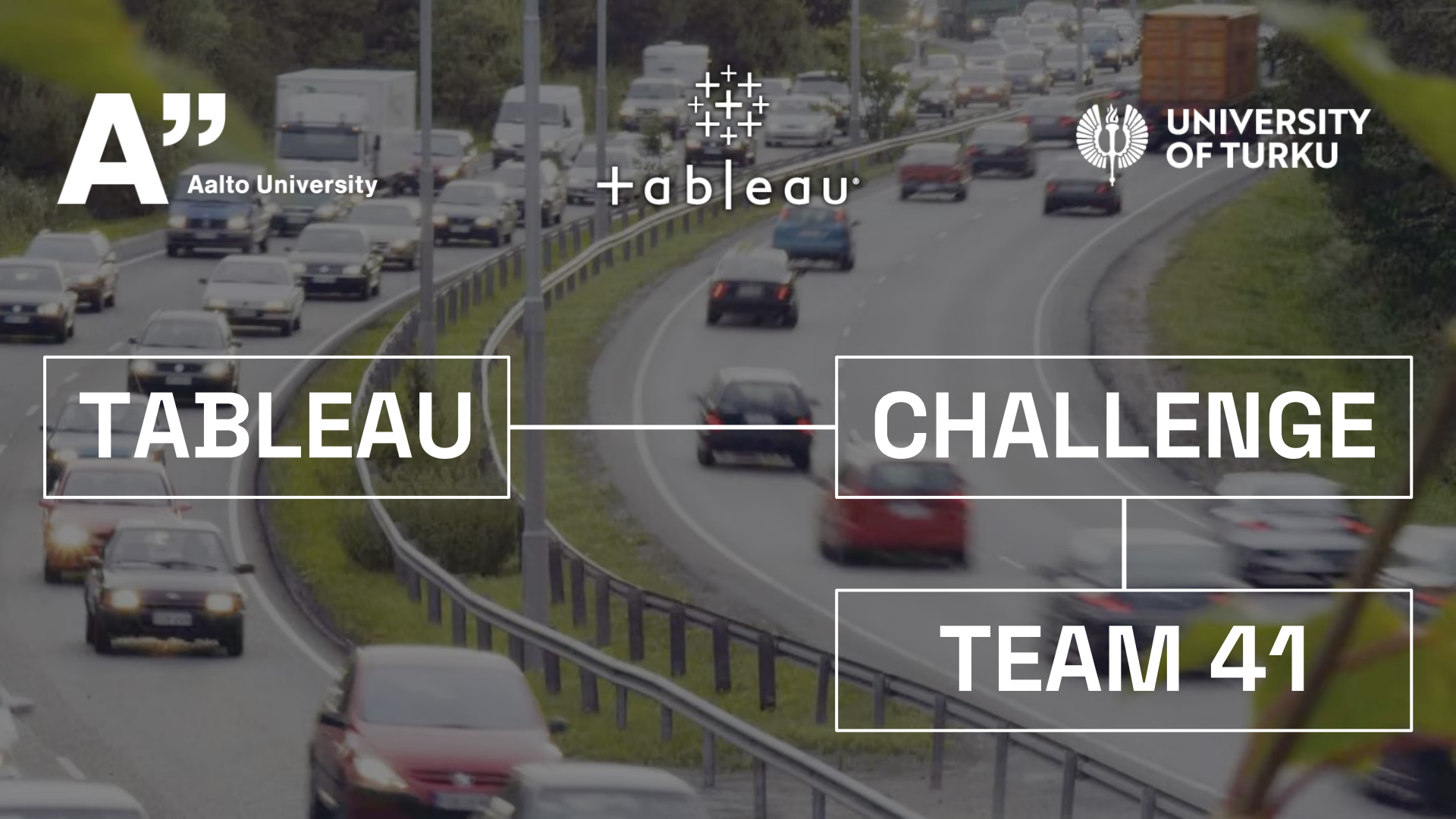
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TABLEAU
CHALLENGE
TEAM 41

AGENDA

1/ OVERVIEW

2/ ACCIDENTS BY TYPES

3/ OUTLIERS

4/ RECOMMENDATIONS

01 OVERVIEW

1

Total accidents downward trend

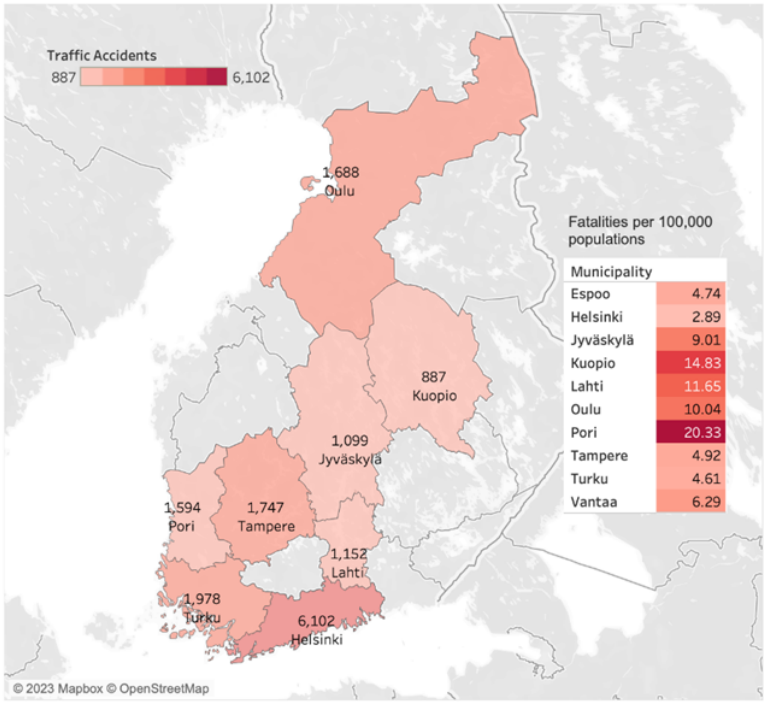
2

High number of accidents in Residential Zone

Downward trend in number of accidents in 10 Finnish biggest cities from 2018 to 2021

18,901	5,731	152
Total Accidents	Total Injuries	Total Fatalities

Total Accidents by Municipality



Fatalities per 100,000 populations

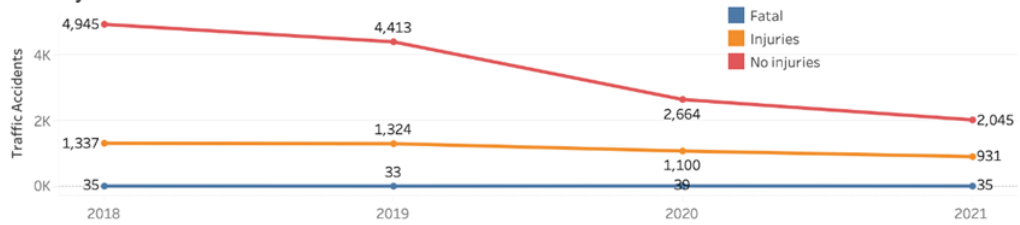
Municipality	
Espoo	4.74
Helsinki	2.89
Jyväskylä	9.01
Kuopio	14.83
Lahti	11.65
Oulu	10.04
Pori	20.33
Tampere	4.92
Turku	4.61
Vantaa	6.29

10 biggest Finnish cities are taken into account including **Helsinki, Espoo, Tampere, Vantaa, Oulu, Turku, Jyväskylä, Kuopio, Lahti and Pori**. Helsinki leads with the highest number of accidents which account for roughly 34% of total accidents. Meanwhile, Pori and Kuopio seem to have high fatality rate per 10,000 populations.

