

Traffic Accidents Resulting in Injuries and/or Fatalities in Lithuania from 2014 to 2022



Data Analytics Course
Capstone Project

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General Accident Trends

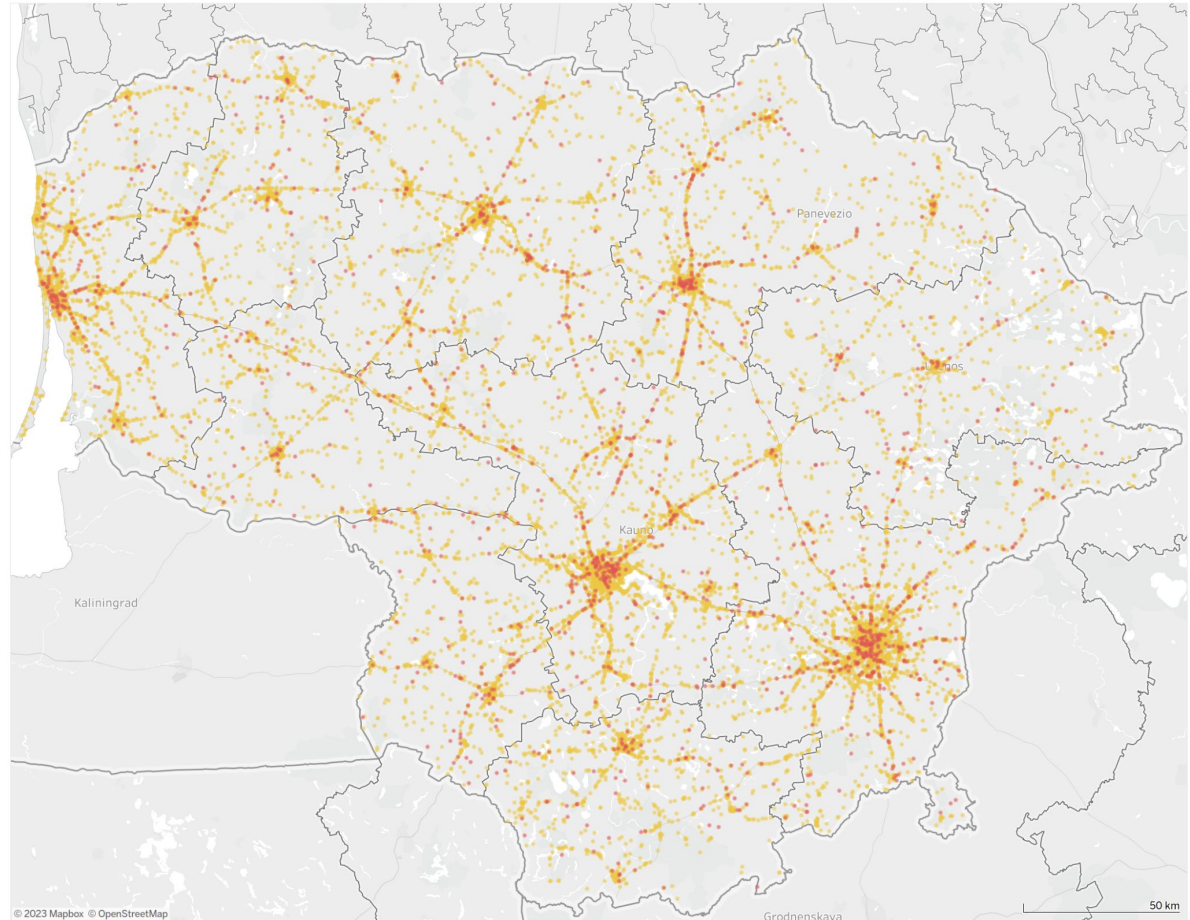
- Amount of accidents where people got killed or injured is slowly going down.
- Inspiringly, the amount of accidents which include fatalities has decreased more than a half in 8 years.
- The main hotspots are correlated with the amount of traffic in the area, mainly cities and popular highways.

26,808
vs. Last Year
+1.6%
Accidents

of Accidents per Year

2014	2015	2016	2017	2018	2019	2020	2021	2022
2,941	2,750	2,996	2,867	2,747	2,993	2,621	2,647	2,714
238	219	179	177	161	169	156	128	105

