

# Road safety

Paulina Wiklo

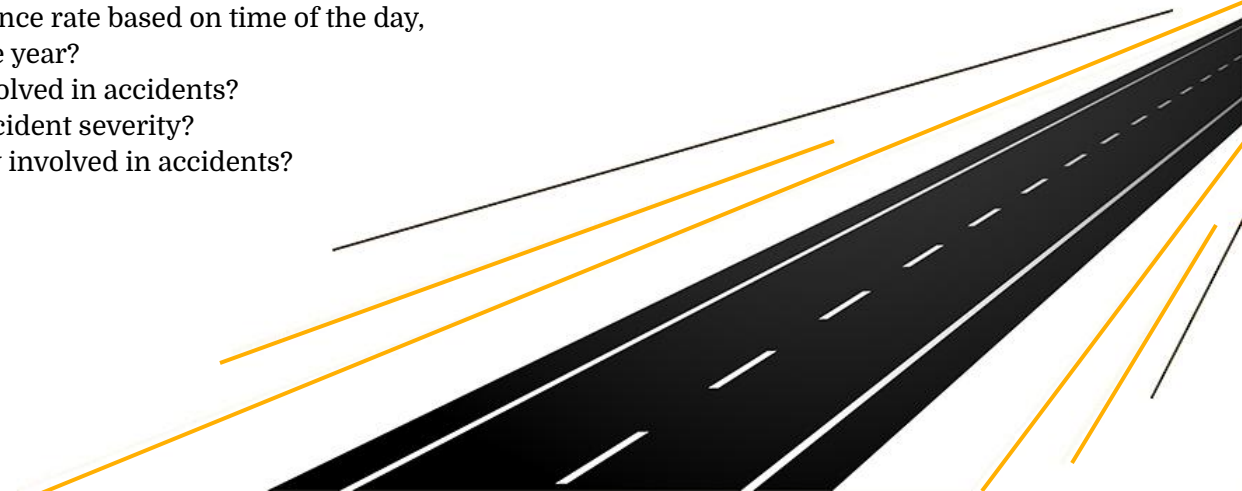


## OBJECTIVE

# Analyse road traffic data over time to identify risk factors and vulnerable groups.

(and code some heatmaps in Python!)

- ★ What is the accident occurrence rate based on time of the day, weekdays, and months of the year?
- ★ What are the risk groups involved in accidents?
- ★ How is the distribution of accident severity?
- ★ What type of driver is mostly involved in accidents?



- Road class
- Road type
- Weather conditions
- Light conditions
- Road surface
- Speed limit zone
- Junction detail
- Number of vehicles
- Number of casualties
- .. and more

- Type of vehicle
- Age of driver
- Gender of the driver
- Manoeuvre
- Journey purpose
- .. and more

- Gender and age of each casualty
- Severity of each casualty
- Casualty class (pedestrian, passenger, driver or rider)
- ... and more

MG NSRFA

1.3 ACCIDENT REFERENCE

19 TIME

1st Road Class & No. or the local address - UIC

2nd Road Class & No. or the local address - UIC

Town

County or Borough

Parish No. or Name

1.11 Grid Reference

REPORTING NAME

OFFICER

# ACCIDENT STATISTICS

\*FATAL/SERIOUS/SLIGHT

1st Road Name

2nd Road Name

1.2 Force

Section 100

Other ref.

