

7CS035

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Executive Summary

TRAFFIC ACCIDENTS IN THE NETHERLANDS

This report tells a high level story and explore the patterns of accident across the Netherlands using the ONGEVALLEN2016_EN data set provided by SAS. The goal is to identify and analyse trends , investigate on various relationships , provide reliable insights that would improve road and traffic safety. The data set for this project was collected in the year 2016, and a record number of **124,992** accident was recorded during this period. The project is structured into six key scenarios (specifically dashboards):

1. **Accident Locations** : Where were the accidents? In this section I intend to analyse regional differences in accident frequencies, taking into consideration that with densely populated provinces and urban areas would have higher accident rates compare to other areas. Also highlighting high-risk zones and key insight of the involvement ratio of different means of transportation , influence of holidays in different region since it differs for different region in Netherlands.
2. **Temporal Patterns** : When were the accidents? Here I would want to examine accident trends , that is to see the frequency of accidents monthly and going into hourly and see if there is any seasonalities. I would investigate other factors like weather conditions or holidays on different duration and with their correlation to see if they have any direct or indirectly causation of the accidents to understand time-base risk factors.
3. **Who were the offenders?** In this scenario I would like to identify different offenders characteristics; such as hit-and-run cases, number of intoxicated (drugs/liquor). We will investigate if there's any patterns in regards to offenders profiles. Using geo map to see how the offenders are distributed and road number so that the can be easily identified in real time, see the impact on dry and rainy weather on offenders to gain more insights.
4. **Casualty Details** : Who were the casualties? In this section I would to investigate on the different casualties details; taking into account the age group and see which age group was involve more? where they more children involve or adults? Would like to investigate which group was influenced by certain factors like holidays school. Comparing casualties over different times or across different region.
5. **Accident Types** : What types of accidents happened? Here I intend to investigate the different accident types. See if there is any relationship between the different accident types and different factors like (weather conditions and road characteristics).

The insights we will get from the different scenarios will help and equip different stakeholders of the department of traffic and safety to create and update safety measures, reduce any traffic accident occurrences and improve the overall traffic management systems in the Netherlands.

Overview



Traffic Accidents in the Netherlands

This dashboard provides an overview of traffic accident statistics in the Netherlands, highlighting trends, casualties, and demographic information.

Number of Accident

125K

Number casualties

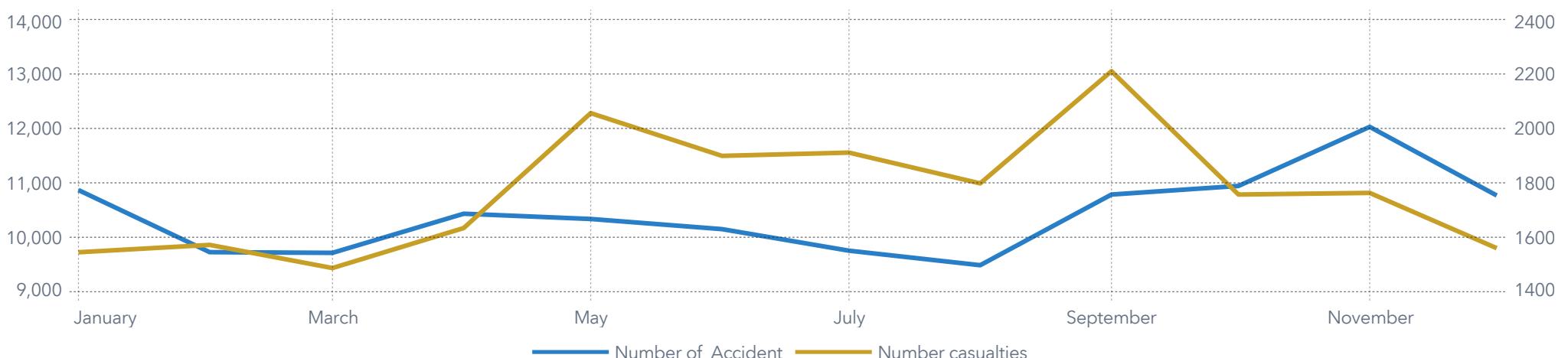
21K

Age oldest casualty

99

Age youngest casualty

1



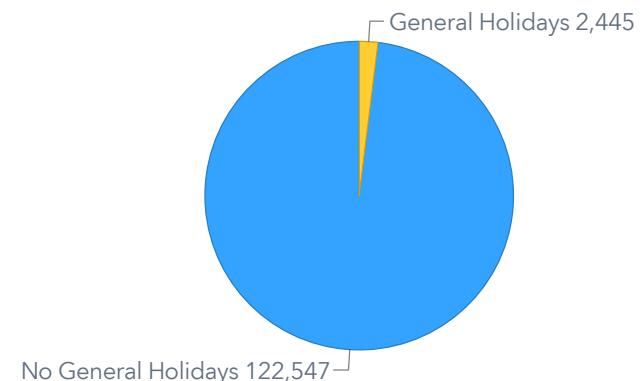
Accident Locations

Accident Locations

This dashboard shows the distribution statistics of accidents for different region in the Netherlands, indicating the influence holidays has to it and comparing the different accident involvement ratios of various means of transportation (trunk , vans..) per province.