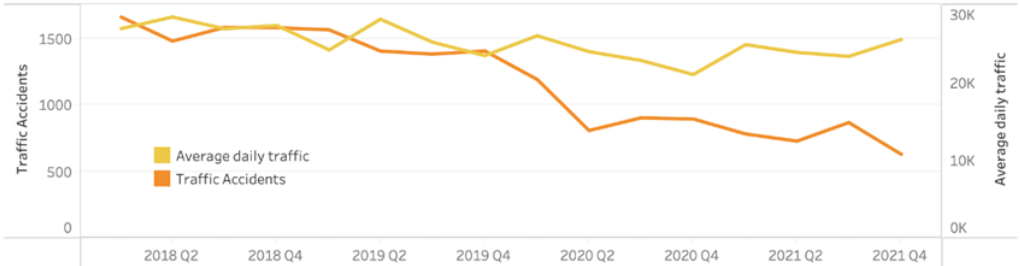
Overall, in these cities, there were a total of **18,901 traffic accidents** that caused **5,731 injuries** and **152 fatalities** in the 4-year period from 2018 to 2021. While the average daily traffic remained relatively stable over the years, the number of traffic accidents dropped by half from 2018 to 2021.

Despite the declining trend in no injuries cases, there was hardly any sign of significant reduction in number of casualties.

Severity over time

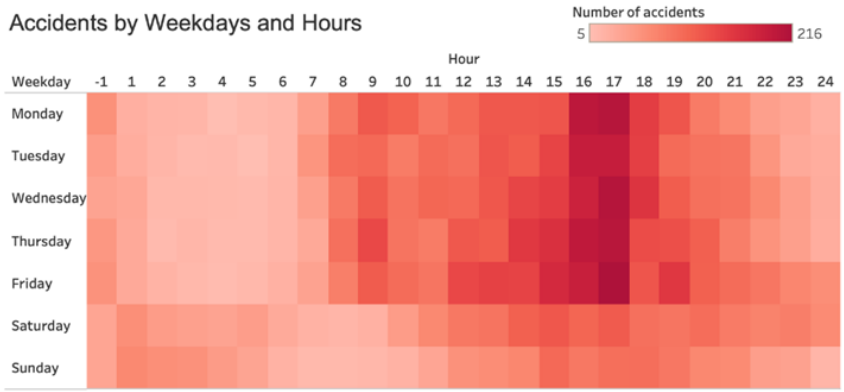


Total accidents vs average daily traffic trend

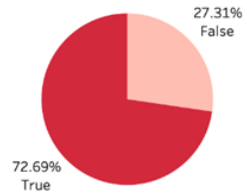


High number of accidents in Residential Zone during peak hours

Accidents by Weekdays and Hours



Accidents in Residental Zone

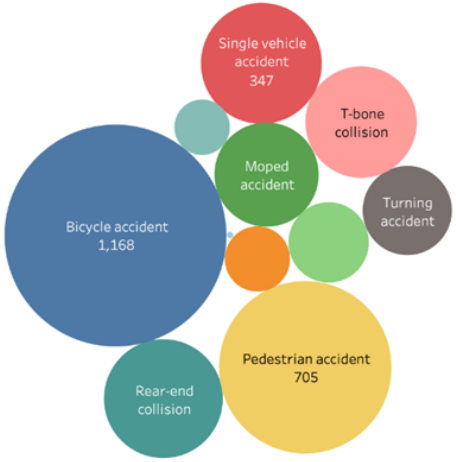


More than 70% of accidents happened in Residential Zones during peak hours in weekdays from around 16:00 to 18:00. Accidents tend to occur in no-intersection locations.

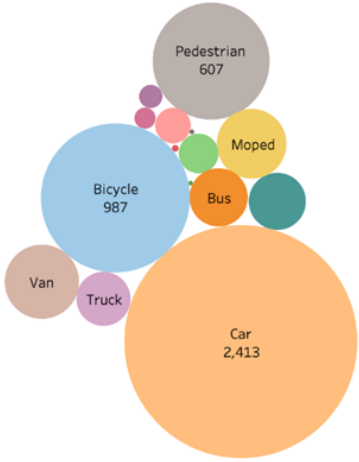
Over half of the accidents that lead to fatals and injuries are bicycle and pedestrian accidents where cars are mostly involved with more than 81%. Following participants that are highly related to these casualties are bicycles and pedestrians.

Other typical accidents taking place in Residential Zone are single vehicle accidents, T-bone collision and Rear end collision accidents.

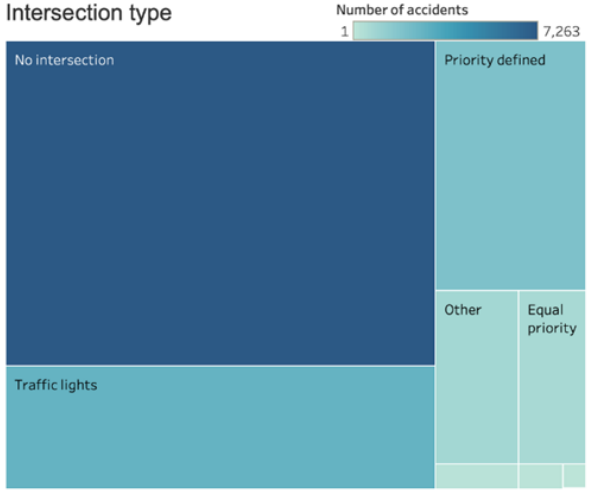
Fatals and Injuries cases by accident category



Fatals and Injuries cases by participant type



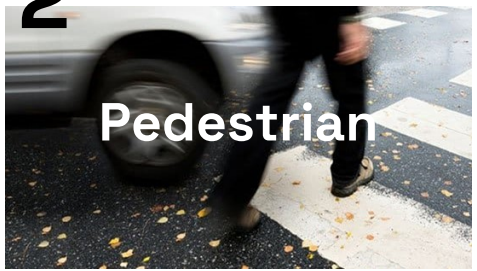
Intersection type



02 ACCIDENT TYPES

1

2



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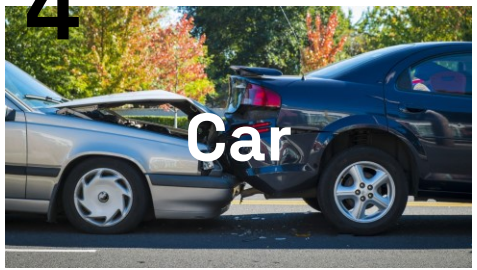
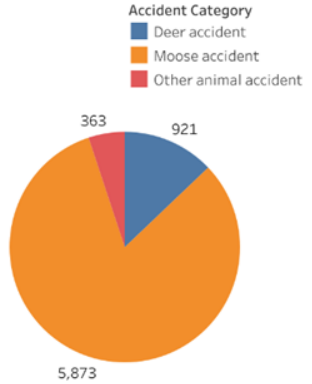