■ Injuries only
■ Including fatalities

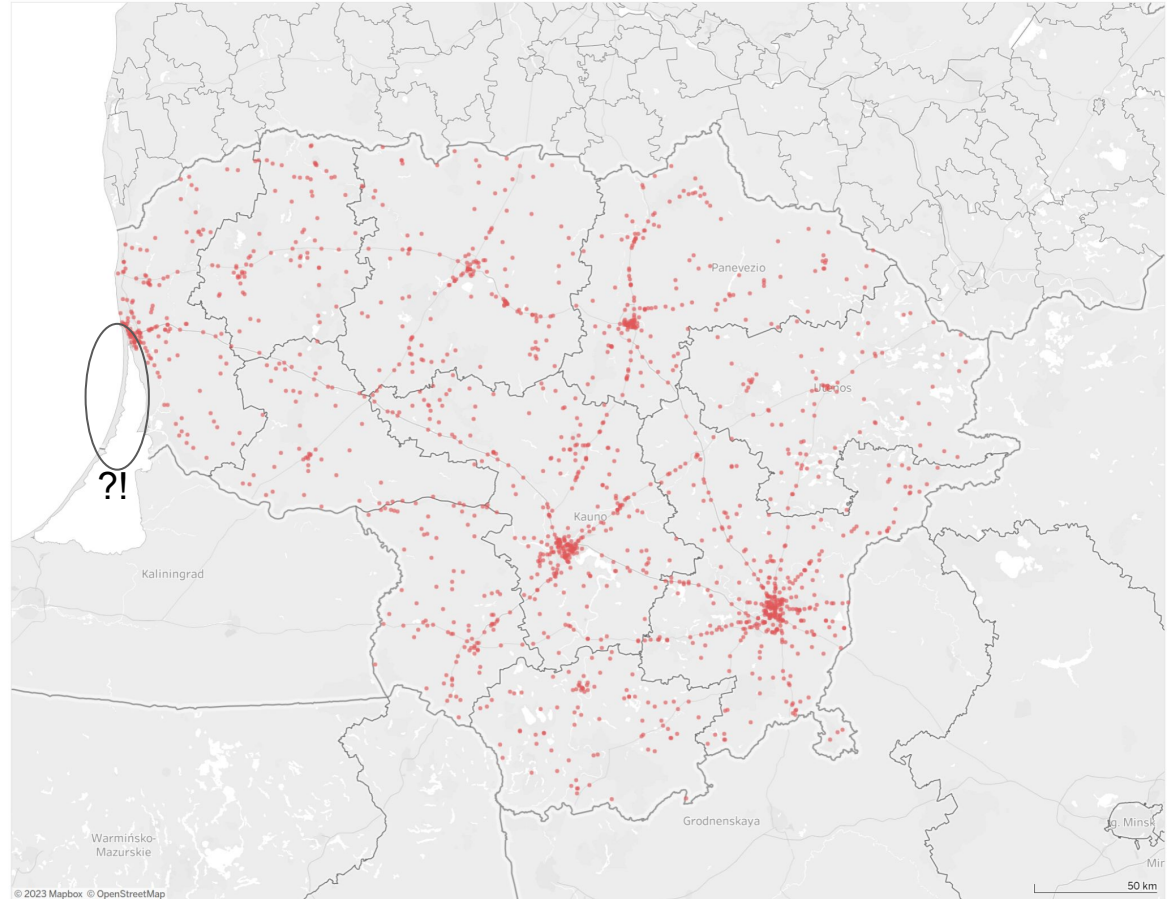


Fatal Accident Geography

1,532 -18.0%
vs. Last Year
Accidents

of Accidents per Year

2014	2015	2016	2017	2018	2019	2020	2021	2022	
2,941	2,750	2,956	2,867	2,747	2,993	2,621	2,647	2,714	■ Injuries only
298	219	179	177	161	169	156	128	105	■ Including fatalities



- Follow the trend of traffic density.
- Neringa is an anomaly?!
- No fatal accidents in 8 years even though half a million tourists visit Neringa each year.

Neringa Road Safety - an Exemplary Case

- **Road renovation in 2012-2013.**

"The road built in 1970 is one of the worst rural roads in the country, with many accidents." [1]

- **Bicycle - a safer alternative.**

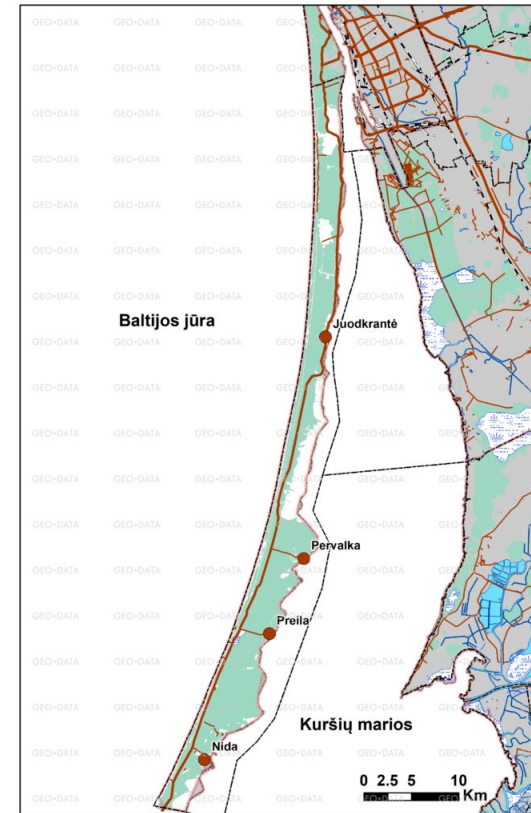
Bicycle roads accompany main road in all of Neringa. They are the preferred means of transportation in the area with many rental points. Bicycle roads have been reconstructed recently [2], which also encourages more people to choose bicycle instead of a car - a more dangerous vehicle.

- **Accident prevention.**

Most of the road has stricter speed limitations outside of towns (70 km/h instead of 90 km/h) and an increasing number of speed cameras [3].

- **Pay to Get In.**

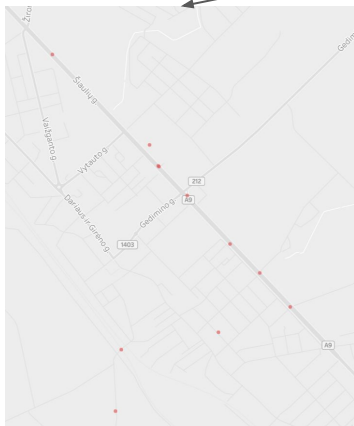
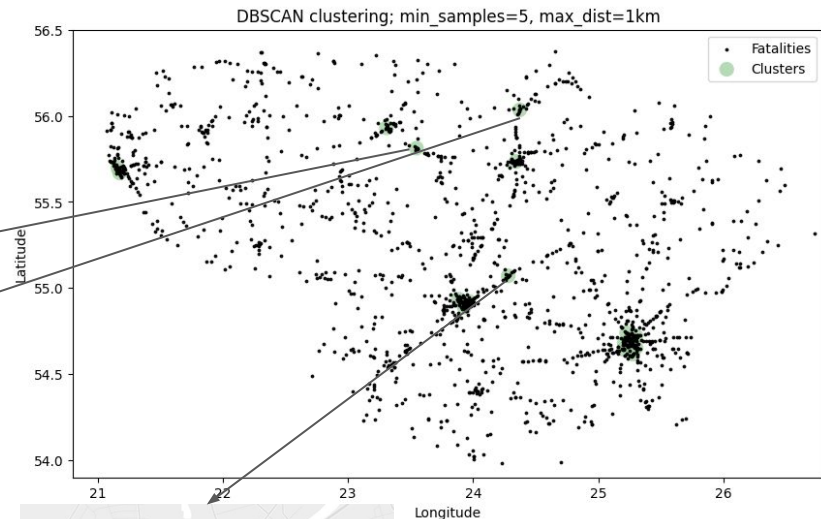
As Neringa is a natural park with 2 reserves [4], there is a fee to be paid if you want to get in with a motorized vehicle (30 eur per car) [5]. Also, to get in to Neringa in the first place you need to use a ferry, which charges more for motorized vehicles. All of this added up suggests you to use safer alternatives of transportation like bicycles and buses over more dangerous ones - cars and motorcycles.