Number accidents

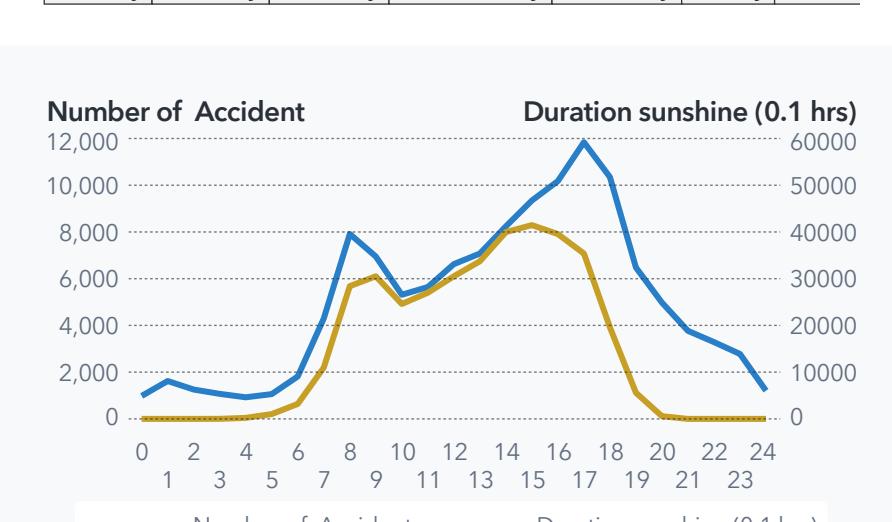
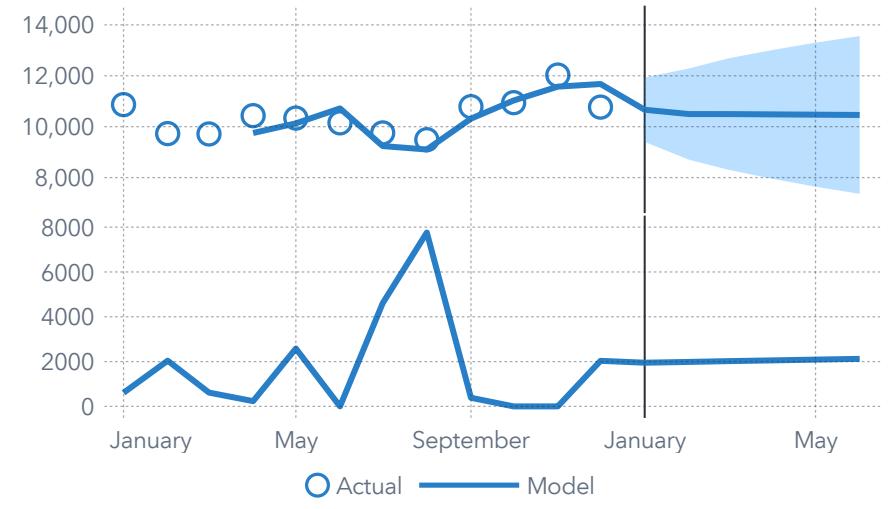
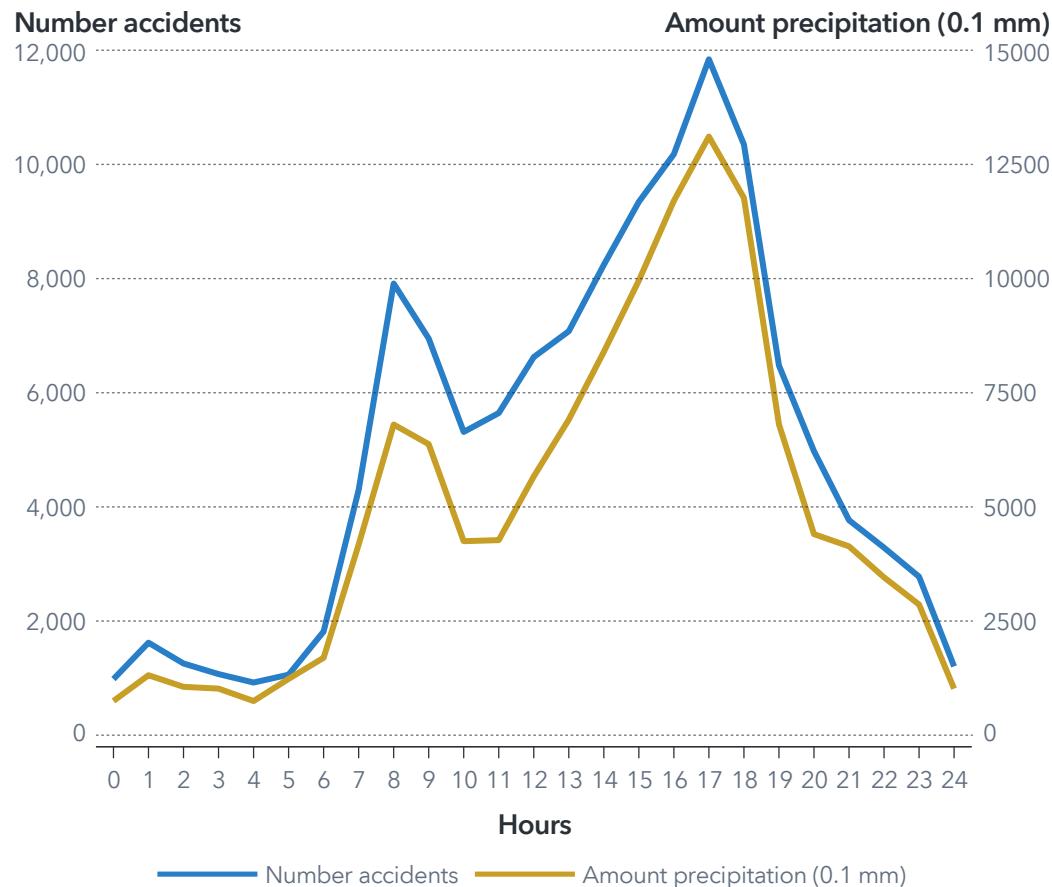


Province	Bike Involvement Ratio	Motor cycles involvement ratio
Noord-Holland	0.26	0.04
Groningen	0.25	0.03

