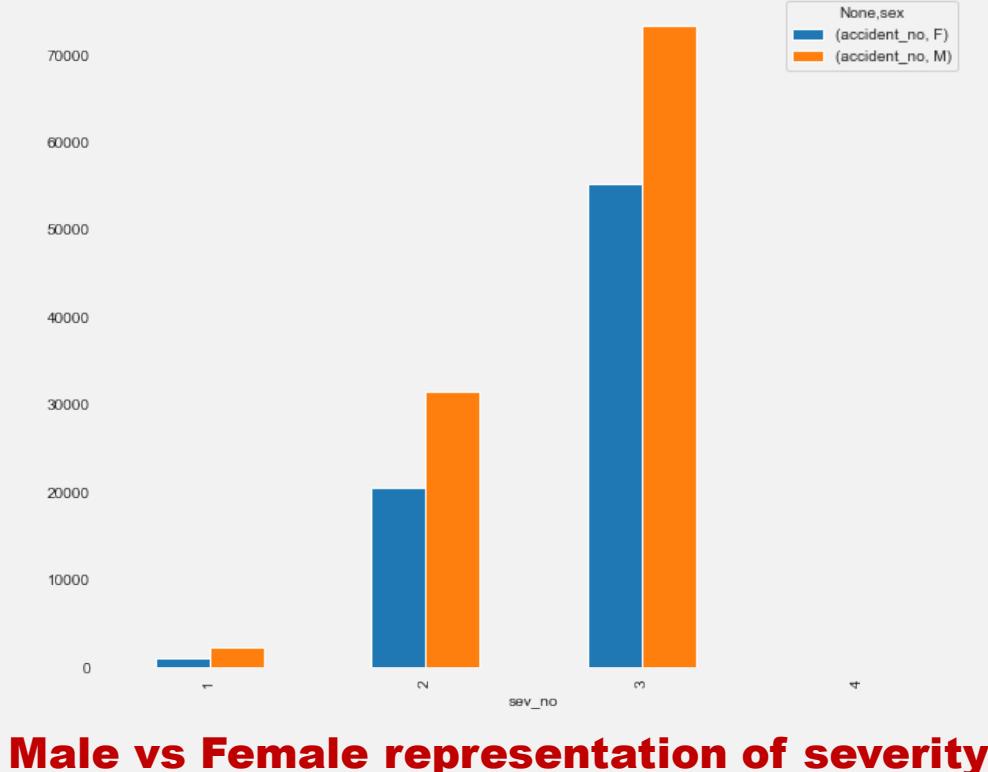
## Do men really flout rules more than women?

H0 = there is no difference in the severity rate between male and female drivers

H1 = there is a difference in the severity rate between male and female drivers

Alpha = 0.05

p- value = 0.023



**“ We reject the null hypothesis –  
There is a difference in the severity rate between male and female drivers**



# SUMMARY

We have answered the



**WHEN**



**WHERE**

LGA

Melbourne

Thursday

**Afternoon**  
12:00 – 18:00

**Severity**  
3.0 [other injury]

Victoria road

Princes Highway

Friday

**Afternoon**  
12:00 – 18:00

**Severity**  
3.0 [other injury]

Mel Urban road

Nepean Highway

Friday

**Afternoon**  
12:00 – 18:00

**Severity**  
3.0 [other injury]

Melbourne road

West Gate Freeway

Wednesday

**Afternoon**  
12:00 – 18:00

**Severity**  
3.0 [other injury]



We have partly answered the



WHO

**Drivers make up 63.5% of road users, while male driver are higher than female drivers.**

**There is significant difference between severity and male and female driver**

**There appeared to be no difference between severity and younger and older driver**

**There is no difference between higher speed and severity**

**We cannot conclude that fatality in younger drivers and male drivers is significantly higher without some more data acquisition and aggregation.**

# GOING FORWARD

We cannot answer the **?** WHY

- There is not enough data to answer the reasons for crashes.
- Further data acquisition would be required specifically pertaining to:

**Atmospheric condition** - such as wind conditions or stormy weather conditions

**Physical environmental** - conditions such as Road condition and geometry

**Vehicle Type** - such as passenger cars, utility vehicles and heavy passenger vehicles.

**Psychological & Physiological** - conditions such as health, alcohol, safety belts,...etc.

- There would also need to more data granularity in order to predict accidents based on location, time, and atmospheric condition



# ANY QUESTIONS ?



# THANK YOU