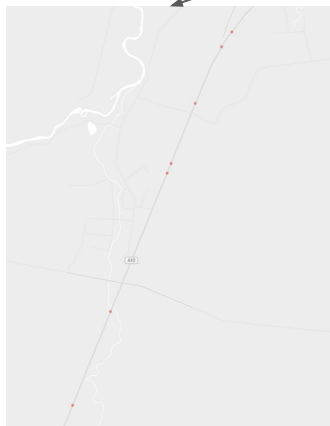
Conclusion of the case - a mix of measures needs to be taken in order to prevent traffic accident fatalities. The same measures could be implemented in car accident hotspots - main cities and dangerous roads across Lithuania.

Looking for Most Dangerous Roads in Lithuania

- DBSCAN clustering for geographical points.
Parameters: minimum samples in a cluster - 5, maximum distance between two points in a cluster - 1 km.
Result - 18 clusters.
- Points of interest are clusters distributed on one road with the same traffic regulations (no intersections, etc. that would change the traffic flow). Therefore, clusters in main cities are discarded.



A9 highway section going through Radviliškis town.



A10 highway section near Pasvalys town.



A6 highway section going through Jonava town.

All are high-speed roads near or going through more densely populated areas - towns!

General Victim Information

32,881 +2.9%
Victims vs. Last Year

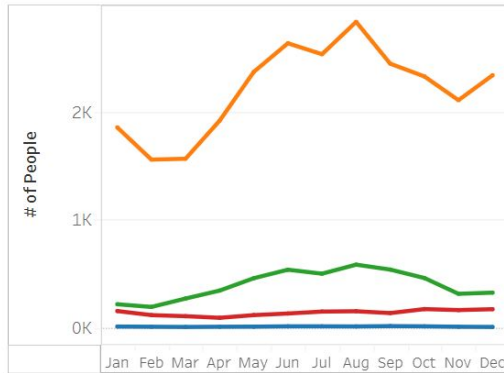
26,508 +4.7%
Adults Injured vs. Last Year

4,697 +0.2%
Children Injured vs. Last Year

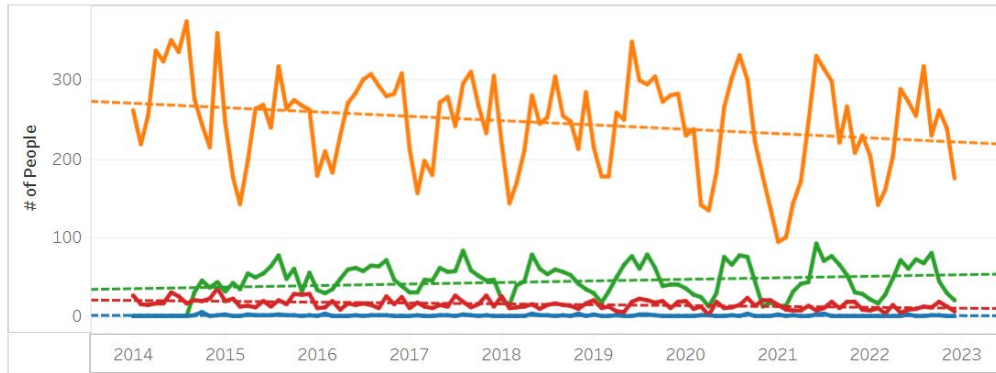
1,608 -17.4%
Adults Fatally Injured vs. Last Year

68 -50.0%
Children Fatally Injured vs. Last Year

of Victims by Discrete Months



of Victims by Months



- The metric of injured adults is progressing downwards.
- However, the amount of injured children is slightly trending upwards?!
- The increase of accident victims is being seen in summer season.