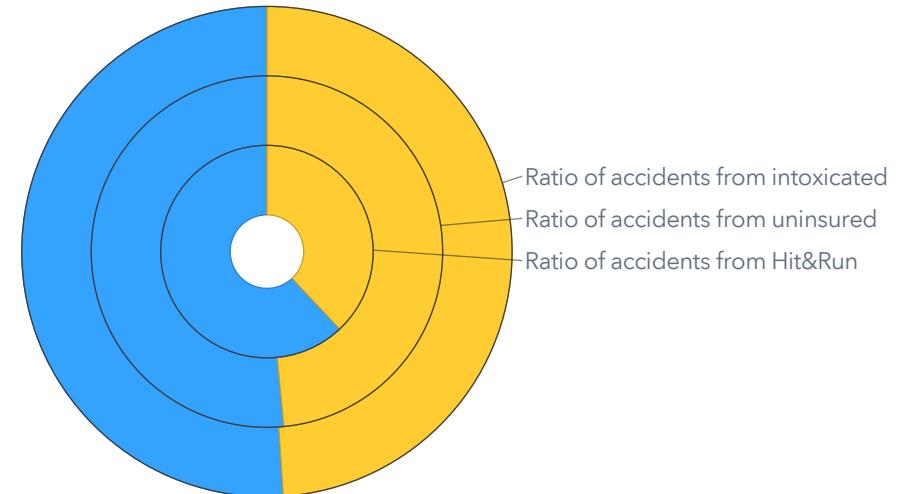
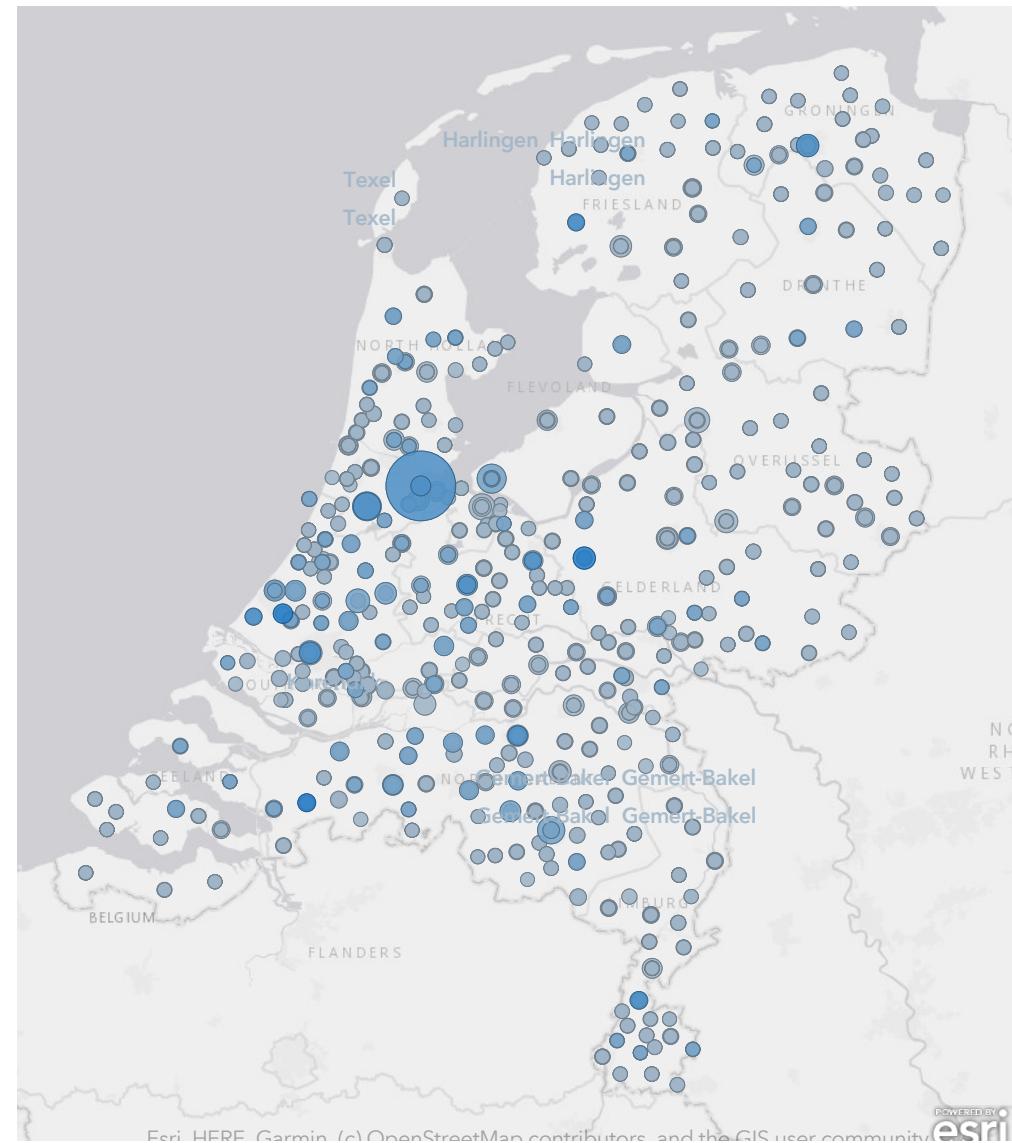
Temporal Patterns

Temporal Patterns

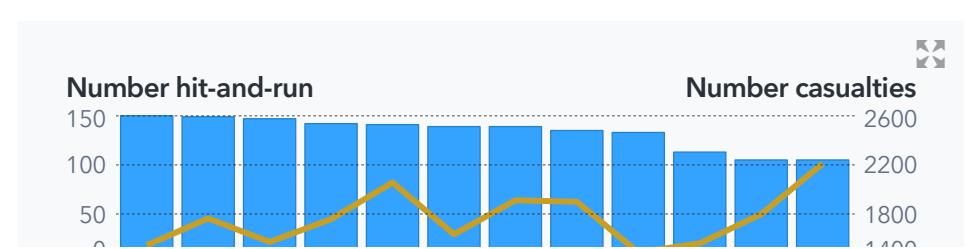
This dashboard shows trends of accidents in Netherlands, going from monthly, daily right till hourly. Taking into consideration of weather condition like temperature and its impact to number of accidents. We would also see other factors like school holidays and also prediction of accidents using some of these factors.