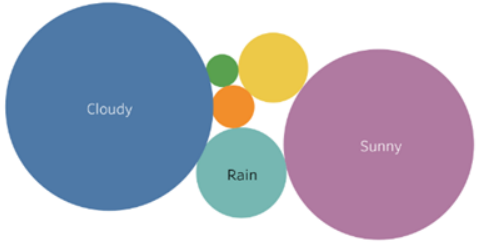
A ANIMAL-RELATED ACCIDENTS

Animal-related accidents

Categories of animal-related accidents

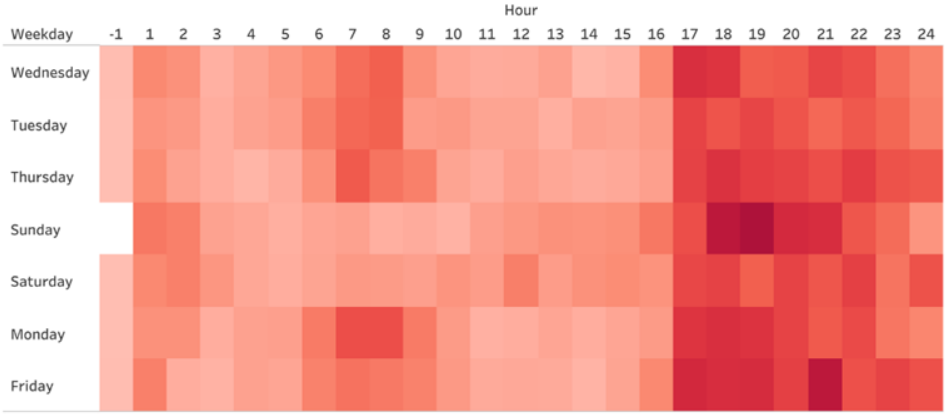


Weather in animal-related accidents

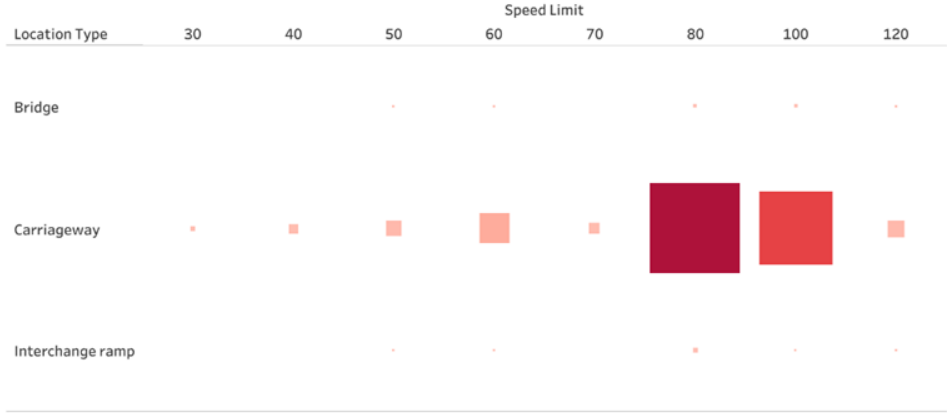


- The viz shows the moose accident accounts for the largest number of accident among animal-related accident category. The location - carriageway witnesses the most animal-related accidents.
- From the viz, we see that the most hours accidents related to animal (deer, moose or other animals) are evening time (17-24). It can be explained by the fact that deers and moose are most active during the twilight hours of dusk and dawn.
- According to the research from Tufts University, cloudy skies are somewhat better for spotting deer movement. A clear sky is the best day to hunt, with bright, clear, cold days. This might explain why most animal-related accidents occurred in these types of weather.
- The speed limit when animal-related accidents occurred is mainly from 80-100km/h (high speed), on carriageaway

Time (hours) when the animal-related accidents occurred



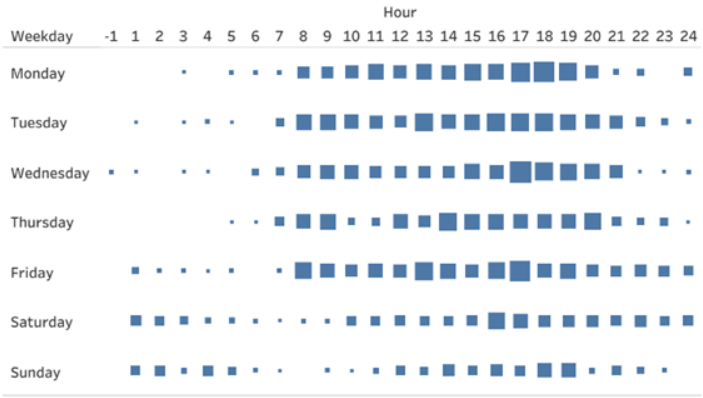
Location & Speed in animal-related accidents