Children Injuries

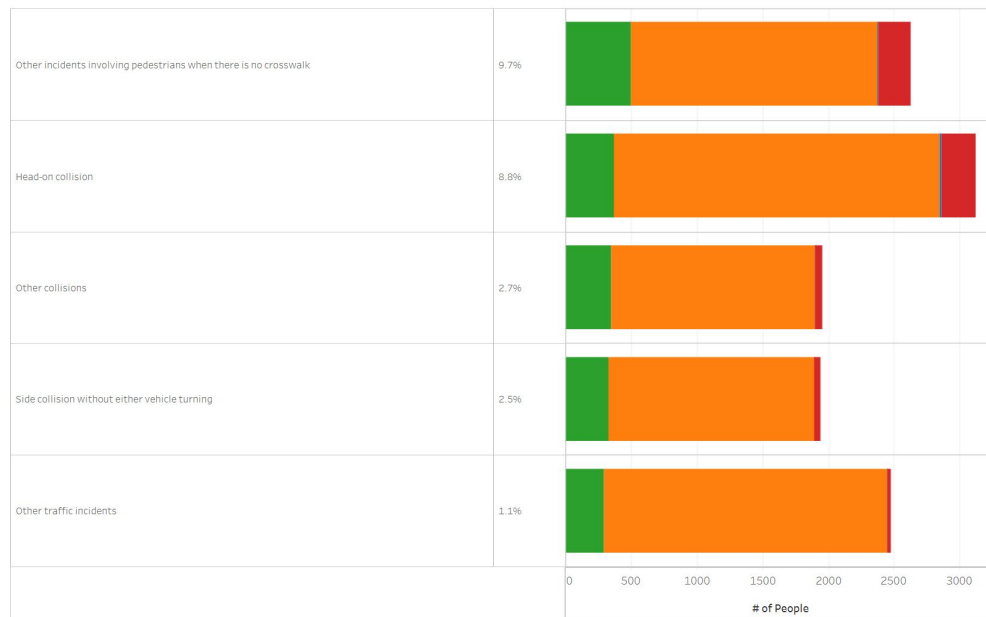
Accountable Only If

Pedestrian, driving children vehicles

Driving children vehicles

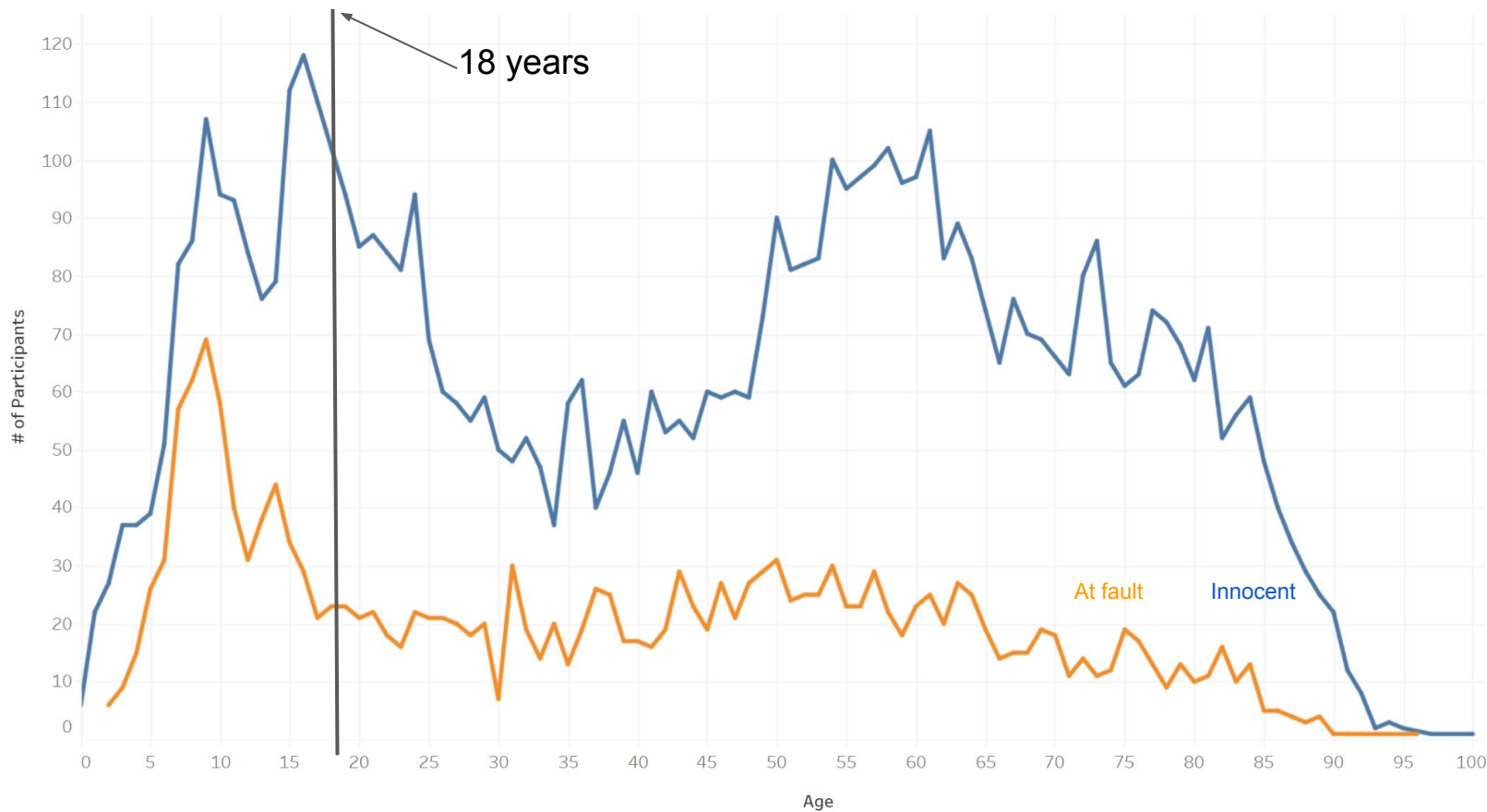
Top 5 Accident Categories by the Amount of Children Injured