Offender Profiles



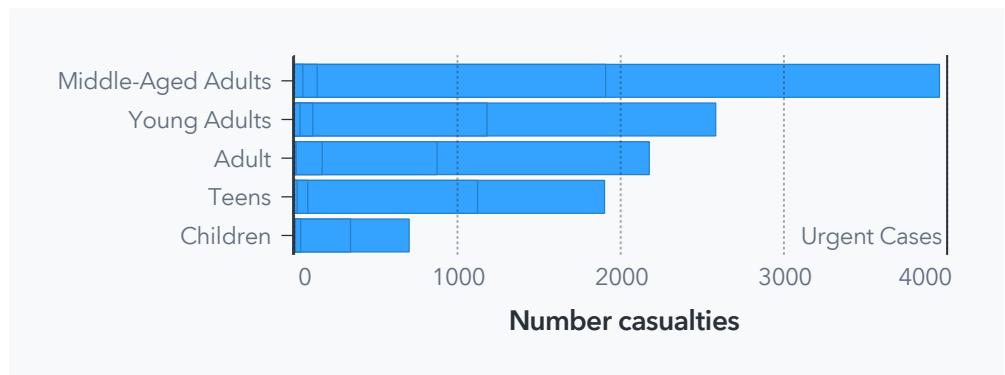
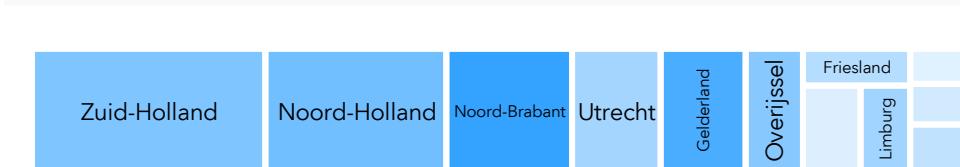
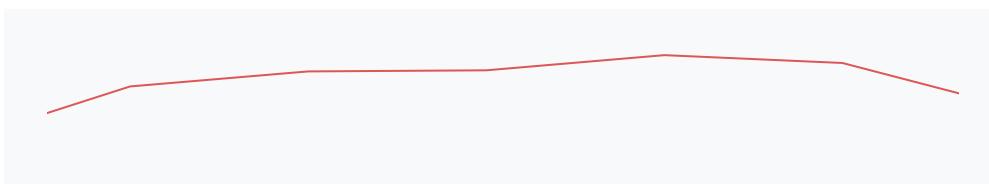
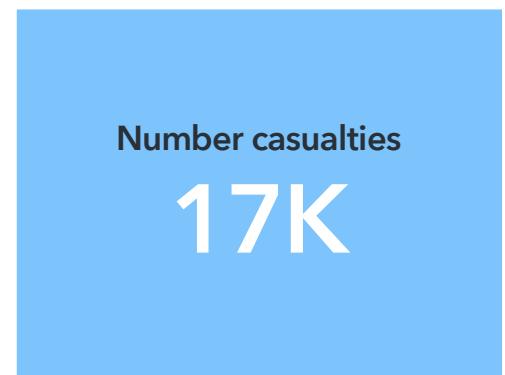
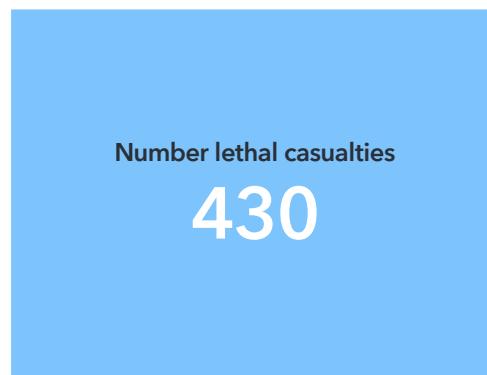
Weather Conditions
Dry Rain



Casualty Details

Casualties Details

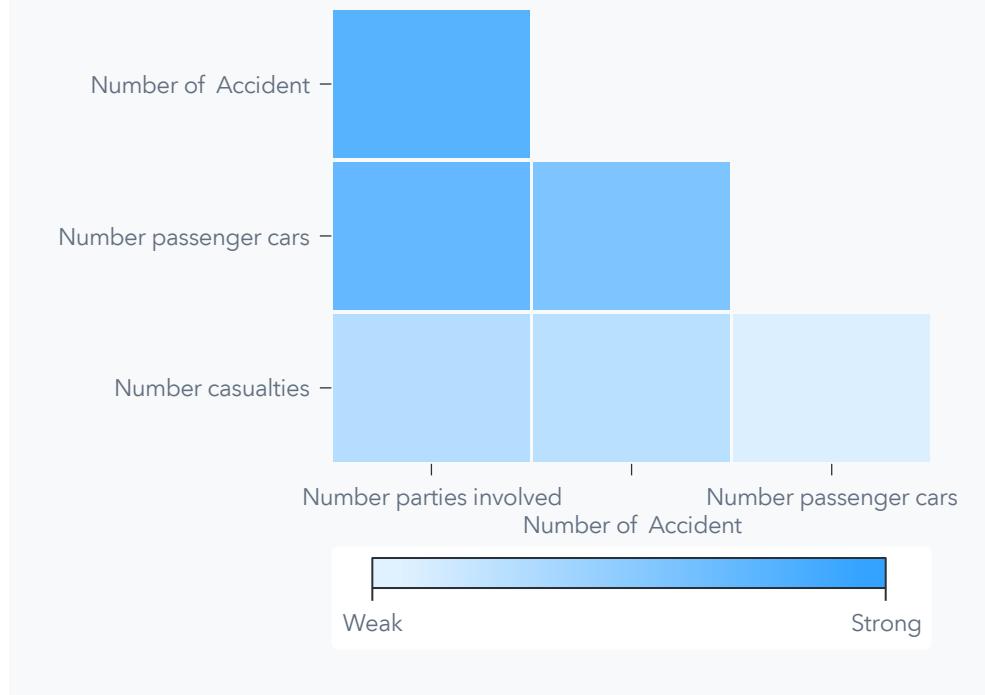
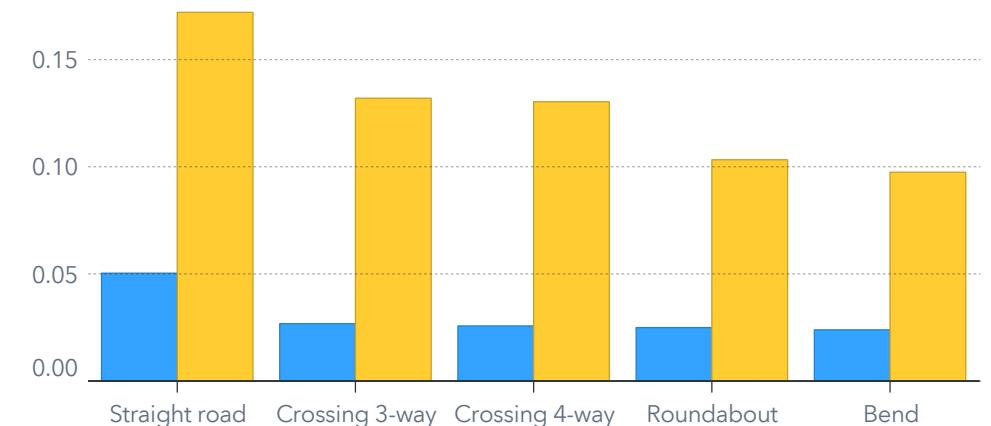
This dashboard shows analysis of the of all casualties involve, we go to their age group and see which age group was involves more and see if any other factors contributed to their accidents. Comparing casualties over time to observe if any trend can be obtained and also see how each group of casualties ended after the accident, a count on per section.



Accident Types

Accident Types

This dashboard gives a high level view of the different accident types, taking into consideration various factor that may have contributed to accident like the road situation, weather condition , holidays. We would see some casualty-related variables and see how they correlate to accident.





CONCLUSION

Just as introduce in the executive summary, the main objective of this project is to analyse the data related to road traffic collision and safety in the Netherlands so as to help the department of traffic and safety with insights that would help them prevent accident , identify zones with high risk of accident and evaluate claims gotten from insured. I divided the insight gotten from the data into 6 scenario or dashboard.