17 DATE

1st Road Name

2nd Road Name

Section 100

1.2 Force

1.5 Number of vehicles

1.6 Number of casualties

1.7 ROAD TYPE

1.8 Direction of travel

1.9 Speed Limit (Mph)

1.10 JUNCTION DETAIL

1.11 JUNCTION CONTROL

1.12 JUNCTION ACCIDENTS ONLY

1.20 PEDESTRIAN/CASUALTY

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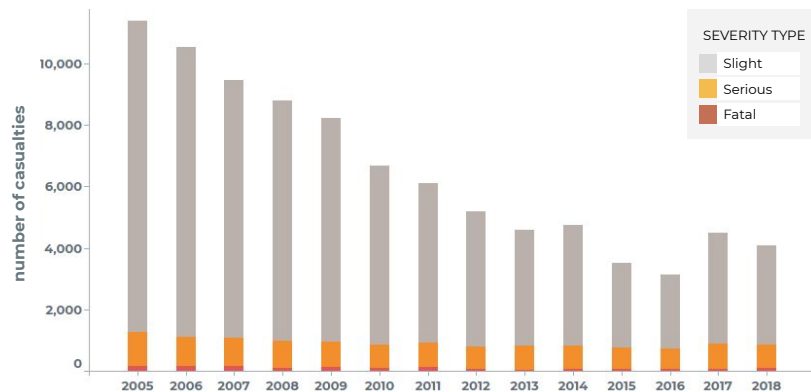
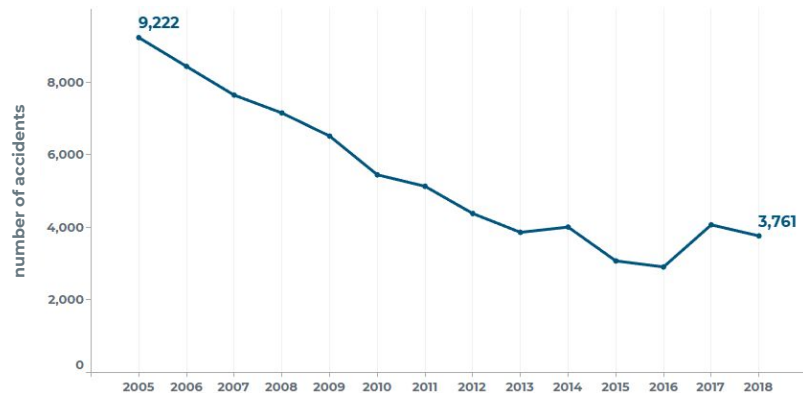
Area:  
Greater  
Manchester

10 metropolitan boroughs:  
Bolton, Bury, Oldham,  
Rochdale, Stockport,  
Tameside, Trafford, Wigan,  
and the cities of  
Manchester and Salford.

## Exploration - general view

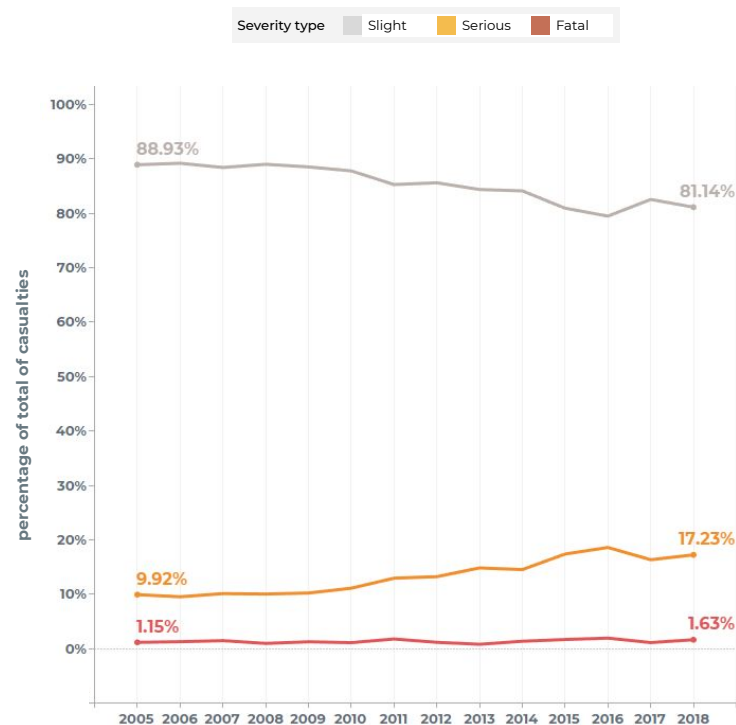
### Accidents and casualties between 2005-2018

*Number of accidents and number of casualties is declining*



### Accidents severity type between 2005-2018

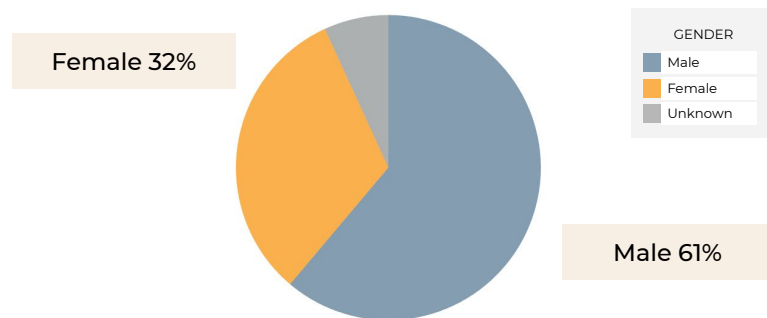
*Less accidents, but different distribution of severity types*



Keep in mind number of casualties on the roads DECLINE in numbers

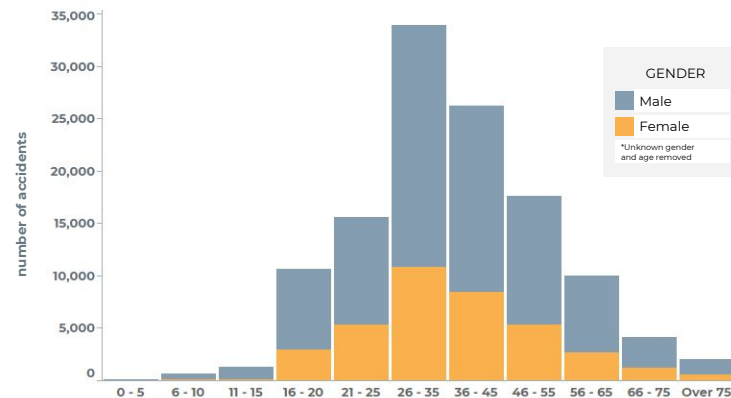
## Exploration - who?