of Victims and Fatality % by Accident Type



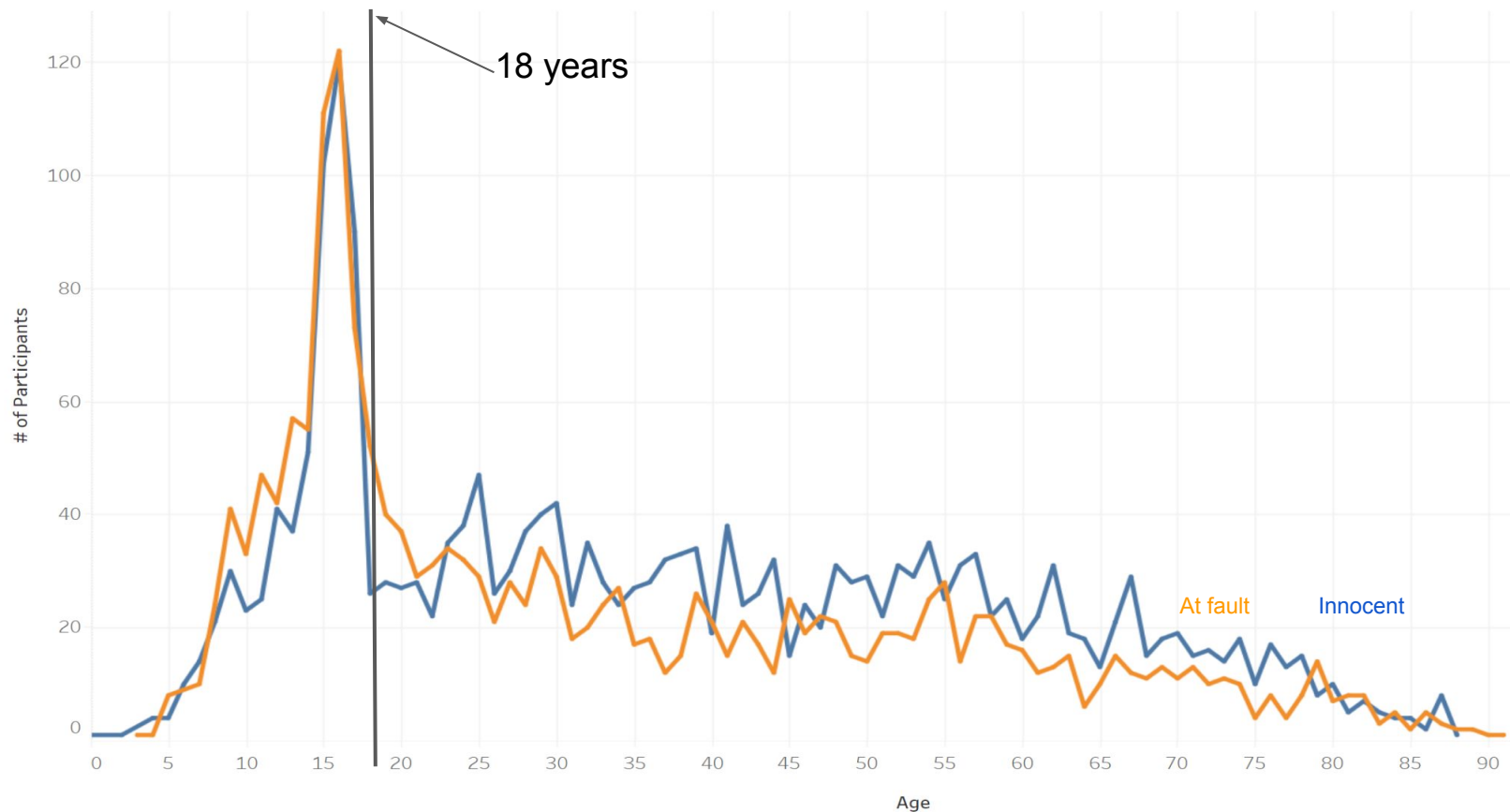
Children Injuries - Pedestrians

Pedestrian Participants by Age



Children Injuries - Children Vehicles (Bicycles, Mopeds, E-scooters, Light Quad Bikes)

Children Vehicle Participants by Age

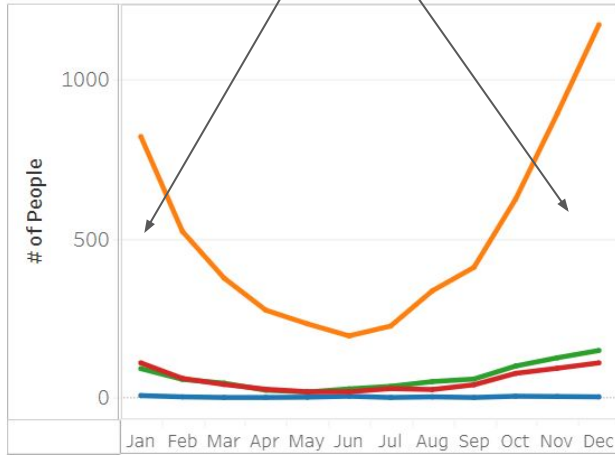


Victims of the Night

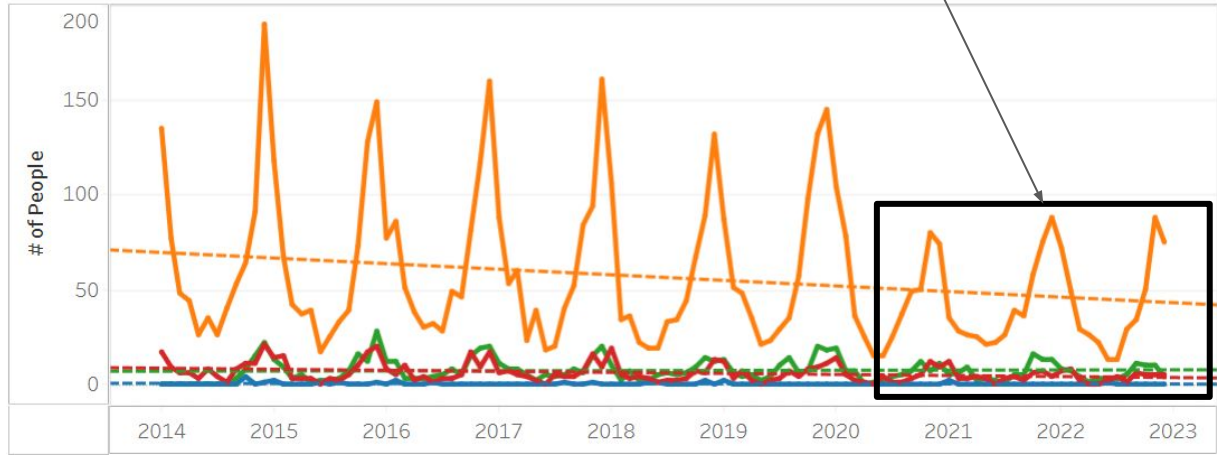
~23% of all accidents happen in the night time.