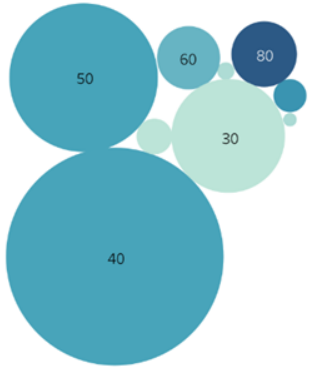
B PEDESTRIAN ACCIDENTS

Pedestrian Accidents

Pedestrian accidents in hours, weekdays



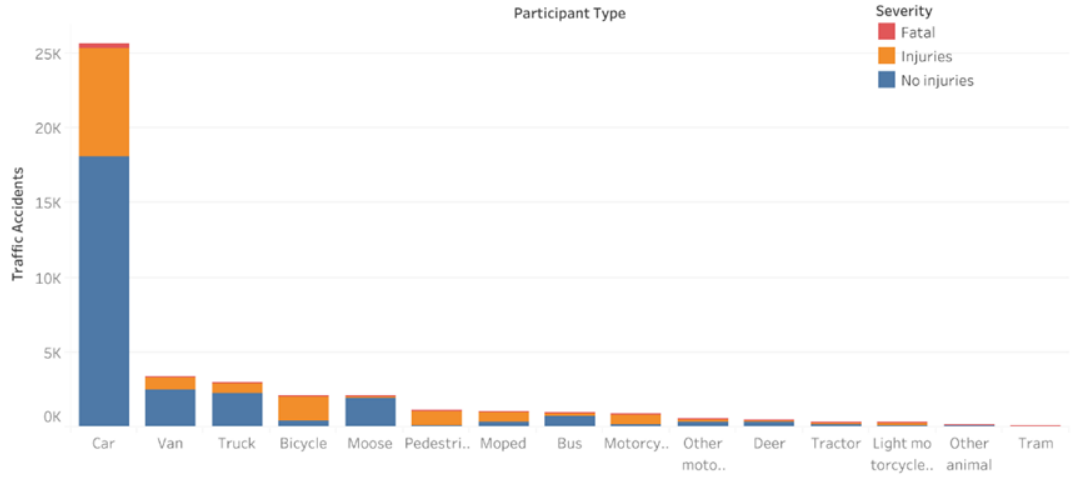
Speed limits with pedestrian accidents



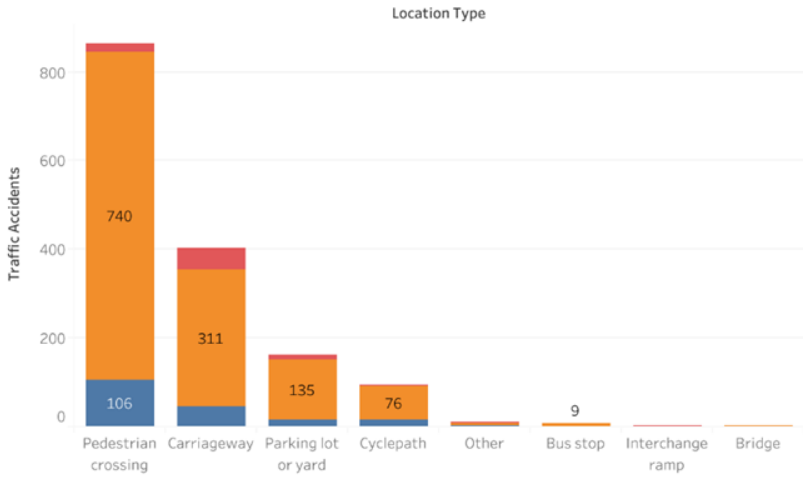
- Pedestrian accidents likely happened most during afternoon to evening time (especially during noon time 14.00-17.00), and during weekdays when people travel from work to home, children go home from school, and people go out for shopping. Noticably, there are number of pedestrian accidents in early morning (1.00-3.00) on weekends (from Friday to Sunday) when people hangout for party late (people might get drunk or tired during driving).

- The speed limit 40-50 km/h has the most pedestrian accidents although that speed is a normal speed of driving. The most accidents (with injury) of pedestrian occurred in **pedestrian crossing**, followed by carriageway. Pedestrian crossing might have problems with signboard (broken signboards, blurry signboards), which leads to the confuse for drivers to avoid pedestrians while they cross the street. Parking lot or yard, cycle path are where accidents for pedestrian occurred as well, which means drivers the cars sometimes do not notice the walkers on road while parking (not having good skill of parking or do not notice mirror while parking).

Participants involved in pedestrian accidents



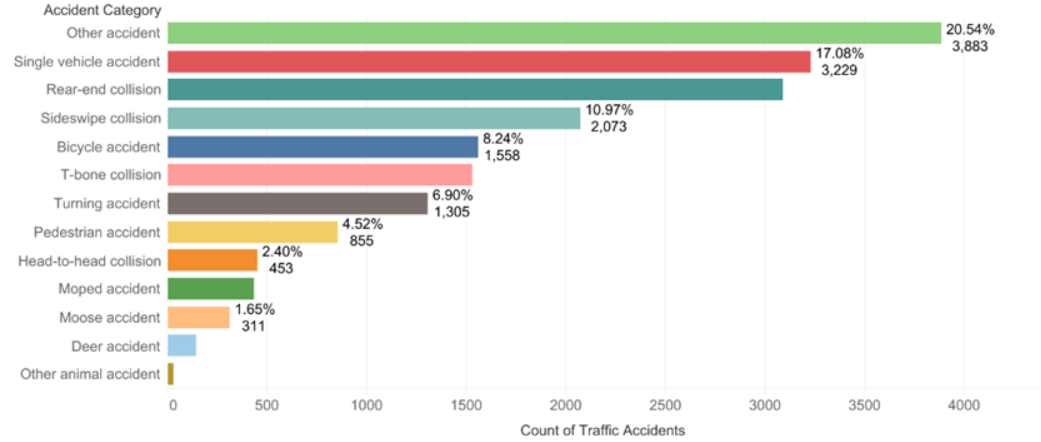
Most common location types of pedestrian accidents



C BICYCLE ACCIDENTS

Overview of Bicycle Accidents

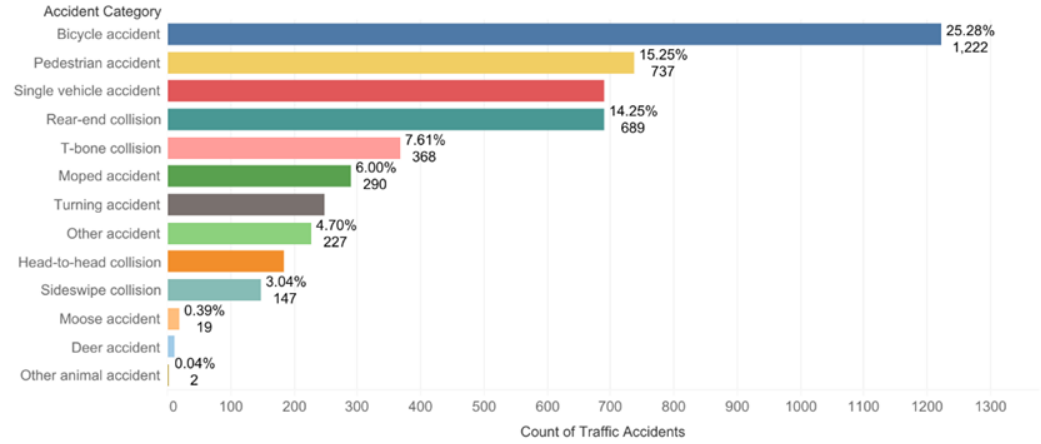
Type of accidents (incl. No Injuries)



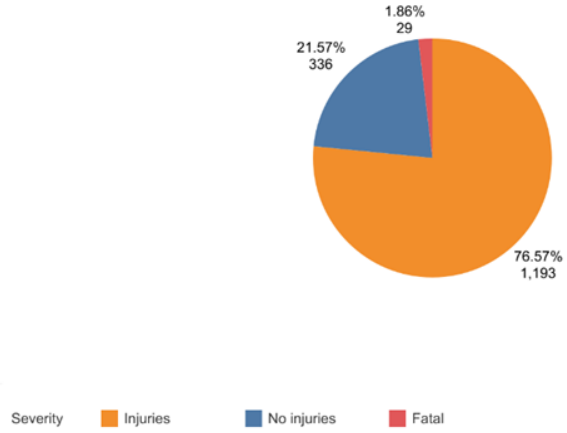
- In total, bicycle accidents account for over 8% of the total number (1558 cases). However, among the accidents that lead to ***injuries or deaths***, accidents involving bicycles account for 1/4 of the total number, which is 1222 cases. This shows that bicycle accidents generally tend to be more severe than with other modes of transport, potentially due to the lack of designated infrastructure and protections cyclists have compared to other type of motorized vehicles.