### Gender of the drivers involved in accidents



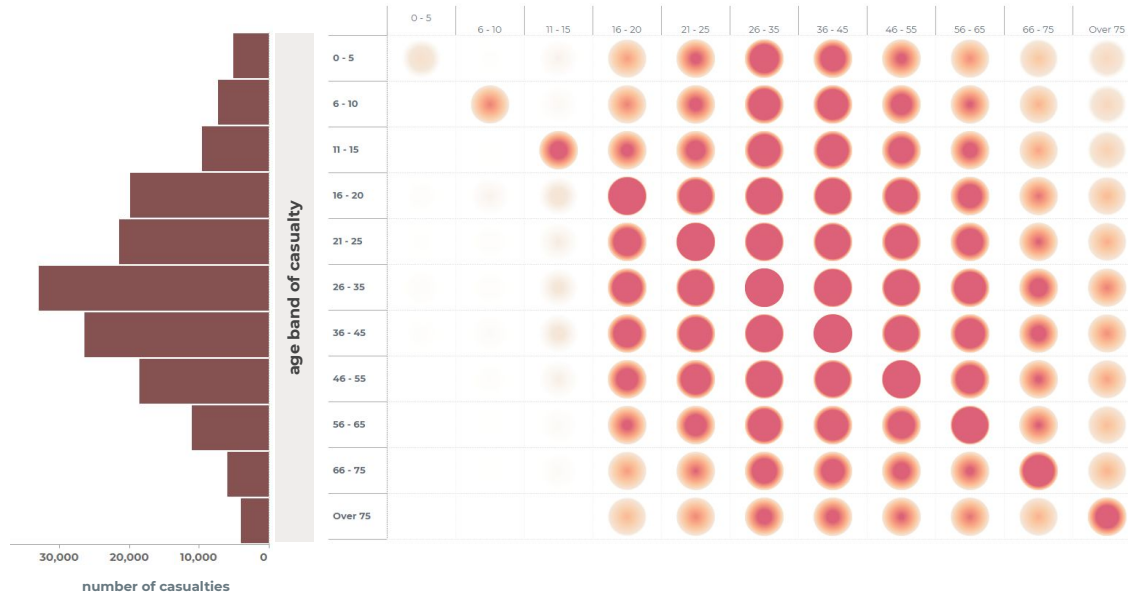
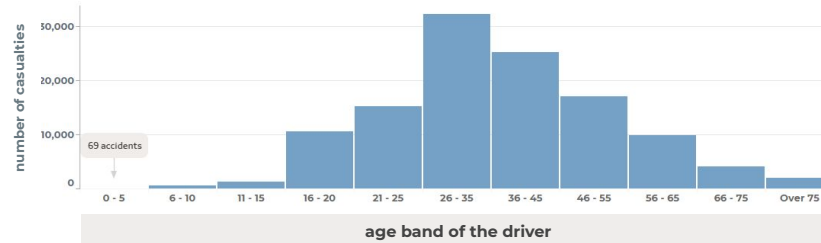
\*There are around 7073 accidents in the dataset with unknown drivers gender and 8838 accidents with unknown age band.

### Gender of the driver involved in accidents within age groups



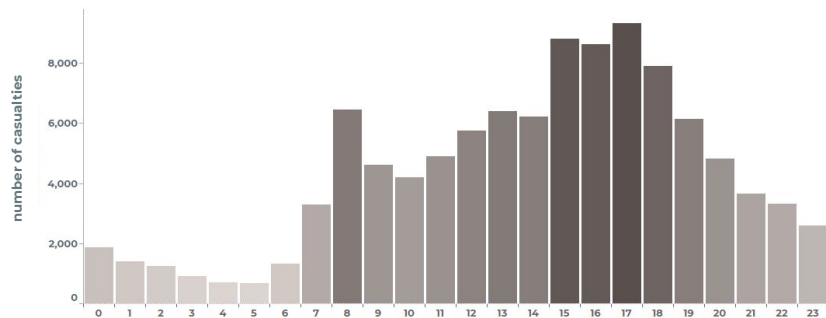
## Exploration - who?