Overview :

This dashboard shows a general overview of traffic accident in the entire Netherlands, showing that there was a total number of **125, 000** accident recorded and 21, 000 casualties. The oldest casualty was age 99 years and the youngest was age 1 year old. We can also have quick overview for different county in the Netherland using the controller. A red colour is used to identify county with high number of accident and casualty helping the department of traffic and safety to prioritise these zones. It was realised that big county like Amsterdam , Breda , Rotterdam were high risk zone as compared to smaller county this maybe because of the large number of population and means of transportation.

There was a record number of 12, 082 accident in the month of November and the lowest number of accident in February.

Accident Location :

This dashboard shows us the graphical distribution of accidents in the Netherlands. We have a map that shows the distribution for the different provinces, with the color indicating the number of accident, the size a ratio of the casualties per accident and also hovering over the province we will know the number of parties involved and built up area characteristics. As such this would aid the department of safety and traffic on first view know province with more cases compare to others and region which had more impacts on casualties and parties involved helping them prioritising their decision. From the map we see that; **Noord-holland** , **Zuid-Holland** and **Utrecht** had a high casualties per accident. **Noord-holland** and **Zuid-Holland** has urban area code BU('bebouwde kom') indicating that there are municipalities that are urbanized with a high density of infrastructure , this influences its numbers of casualties per accidents and number of accidents.

Since in the Netherlands holidays varies per province, so it would be interesting to see the influence of holidays to number accident and see if it of course a factor that causes accidents in the Netherlands. From the pie chart we can see that they were more accident recorded when there was no General holidays as compared to when there were holidays for every province.

Lastly for the different means of transportation (bike, van , truck and motorcycle), I investigated their accident involvement ratio for each province to see which means contributed high on accident. **Bike** and **Vans** had the highest hence the department of safety and traffic should pay attention on these two and probably add a special road lane for these two especially for bike if there's none, this will decrease number of accident for every region. Observing this regionally is of utmost

Con 2.

Temporal Pattern :

This dashboard depicts accident trends in other to visualized months with high accident rates, how much weather conditions like sunshine and temperature influence the rate of accident and lastly do some prediction on accident using weather condition and holidays as independent feature and accident as the dependent feature.

Unfortunately , we have data only for 2016 which is not enough to conclude on trends or patterns if they are higher accident on particular months so it would help the department of safety and traffic to make decision based on these patterns. November 2016 had the highest number of accident compare to other months and there was no seasonality seen over the months on the occurrence of accidents same for every county in the Netherlands.

We can see from the dual axis line chart that precipitation and sunshine had a lot of influence on the daily occurrence of accident. At higher amount of sunshine and precipitation the is a high occurrence of accident and it is low at low sunshine and precipitation. Therefore the department of safety and traffic have to take certain measures like to improve road infrastructure (good drainage systems and use of high friction roads) , increase public awareness on the impact of weather condition for the occurrence of accidents, collaborate with weather services to integrate real time weather into traffic management systems. These would possible reduce the rate of occurrence of accidents.

Lastly we can see a forecast of the number of accident from Jan - June 2017 using the forecasting tool provided by SAS VIYA.

Offenders Patterns :

This dashboards focus on 3 main offenders ; **hit and run** , **uninsured** and **intoxicated**. Uninsured are individuals that are involved in road accidents and are found driving without a valid insurance coverage which is illegal. Uninsured had the highest involvement in accident with about 50,000 individuals, followed by intoxicated(under the influence of liquor and drugs) persons with 2200 persons and lastly hit and run, this is over the entire Netherlands. This numbers was also seen for every county and red color was used to indicates cities with high numbers of offenders and green with cities with low risk of offenders.

The graphical visualization shows how the different offenders are distributed over the different counties in the Netherlands taking in consideration the road situation of each cities and if the had and impact to the number of accidents caused by these offenders. They are typically 5 different types of road use over the Netherlands (Straight, bend, roundabout, crossing 3-ways , crossing 4-ways). They were more accidents by offenders on straight roads , followed by crossing 4-ways, hence the department of safety and traffic needs to investigate why ? Road numbers was used to identify each road so that if we can have real time data this can help the department of traffic to easily identify these defenders and also provide rapid solution to mitigate this situation.

The pie chart gives a visual comparison of the ratio of involvement of the different offenders taking into consideration the impact weather condition (dry and rainy) to it. We noticed that there are more offenders ratio involvement during the dry season as compare to the rainy season and of course **uninsured** had the highest involvement ratio, therefore the department of traffic and road safety have to put laws that would encourage road users to get the right documents so as to reduce the number of accident cause by these offenders.

The dual axis bar lined chart aimed at visualizing and analysing the number of casualties and the number of hit and run offenders from January to December 2016. This would help the department of safety and traffic have an idea on the months which had the highest number of offenders and casualties and see how much impact hit and run had of the accidents in the Netherlands or for a specific county.

Con 3.

Casualty Details :

This dashboard shows details about casualties involve in accident in the Netherlands. 21000 casualties was recorded in 2016, 7200 were injured miscellaneous, 14000 injured hospital and 533 lethal casualties was also recorded during this period.

Analysis the profile of these casualties, I decided to group them based on age into 5 group (children, teens, adult, young adult and middle age adults) to see which age group was affected most and within each age group we see also so details on their accident endings. A bar car was used to visualize this. The middle aged group had the greatest proportion of casualties, with accident endings as follows; 68 injury first aid, 171 lethal casualties, 2365 injured mics and 4846 injured hospital. Children were the least involve, with distribution ending; 42 lethal casualties, 390 injured mics and 838 injured hospital.

A line chart was used to visualize how the number the casualties changed on a weekly basis. It observed that weekends recorded the most number of casualties and this drop rapidly from Sunday to Monday.

A tree map was used to see the distribution over the different regions in the Netherlands using Province-County hierarchy so that the department of traffic and safety could get details for both province and county, Zuid-Holland had the highest number of injured hospital casualties (3339 casualties) and Noord-brabant had the most lethal casualties (100). Drilling through the tree map we can see details for counties of each province.

This dashboard also has a holidays controller that allows the department of safety and traffic to see the impact of holidays to the number of casualties; it is worth mentioning that they were more casualties during no holidays and oppose to when they were holidays.