- Surprisingly, more than 3 in every 4 bicycle accidents lead to injuries. About a quarter of bicycle accidents lead to no injuries. Only almost 2% lead to deaths, accounting for 29 cases from the period from 2018 to 2021. One possible explanation is that bicycles are ridden at lower speed compared to cars, which is less risky of serious injuries or death.

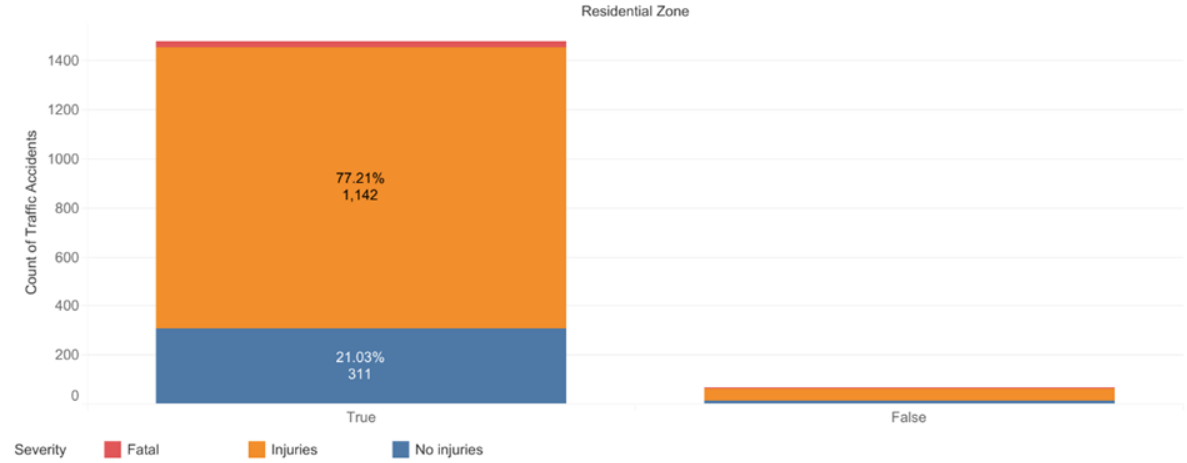
Type of accidents (excl. No Injuries)



Severity in Bicycle Accidents



Residential Zone

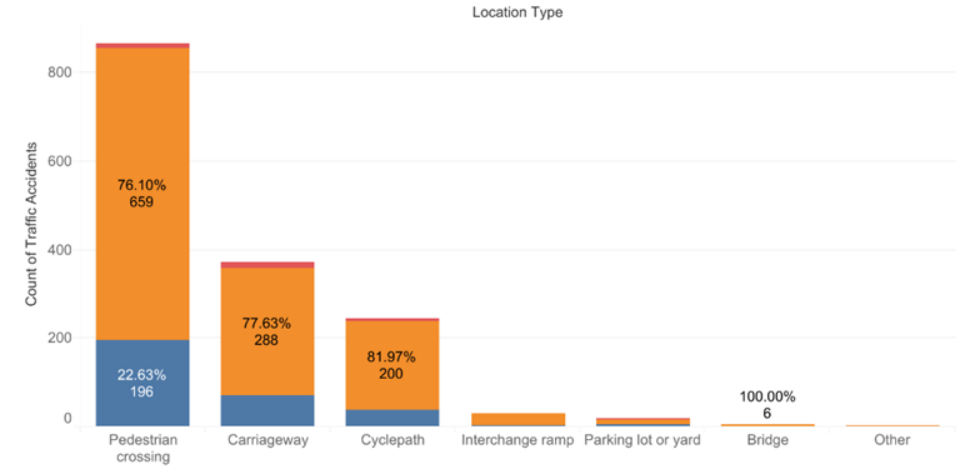


- Interestingly, almost all bicycle accidents occured in Residential Zone (almost 1500 cases), with over 77% cases leading to injuries. Only 71 cases took place in non-residential zone. This is likely due to the fact that residential areas tend to have lower speed limits, more intersections, and more spaces that are shared by cyclists, pedestrian and other road users.

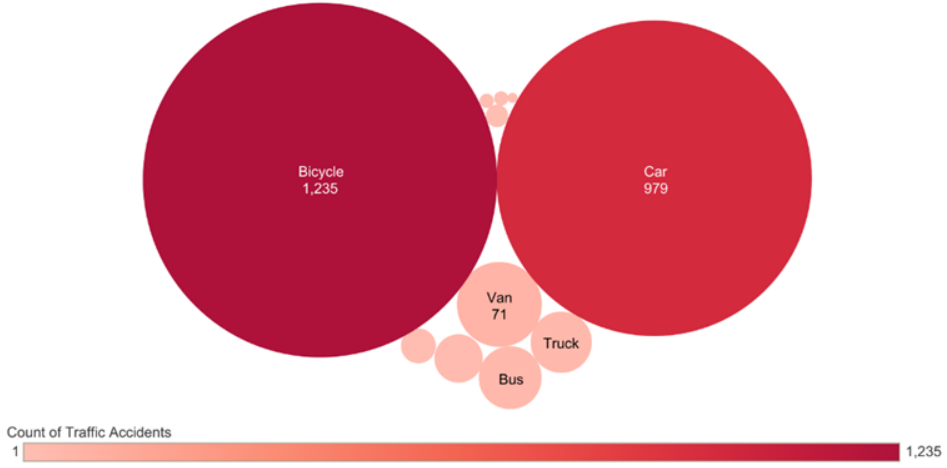
- Additionally, most of the bicycle accidents happened at pedestrian crossing, accounting for over 850 cases. This is then followed by carriageway (almost 400 cases) and cyclepath (almost 250 cases).

- Bicycle accidents are primarily caused by other bicycles and cars.

Location Type



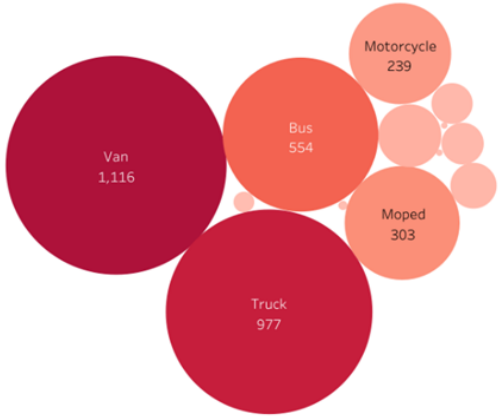
Participant types



D CAR ACCIDENTS

Overview of Car Accidents

Participants type

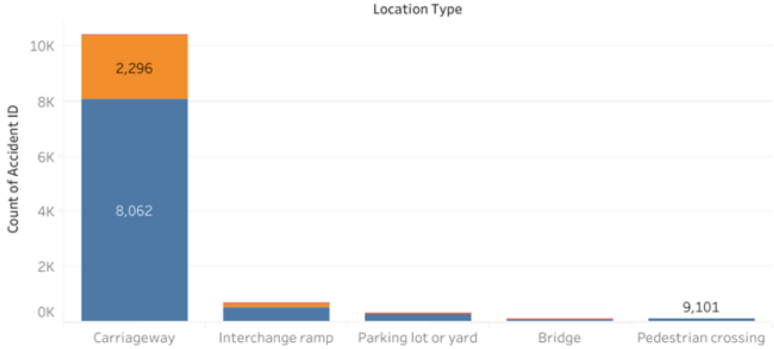


Obviously, the most common participant type involved in car accidents is cars, followed by Van, Truck and Bus. Also, motorcycle and moped are also common participant types associated with car accidents.