## Who was involved in accidents?

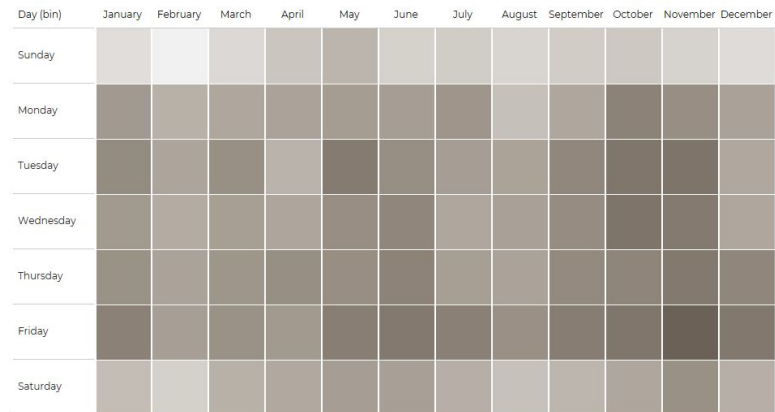


## Exploration - when?

**Most dangerous time during the day**  
**number of casualties**



### Distribution of accidents per month and weekdays



## Exploring risk factors - examples



ROAD TYPE



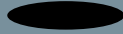
LIGHT CONDITIONS



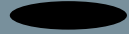
VEHICLE TYPE



SPEED LIMIT



WEATHER CONDITIONS



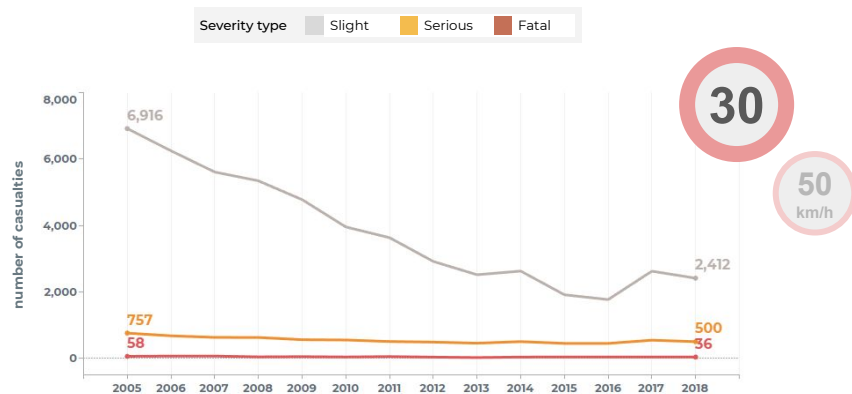
JUNCTION DETAIL