With the above analysis, it is recommended that the department of traffic and road safety do the following :

- Since middle-age adults had the highest proportion of casualties; they should focus on promoting driving courses and knowledge on high-risk behaviours (speeding , drinking and driving) , for children it is recommended to enhance safety measures around schools for province and counties with high number of casualties.
- Audition and infrastructure enhancement should be done on province with high number of casualties like Zuid-holland and also with an improvement of medical emergency response. For zones with high lethal casualties (Noord-Brabant) , speed limit reductions should be implemented.
- With the impact holidays has on the number of casualties, the department of safety and traffic should develop strategies to reduce the volume of traffic volumes during peak times and enhance enforcement during non-holidays period.

Accident Types :

This dashboard shows the different accident type for the different Provinces in the Netherlands ,focusing on the factors that influences the accident for all province, like road situations and weather conditions (rainy and dry) season and correlations to see with feature had a strong correlation with the frequency of accidents in the Netherlands.

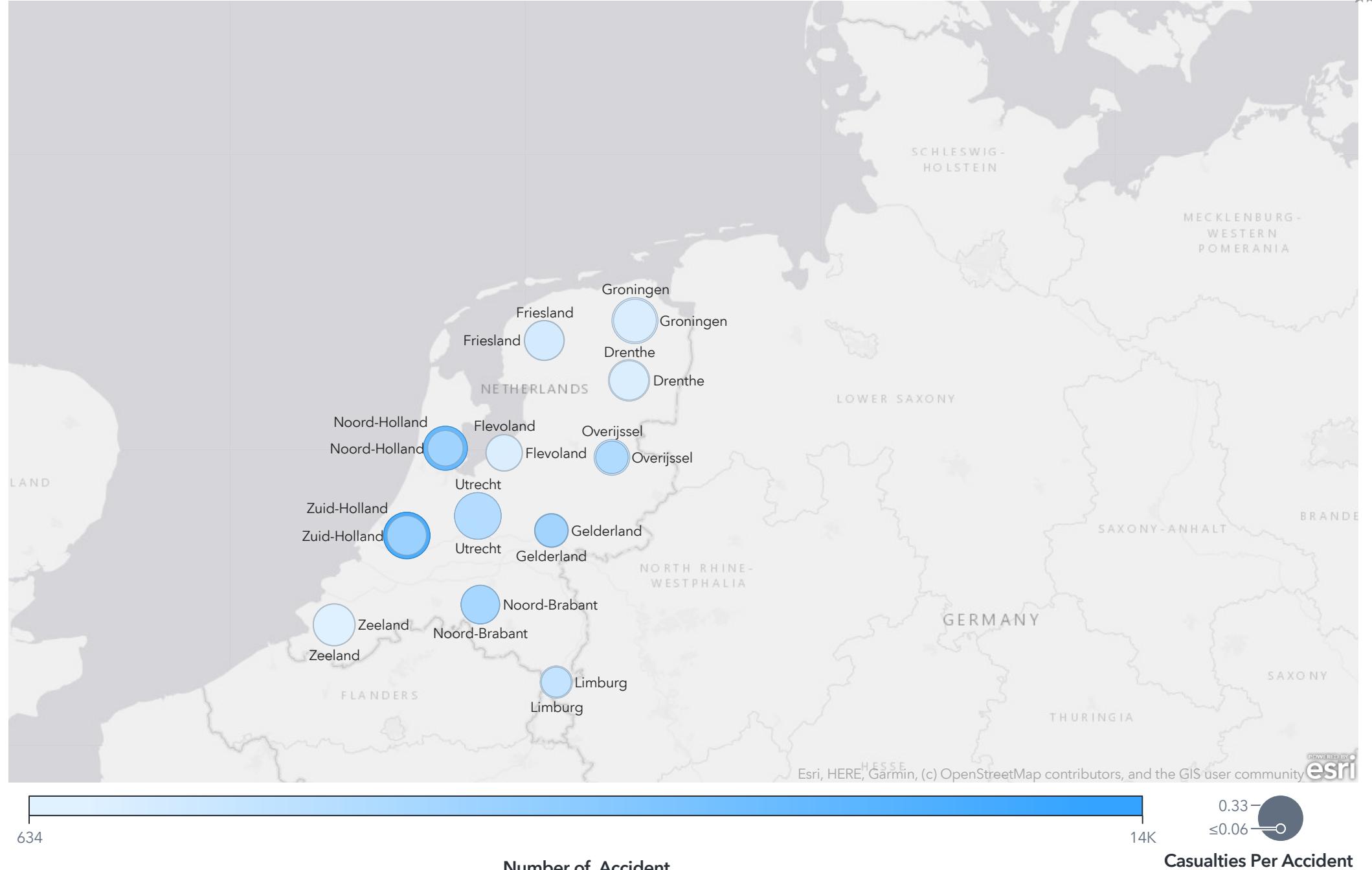
The bar char was use to visualize the different road situations and how the accident involvement ratio of both vans and trucks are distribution over the different road situation of specific regions. **Straight roads** recorded the largest number of accident with vans having higher number as compared to trucks. Bend road recorded the least number of accidents and also vans had higher number for this road situation.

A word cloud object was use to visualize the accident for every region; Material only having the largest number of accident (54,076) , with 0.0 casualties ratio and all happened during the dry season (weather). Injury first-aid has the least number of accident (16) , with 1.19 casualties ratio under rainy season weather condition.

The correlation matrix shows how different accident features relates to each other. It was seen that there was a strong negative correlation(-0.7) between the number of parties involve and the number of accident. Although correlation doesn't means causation, it is important that the department of traffic and road safety consider if the number of parties had a direct impact on the number of accidents.

Con 4.

- With the analysis gotten above, it is recommended that the department of traffic and road safety do the following :
- Since straight has the largest number of accident, they should consider implementing road controls and enhance road markings.
 - Address the higher involvement of vans to accidents and consider safety measures for heavy vehicles.
 - Conduct specific road safety studies to observe the negative correlation between the number of parties and the number of accidents.