The most common location type for all car accidents is the Carriage ways, with nearly 20% of injuries and 0.55% of death. Interchange ramp is the second most common location type, closely followed by Parking lot or Yard.

Interestingly, there are more accidents happen when the driving condition is reasonably good, with dry road and Sunny weather. This trend could be explained by either increased traffic volume when driving condition is good, or overconfidence and distractions from drivers.

Most common Location type for all accidents



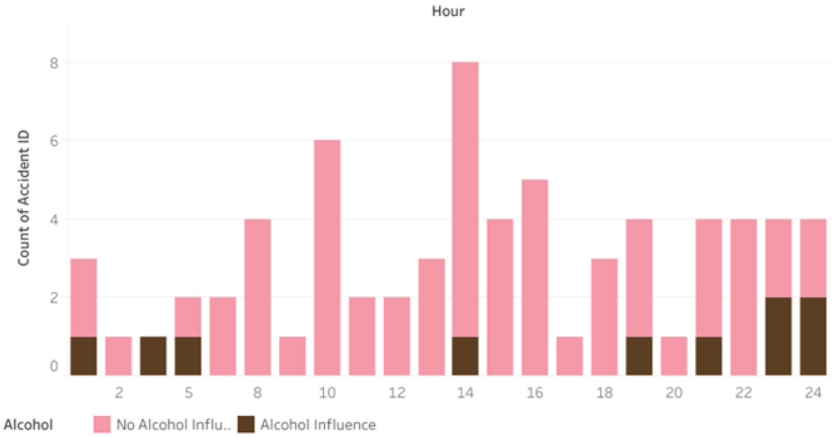
*Weather vs Road surface condition

Weather	Road Surface Condition: Dry	Icy	Slushy	Snowy	Wet
Cloudy	2,203	557	104	327	
Fog	15	10	7	4	
No value	32	14	6	16	
Rain	8	33	26	3	
Sleet	4	16	139	16	
Snowfall	14	212	83	383	
Sunny	4,020	467	39	193	

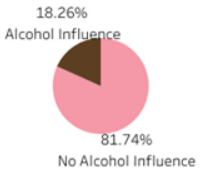
Count of Accident ID (color) broken down by Road Surface Condition vs. Weather. The data is filtered on Municipality, Accident Category and Speed Limit. The Municipality filter keeps 10 members. The Accident Category filter keeps 7 of 13 members. The Speed Limit filter excludes Null. The view is filtered on Road Surface Condition, which excludes No value.

Alcohol Influence and Speed limits

Death cases by Alcohol influence in hours



Fatal accidents by Alcohol influence



Alcohol has influence over only around 7% of total accidents, but accounts for 18.26% of fatal accidents, which is very high.

The hours that have highest number of fatal accidents are **2pm, 10am and 4pm**, respectively.

Also, 8am, 3pm and late evening hours (7pm-12pm) also have high number of accidents that lead to deaths (except for 8pm)

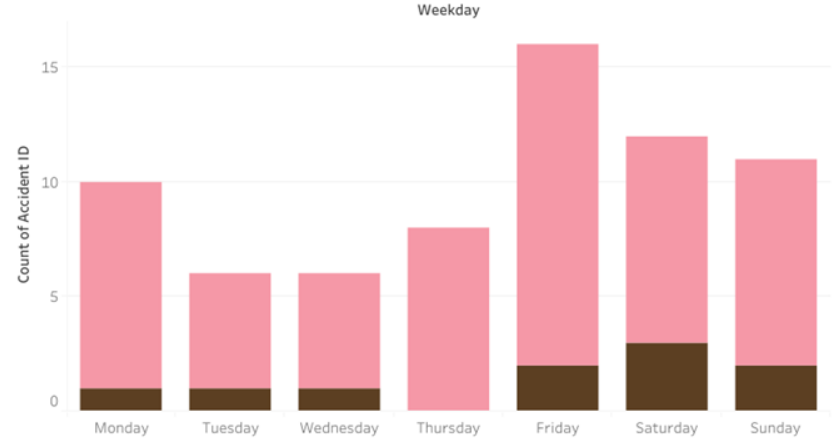
Among all the hours, **midnight hours** have the highest number of fatal accidents under **the influence of alcohol**.

Weekends and Monday tend to have more fatal accidents. The number of accidents influenced by Alcohol are obviously higher on weekends.

Many of the accidents happened when the age limit is 40, 50 or 80, with the highest number of all accidents at the speed limit of 50.