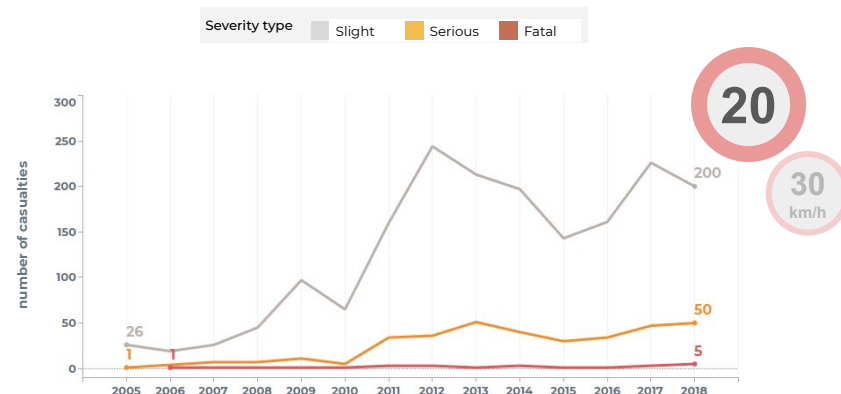
## SPEED LIMIT



### 30 miles per hour speed limit zone accidents numbers and severity type

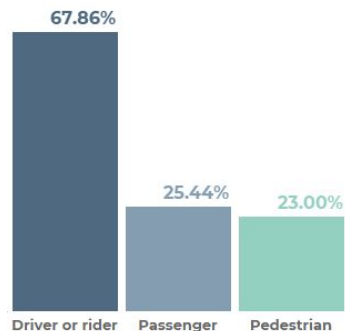


### 20 miles per hour speed limit zone accidents numbers and severity type

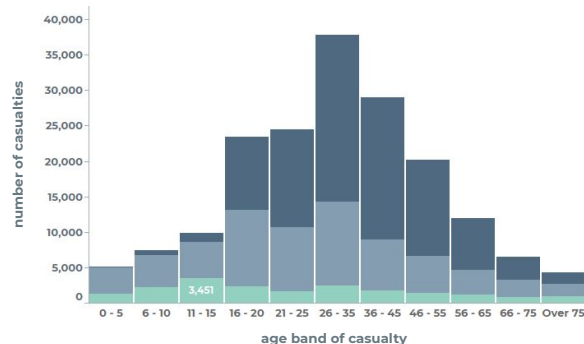


# What are the most common casualty types?

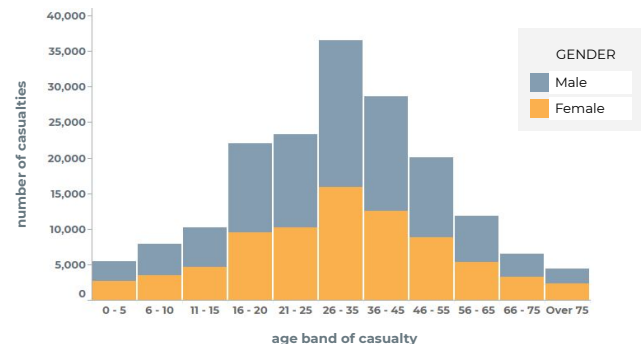
## Casualty class involved in accidents



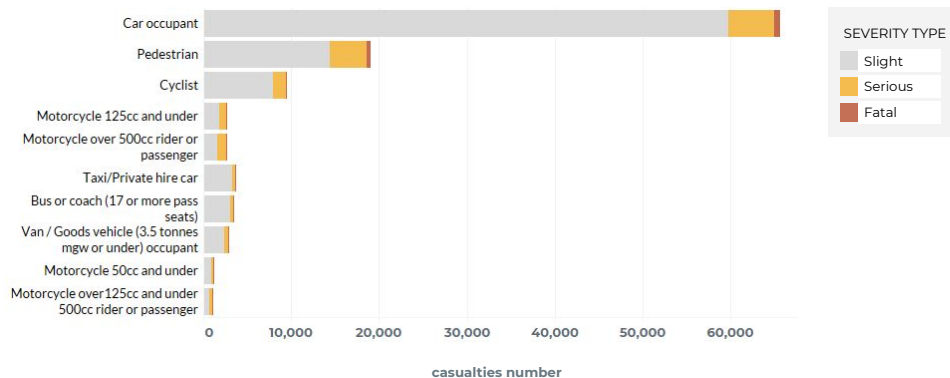