List table - Province 1



Province	Bike Involvement Ratio ▼	Motor cycles involvement ratio	Truck Involvement Ratio	Vans Involvement Ratio
Noord-Holland	0.26	0.04	0.02	0.11
Groningen	0.25	0.03	0.02	0.12
Zuid-Holland	0.22	0.03	0.03	0.11
Utrecht	0.17	0.02	0.02	0.09
Overijssel	0.16	0.02	0.03	0.13
Gelderland	0.14	0.02	0.03	0.11
Flevoland	0.14	0.03	0.02	0.13
Noord-Brabant	0.13	0.02	0.03	0.11
Limburg	0.12	0.02	0.04	0.10
Friesland	0.12	0.04	0.02	0.13
Drenthe	0.11	0.03	0.02	0.12
Zeeland	0.10	0.03	0.03	0.10

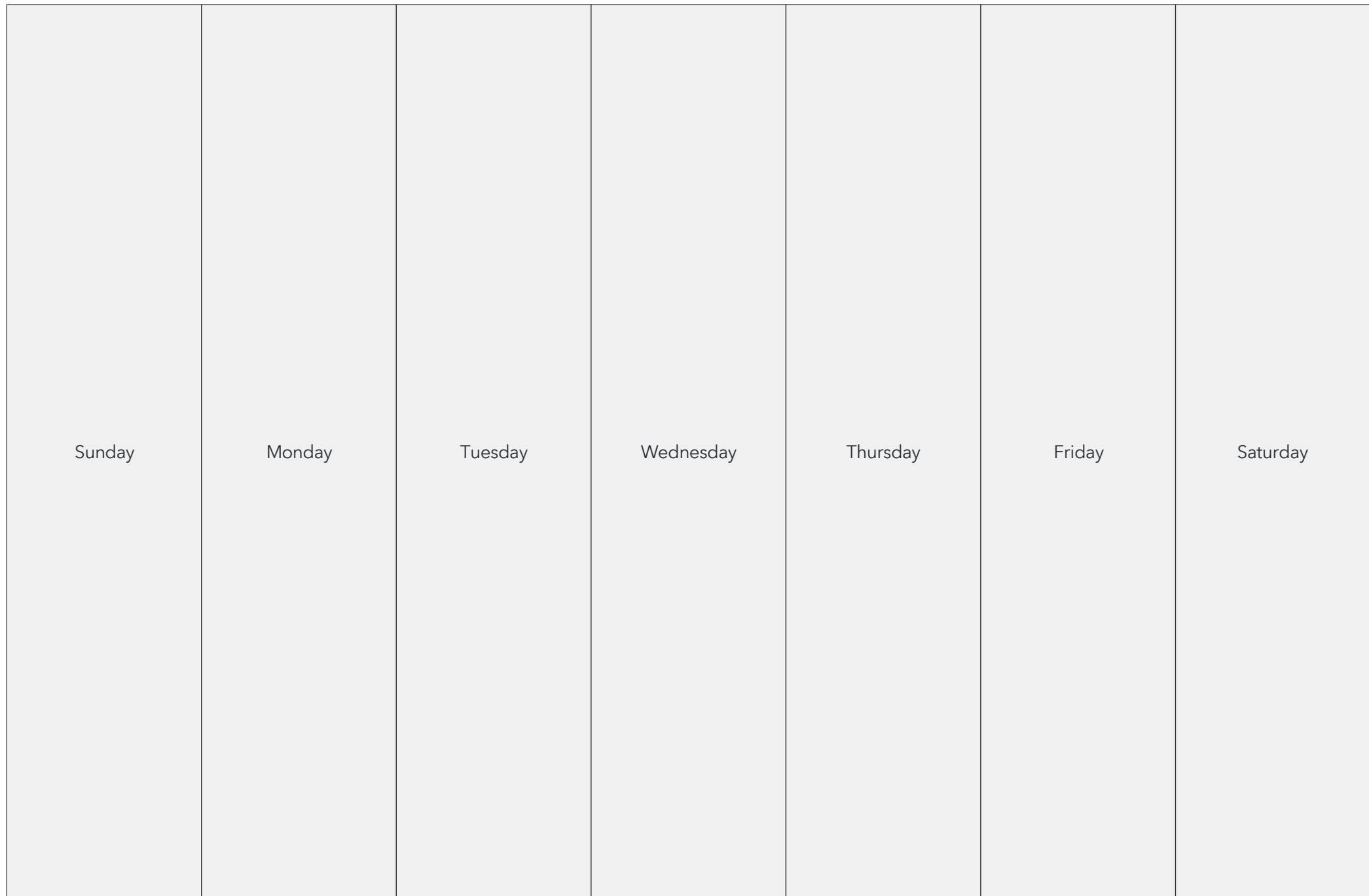


Key Insights

This is a where you can include key insights you would like your report viewers to notice regarding your data. This could be information about distribution, when the report was refreshed, where the data originated, etc.

Table Modified Time: Wednesday, 1 January 2025, 20:44:01

0.18
0.03
0.03
0.11



Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday



Key Insights

This is a where you can include key insights you would like your report viewers to notice regarding your data. This could be information about distribution, when the report was refreshed, where the data originated, etc.