Opposite than in the daytime, most of victims suffer in winter season.

of Victims by Discrete Months



of Victims by Months



- In the winter season, night traffic accidents are more common, because the visibility becomes poor and more unpredictable. Also, 50% of the victims of the night suffered when the lighting was turned off or not installed. Moreover, the temperature change in the night in winter season is much more drastic, which leads to icy roads.
- From 2020 the modernization of road lighting of national importance was implemented in two stages, during which the old type lamps were replaced with new LED type lamps, which can be operated in real time [6].

Victims of the Night

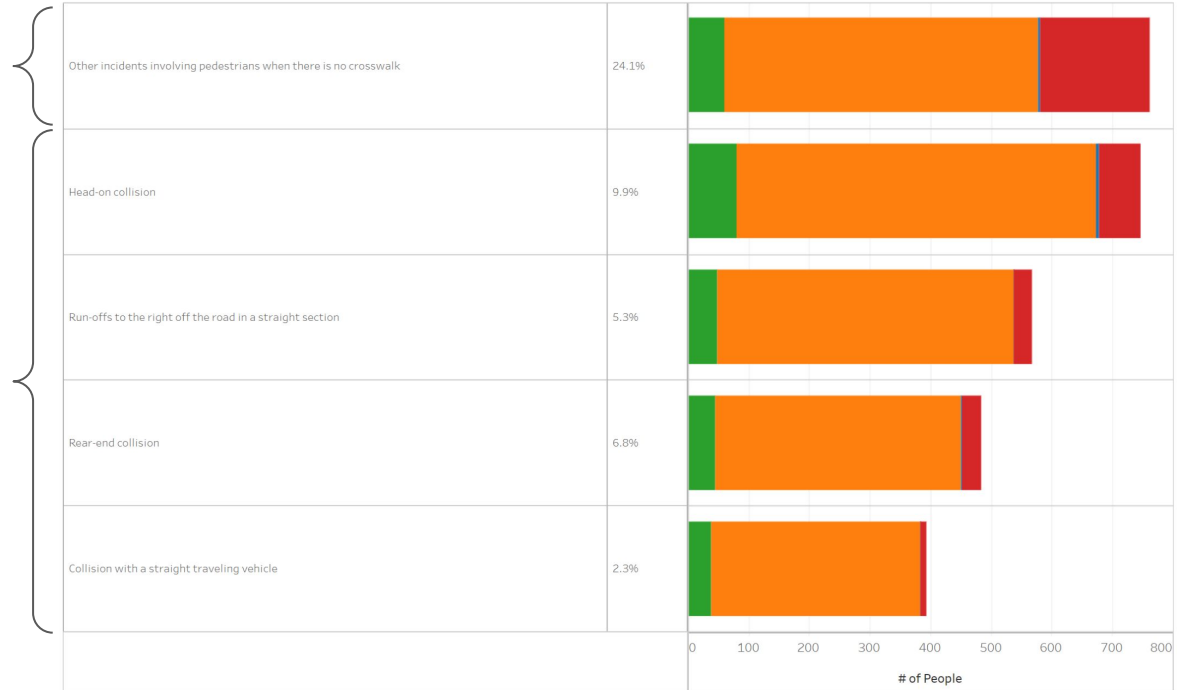
~23% of all accidents happen in the night time.

Solutions

Pedestrian reflectors, building crosswalks with lighting, education

General road lighting, better road infrastructure

Top 5 Accident Categories by Total Victims



Guardrails - a Devil in Disguise?

	Total Victims	People Killed		Fatality %
Guardrails Absent	31039	1510	→	4.86%
Guardrails Present	1841	166	→	9.02%

Fatality rate (9.02%) with guardrails was 85.35% higher than without guardrails (4.86%).
We can be 99% confident that fatalities are more common on roads with guardrails?! (p-value = 0)

- Guardrails are usually built in high speed roads to prevent the drivers who turn off the road. Likely, high speeds are more to blame than guardrails.
- However, if the guardrails are not built properly or in the wrong place, they can pose more threats than security.