## Number of casualties in age groups



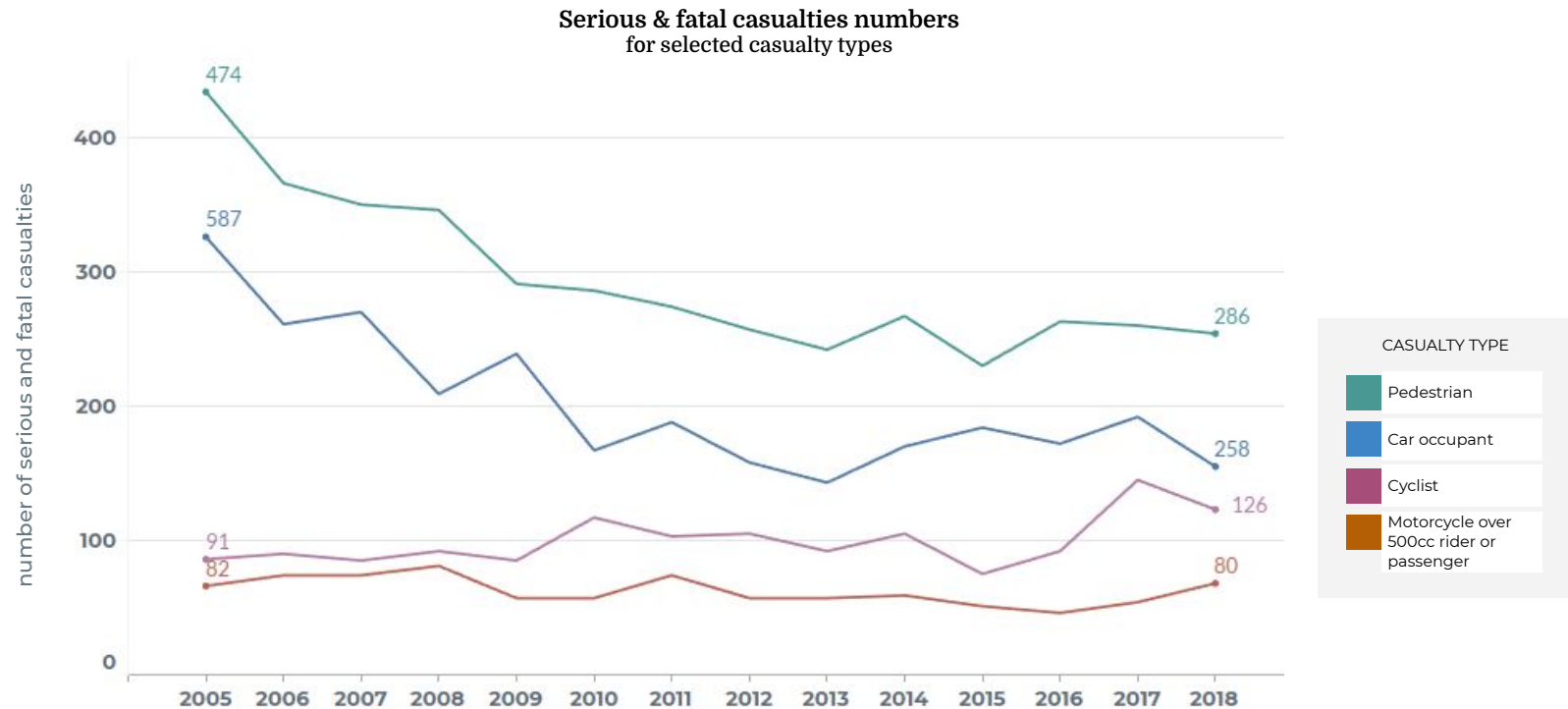
## Gender of casualty in age groups



## Top 10 causality types

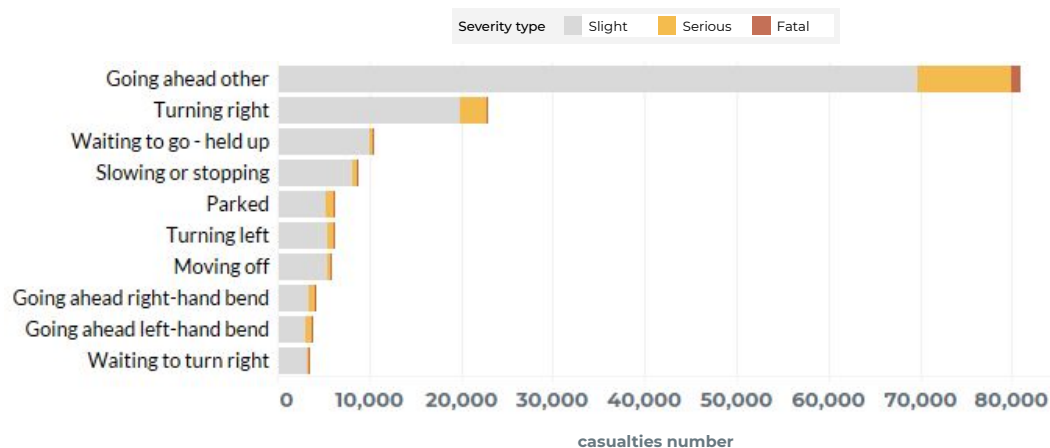


## What is the most vulnerable group?



## What is the driver doing just before the accident?

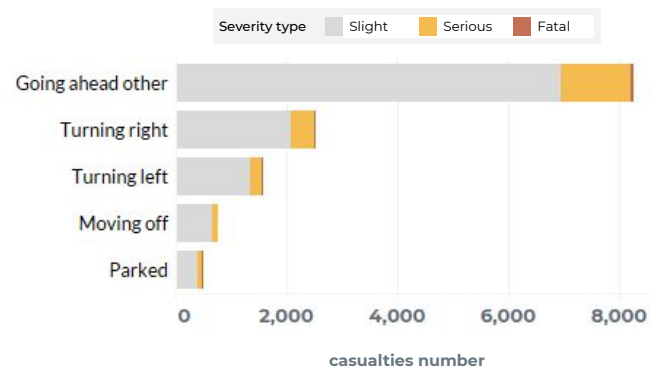
Top 10 maneuvers for all accidents



# Most dangerous maneuvers involving cyclist casualty

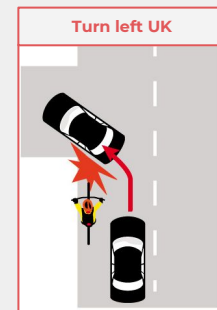
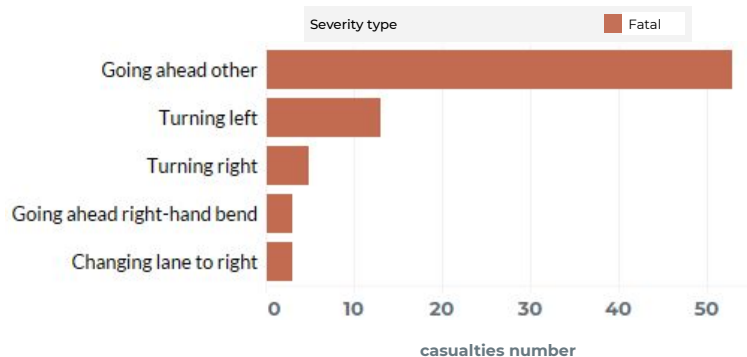