Table Modified Time: Wednesday, 1 January 2025, 20:44:01
124,992



Number hit-and-run

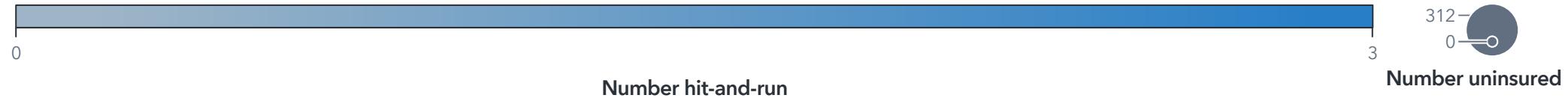
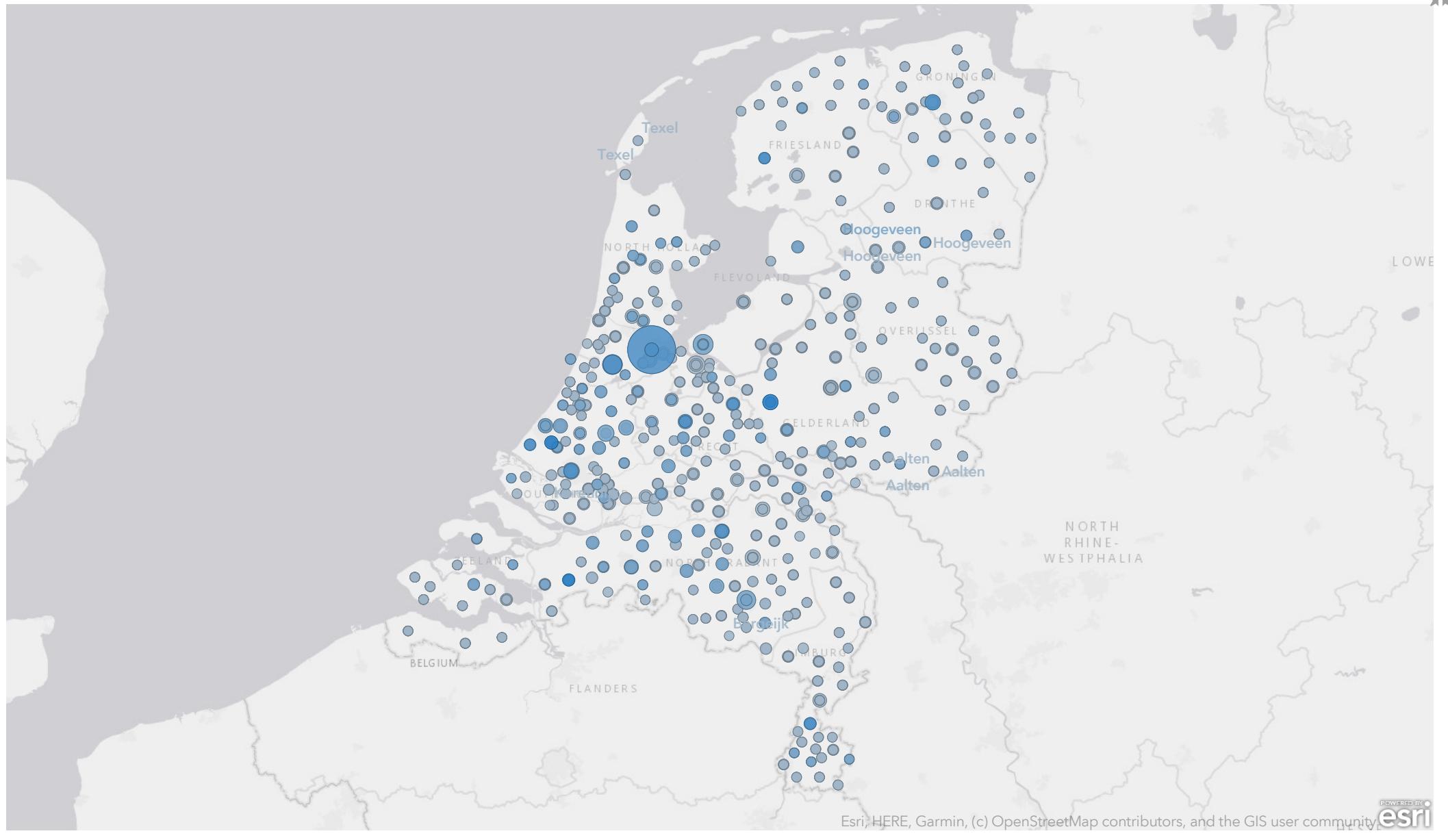
1.6K

Number uninsured

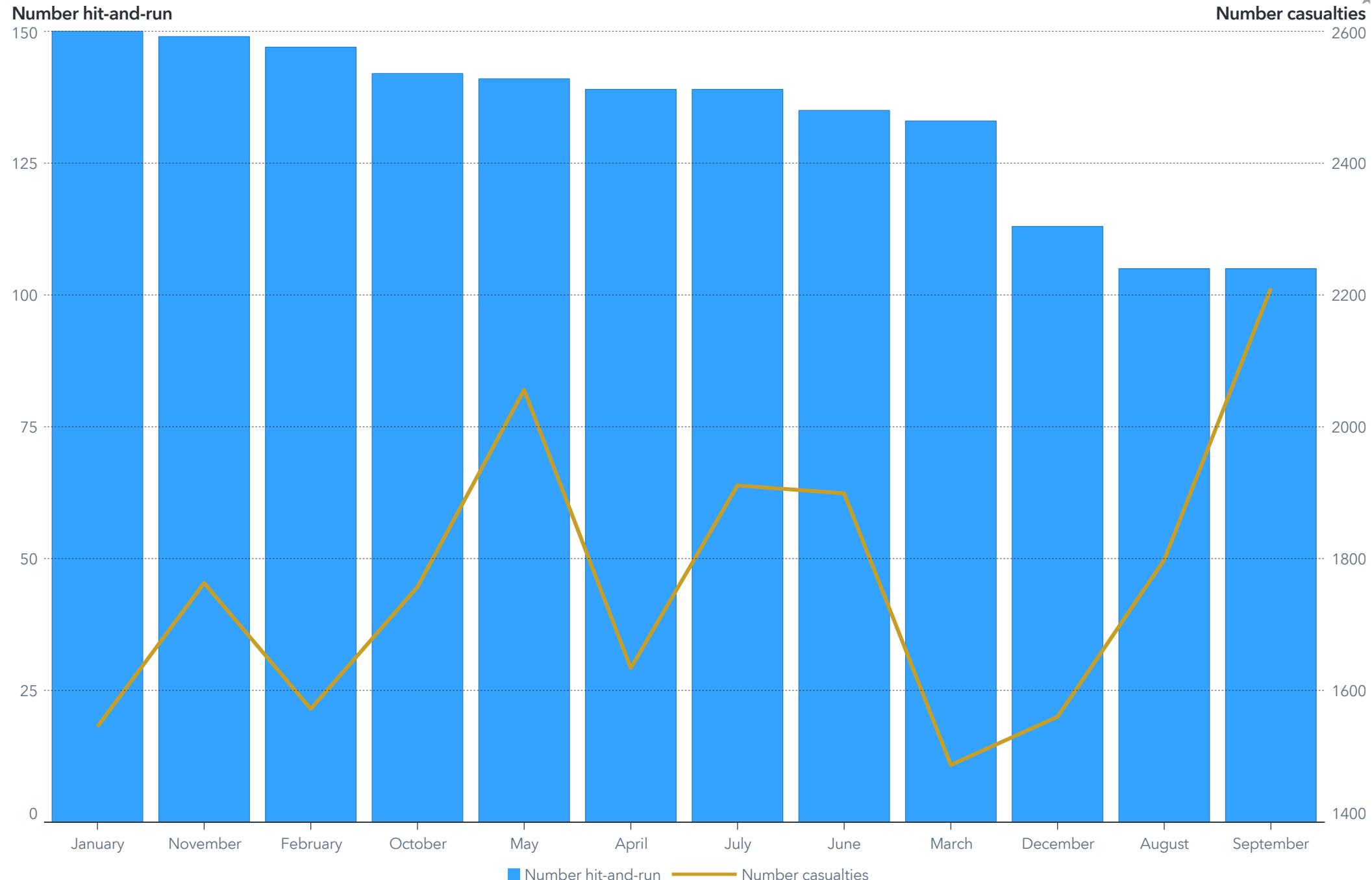
50K

Number intoxicated

2.2K



Dual axis bar-line - Month 1









CONCLUSION

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Accident Location :

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