However, the number of fatal cases is higher when the speed limit is 80

Death cases by Alcohol influence in week days



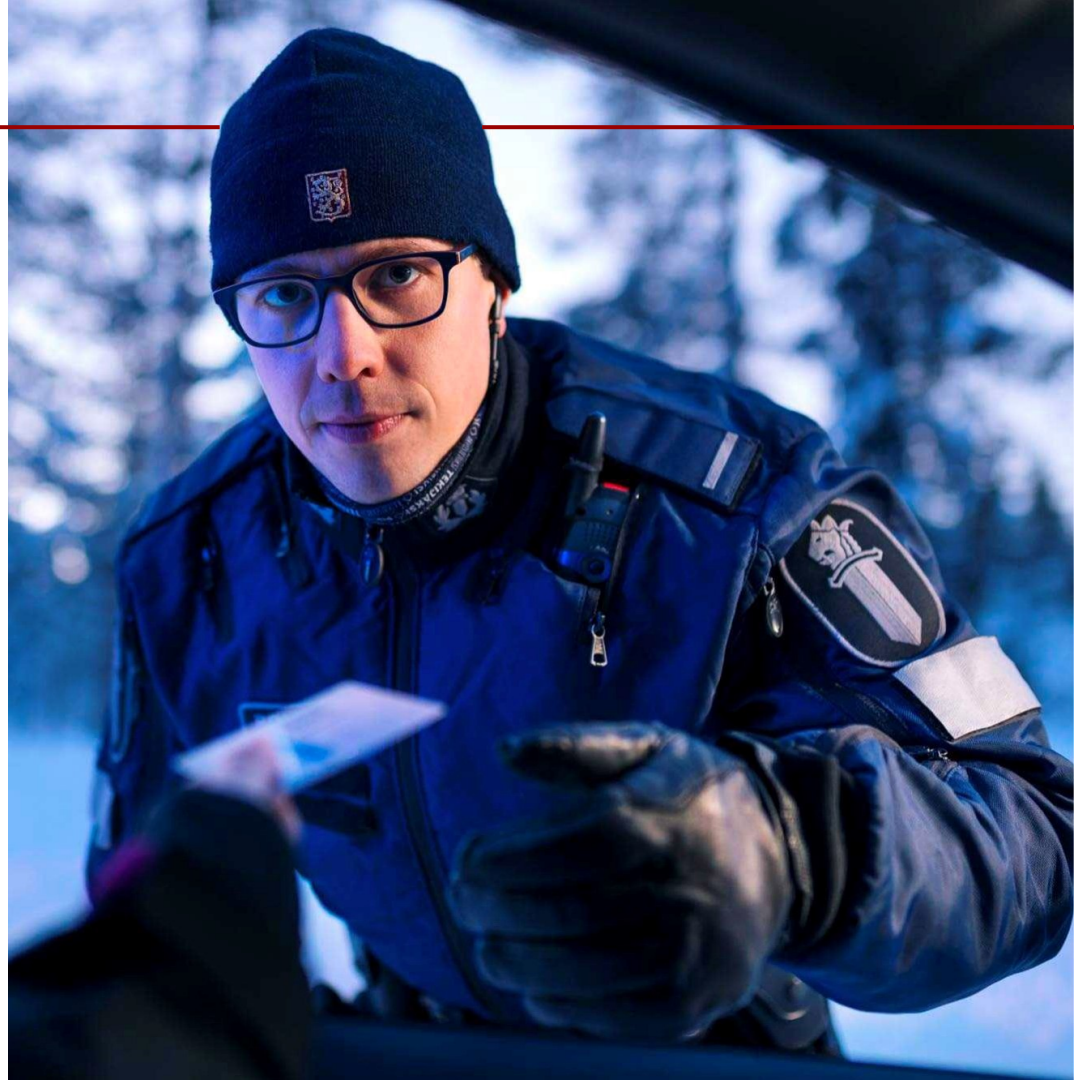
Number of all accidents by speed limits

Severity	Speed Limit 20	30	40	50	60	70	80	100	120
Fatal		2	8	15	9	1	26	8	
Injuries	4	126	612	817	361	53	392	153	29
No injuries	40	764	2,690	2,772	1,064	152	1,274	478	52

Count of Accident ID (color) broken down by Speed Limit vs. Severity. The data is filtered on Municipality and Accident Category. The Municipality filter keeps 10 members. The Accident Category filter keeps 7 of 13 members. The view is filtered on Speed Limit and Severity. The Speed Limit filter excludes Null. The Severity filter keeps Fatal, Injuries and No injuries.

03 OUTLIERS

- Cities were studied for good and bad outliers, which could point to good practises
- Participant information was limited with no information from Kuopio, Oulu and Jyväskylä



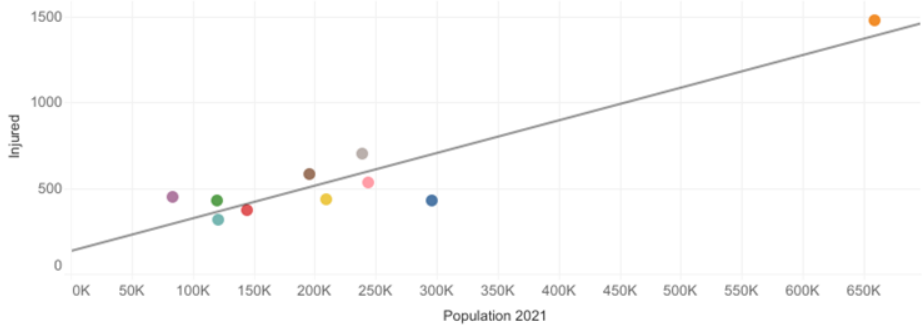
City analysis

- Both accident and injury counts seemed to have high correlation with population.
  - Espoo seems to have lower injuries and accidents, whilst Pori has the opposite.

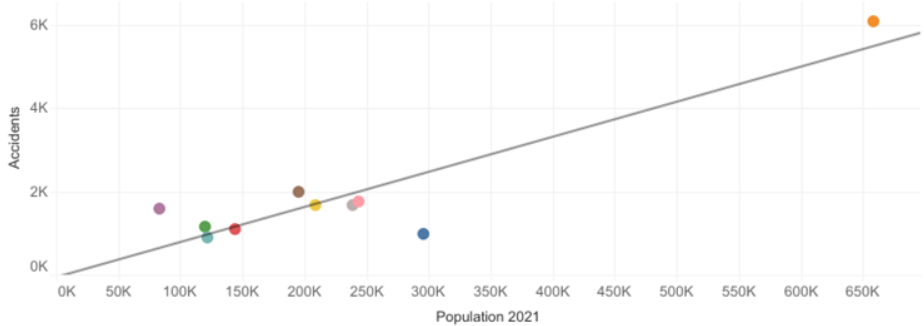
With deaths there was surprisingly very small correlation with high variance in deaths per capita.

  - Helsinki is especially an outlier with very high population and not much above average deaths.
  - Cities like Turku, Espoo and Tampere also fared well.
  - It should though be noted that the sample space with fatalities is much smaller.