## Top 5 maneuvers for accidents involving a cyclist casualty



Happens more often

## Top 5 maneuvers for accidents when cyclist was killed

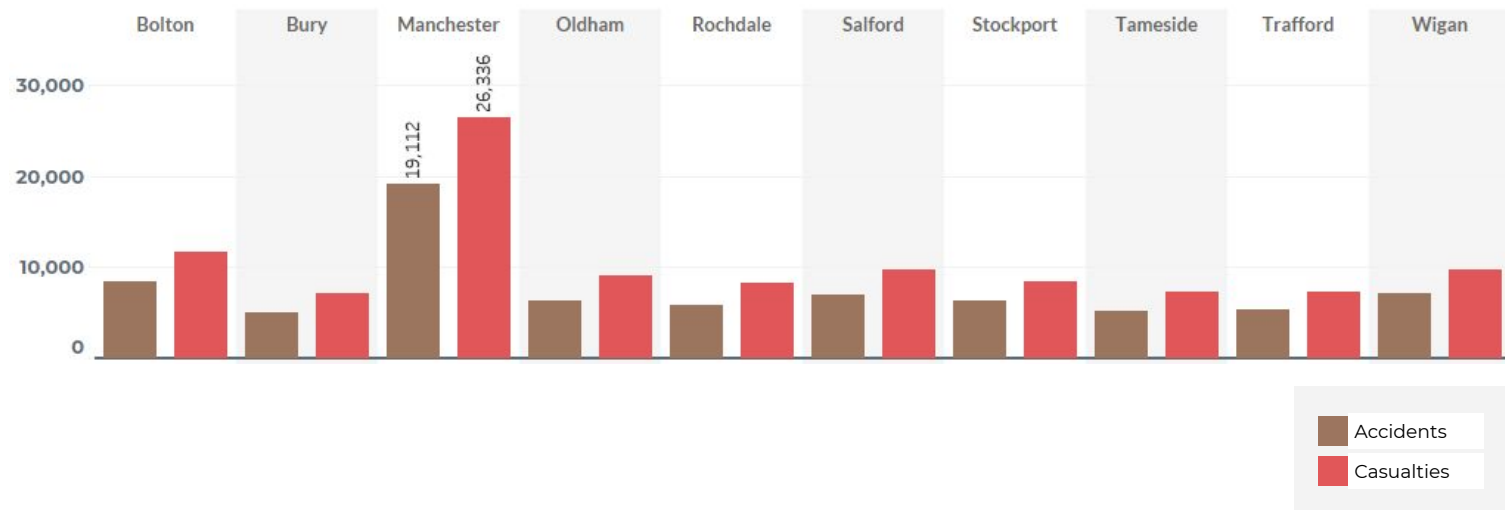


More cyclist killed

## Where are the accidents happening?

### Accidents and casualties within the local districts

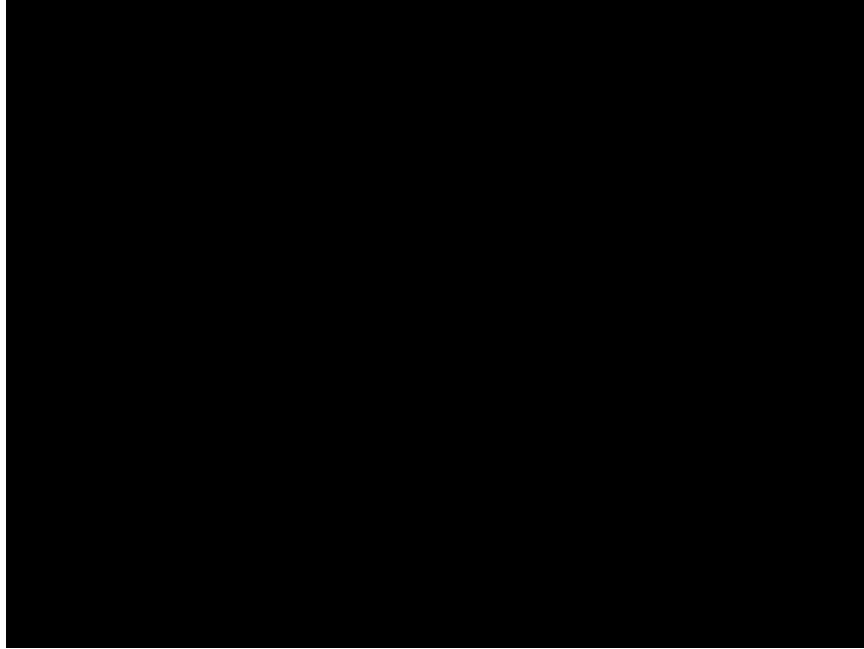
*Manchester district reports almost 25% of total accidents in the area*