Seatbelts - True Guardian Angels

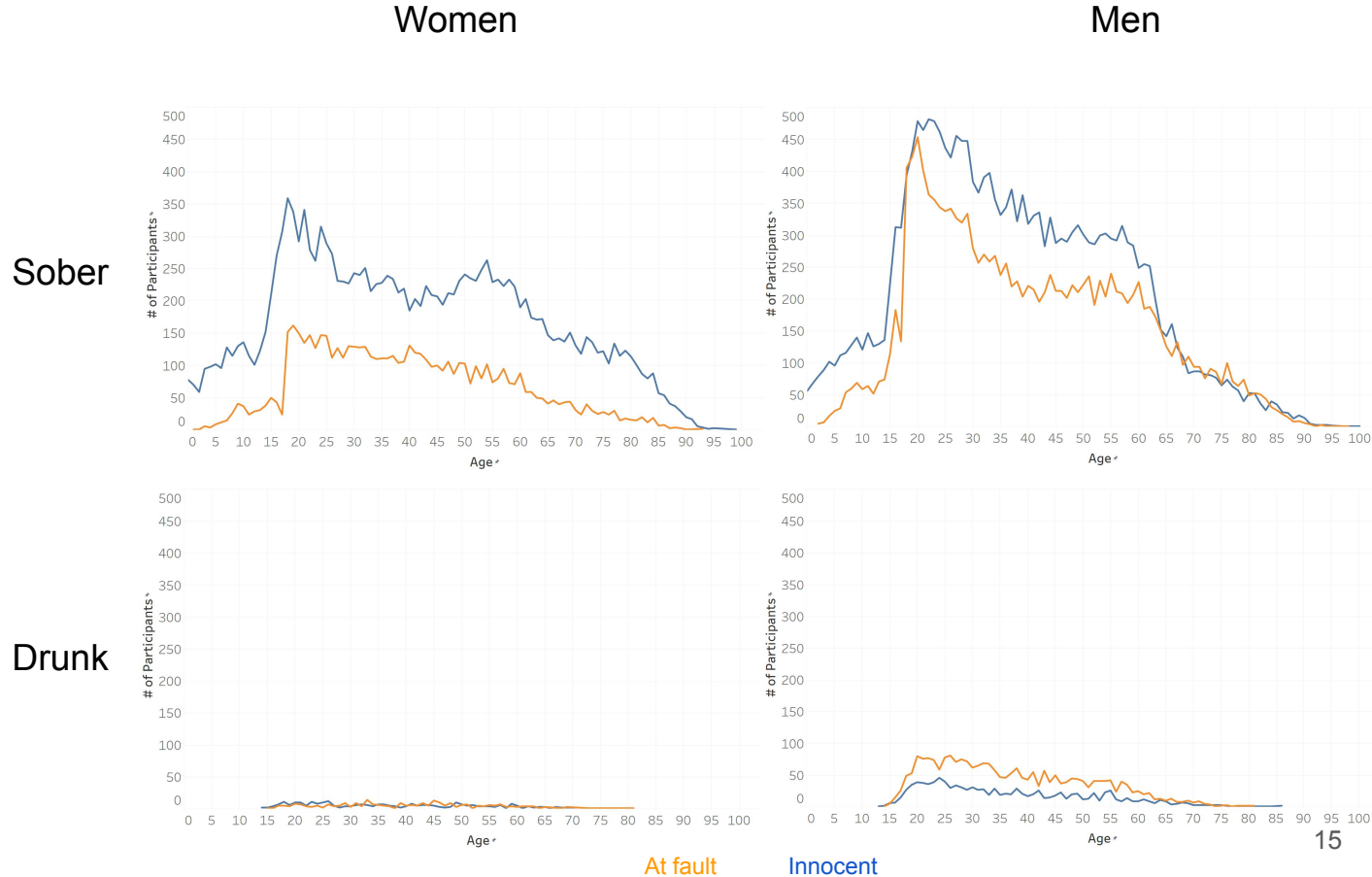
	Total Victims	People Killed		Fatality %
Seatbelts Unfastened	2501	302	→	12.08%
Seatbelts Fastened	23461	1203	→	5.13%

Fatality rate with seatbelts on (5.13%) was 57.54% lower than without (12.08%). You can be 99% confident that seatbelts is a statistically significant choice that can save your life :) (p-value = 0)

- Fasten your seatbelts, it is not a myth!

Women, Men and Alcohol

- Most people who are involved in the accidents are in their 20's despite gender.
- However, women tend to be significantly less at fault than men.
- Drunk driving increases the at fault % in both genders.



Women, Men and Alcohol

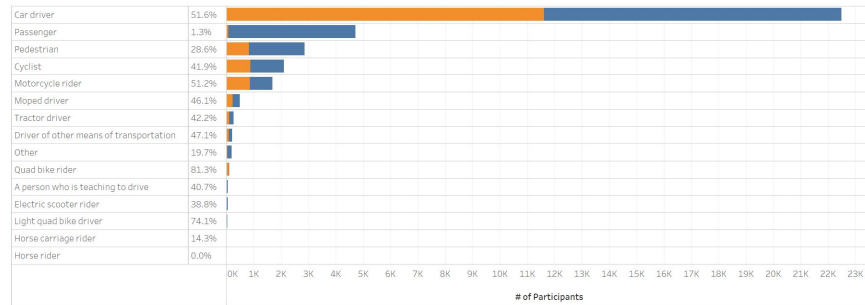
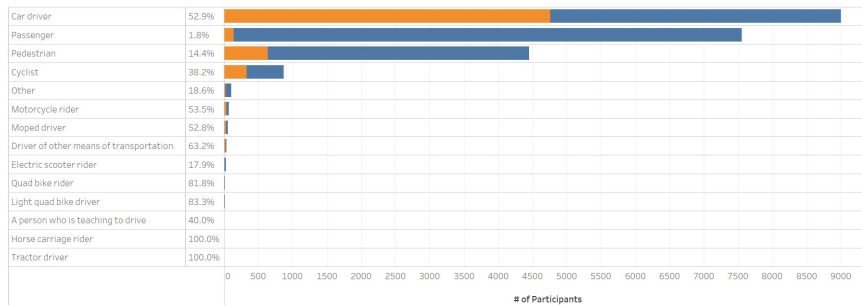
Sober