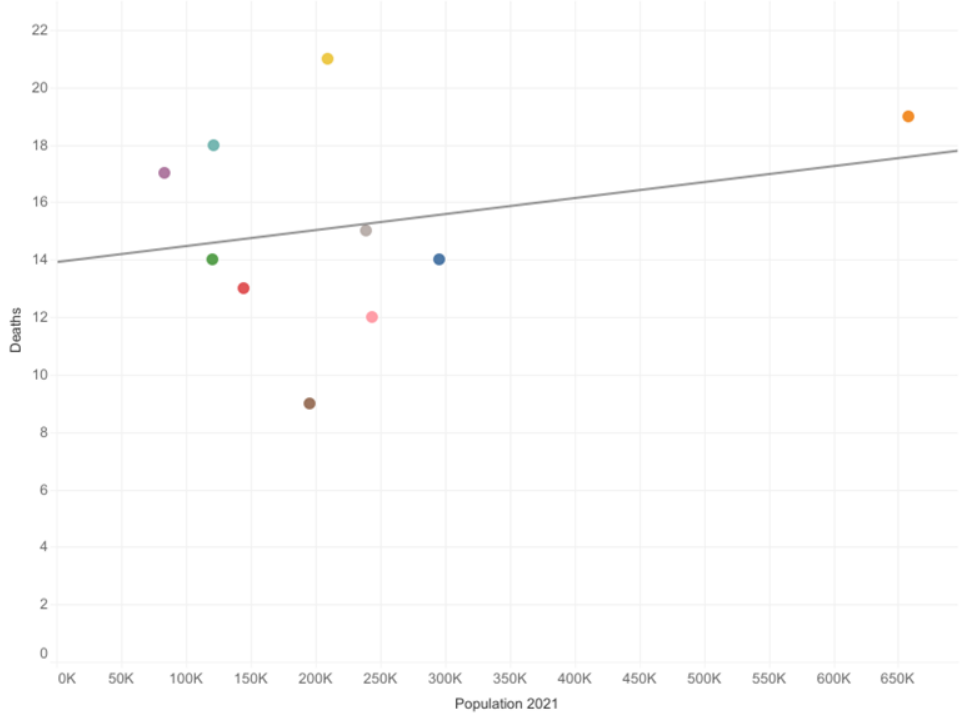
Injuries/population



Accidents/population

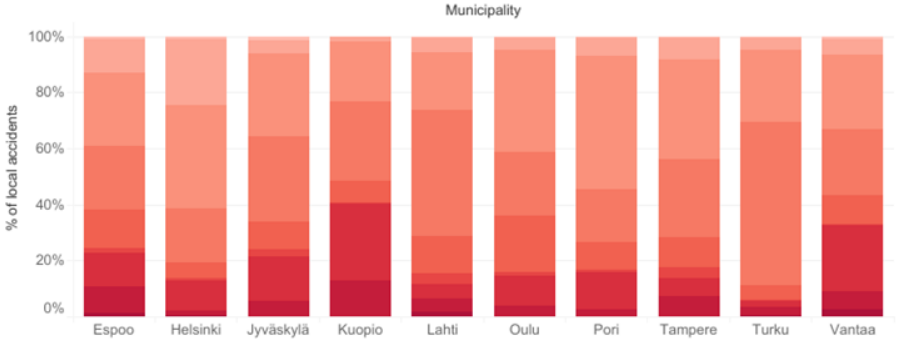


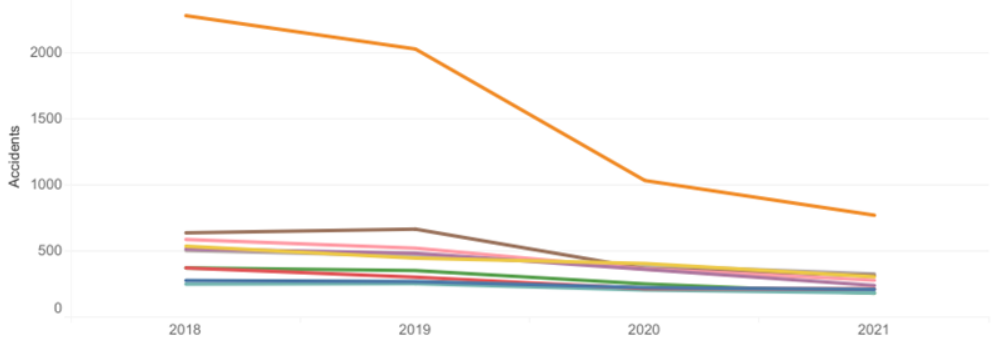
Deaths/population

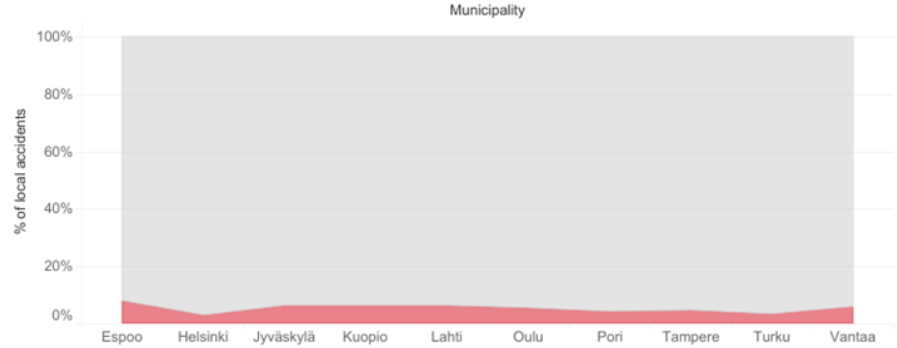


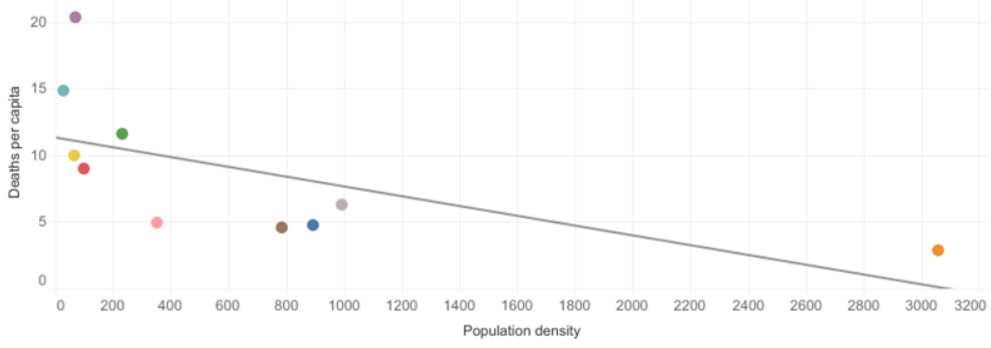
What could explain the variance in deaths per capita?

- Helsinki & Turku a lower share of alcohol related incidents
- Denser populated areas seem to have fewer deaths per capita
- Helsinki & Turku a lower share of high-speed incidents
- The amount of accidents have decreased especially in Helsinki and Turku, the two cities that also have few fatalities per capita









04 RECOMMENDATIONS

#1: Accidents are more likely to happen during peak hours.
→ ***Recommendation #1:*** Provide real-time traffic information. Open alternate routes to avoid heavily congested traffic. Encourage use of public transports.

#2: Car accidents mostly happen during weekends, and when driving condition is good. A lot of severe accidents happen when speed limit is 80km/h and/or under influence of alcohol
→ ***Recommendation #2:*** Education and awareness. Stricter Laws and Enforcement (eg. increasing the penalties for drunk driving, patrol during weekends)

#3: Cycling accidents are generally more severe compared to other types. They happen mostly at pedestrian crossings in residential zones with other bikes or cars.
→ ***Recommendation #3:*** Invest in infrastructure and facilities designated for cyclists (e.g separate bike lanes and improved road markings) especially in residential zones.

#4: Even though cities had quite consistent numbers in accidents and injuries per capita, deaths per capita figures varied dramatically.
→ ***Recommendation #4:*** Lower speed limits and measures in reducing drunk driving could improve road safety. Building urban environments where high speed roads are not necessary for travel will likely reduce the amount of fatalities. Helsinki and Turku are cities that should be studied for good policies for recent good development.

#5: Animal-related accidents tend to happen during evening hours.
→ ***Recommendation #5***: To keep deer & moose away from the carriageway, concrete blocks with holes are placed in the first metres beside the carriageway. Grass will grow through the holes, but the concrete is not nice to walk on or dig in and therefore deer and wild animals will avoid the proximity of the carriageway.


Aalto University
LET’S MAKE OUR CITIES SAFER!
THANK
YOU