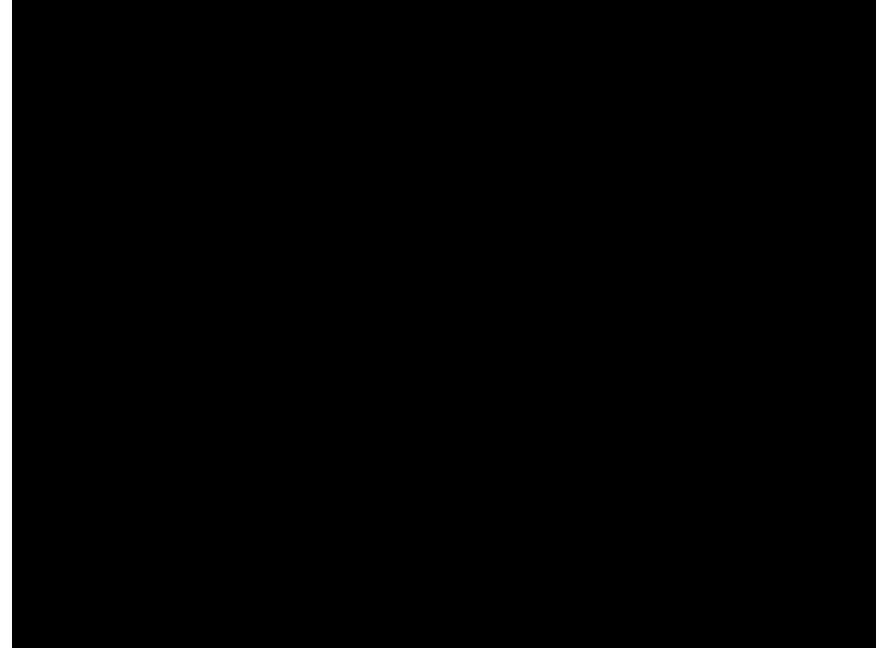
## Where are the accidents happening?

### Accidents within 30 miles per hour speed limit zone

*Example of heatmaps for 2005 and 2018*



12 months of 2005



12 months of 2018

# Conclusions

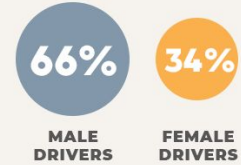
- ★ Total number of accidents has been steadily declining over the last 14 years
  - Fatal casualties dropped by 40%
- ★ Majority of the accidents involve slight casualty
  - 81% of the accidents in 2018
- ★ Cities and urban areas are still more dangerous than rural areas
  - City of Manchester reports 25% of total accidents
- ★ Most vulnerable groups involved in accidents are pedestrians, cyclists and motorcycle riders
  - 23% of all accidents involve pedestrians
  - Almost 40% of total deaths were pedestrians
- ★ 75% of total accidents involved any of the drivers going ahead other and 20% of total accidents turning right

## WHO WAS INVOLVED IN ACCIDENTS?

**27%** of drivers were between 26 and 35 years old

**40%** of all fatal casualties were **PEDESTRIANS**

**13%** of casualties were **children** below 16 years old

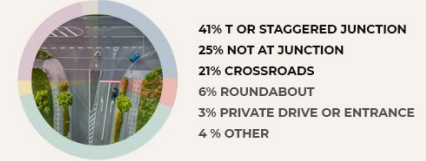


## WHERE DID ACCIDENTS OCCUR?

### ROAD TYPE

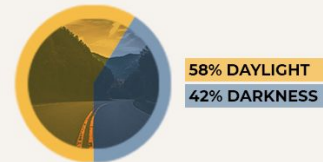


### JUNCTION TYPE

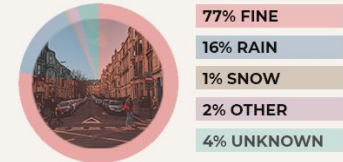


## WHAT CONDITIONS?

### DAY OR NIGHT



### WEATHER CONDITIONS





## Interesting data to follow up...

- ★ Investigate maneuvers types and accident severity in different casualties classes
  - **What is the most dangerous car maneuver for accidents involving pedestrians?**
  - **Are cyclists involved in more accidents while doing a specific maneuver?**

Thank you