Women

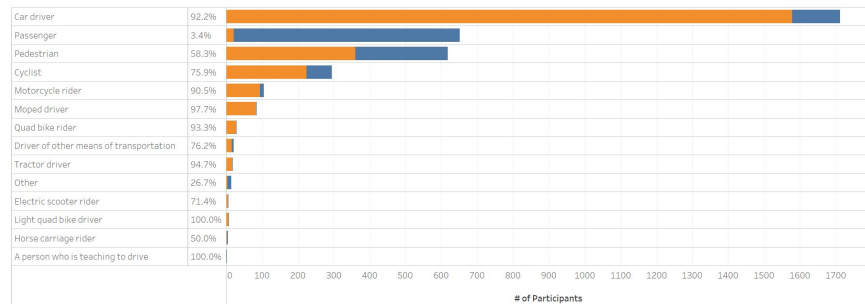
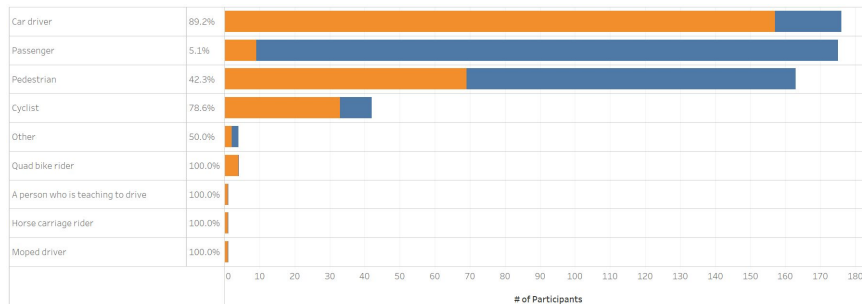
At fault

Innocent

Men



Drunk



For example, if a man is drunk and gets into an accident driving a car, there is a 92.2% chance that he is at fault. If he would be sober that chance would be only 51.6%. The same for women with 89.2% and 52.9%.

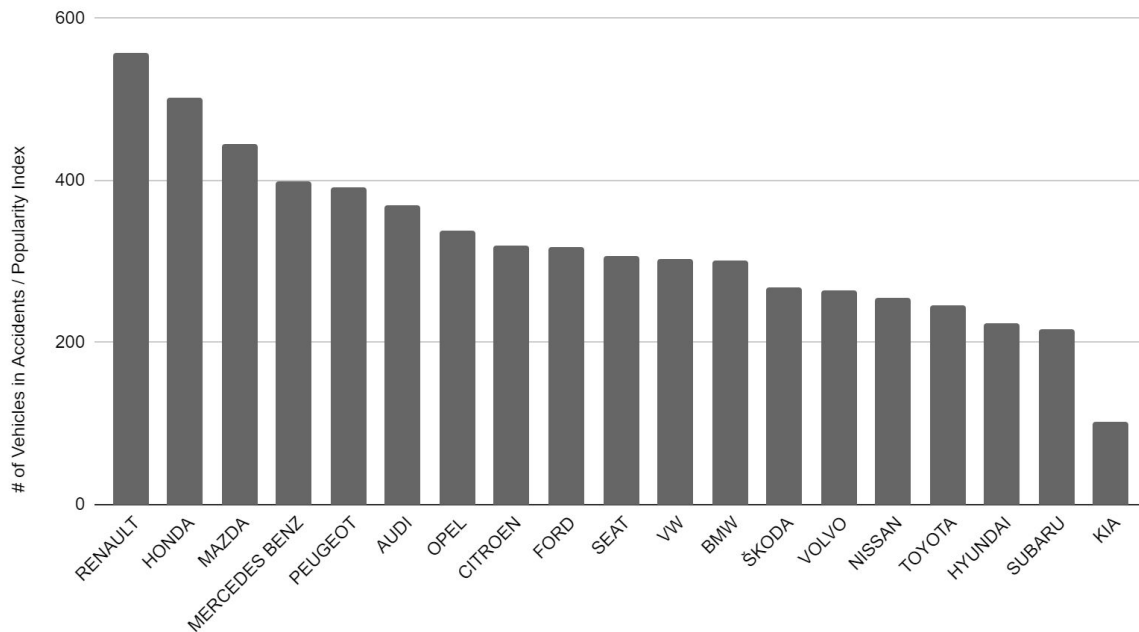
Most Dangerous Car Makers

To find this approximation, a popularity index of car makes in Lithuania in 2022 was used [7] as a representation of car make population.

of Vehicles in Accidents divided by Popularity Index was used as a metric to find the most dangerous car makes.

The higher the number, the bigger chance to end up in an accident in that car make.

Most Dangerous Car Makes



Conclusions/Recommendations

- The total amount of accidents is trending downwards, especially where people get fatally injured. However, Lithuania is still considered as a more dangerous country than others by being placed in 9th place by road safety statistics in the EU [8].
- Neringa's example shows that a comprehensive solution must be applied to eliminate car accident fatalities. This includes modernizing general road infrastructure, establishing traffic regulations and offering attractive alternatives.
- Road safety solutions have to be implemented with priority as there are more problematic cases than others. Especially highways going near or through densely populated areas.
- A slightly rising amount of children injuries is concerning. To address the issue, an educational approach must be taken by teachers and parents about pedestrian road safety and risk taking when starting to drive.
- Modernized lighting systems must be furtherly implemented as they clearly save lives in the night. A priority should be aforementioned problematic road sections and crosswalks through highways. Also, educating the public about pedestrian behavior in the night and popularizing pedestrian reflector usage should be encouraged.
- Building guardrails only when they are truly needed and by using quality materials. If the road is accompanied by an open field without a ditch, then it would be safer to just drive off into the field than to hit a guardrail.
- Seat belts save lives. Find out more ways to get people to wear them. Pitch the idea of bringing back the safety belt interlock to the EU.
- Drunk driving is still an issue as it significantly increases the probability of causing an accident. An educational/preventive measures should be implemented. Especially amongst young men as they are more willing to cause an accident both sober and drunk.
- An approximation of the most dangerous cars show that some car makers are possibly more dangerous than others. This could be food for upcoming analysis, although a more trustworthy data set should be found, which would truly represent the car make population in Lithuania.