

A year with Corona: vulnerable road users more vulnerable

Erik Donkers, Sjoerd Broos · 7 April 2021

Research into the safety effects of the COVID-19 measures in 2020 on the Netherlands: 21% less road accidents, yet vulnerable road users became more vulnerable.

On request of STAR[1], traffic ICT-office VIA researched the effects of COVID-19 measures on the yearly numbers of 2020 and argued about the potential lessons for road safety. This is the second research[2] into the effects of COVID-19 measures on road safety in the Netherlands.

Erik Donkers (erik.donkers@via.nl), Expert Road Safety Sjoerd Broos (sjoerd.broos@via.nl), Data Scientist

Motivation

Corona year 2020 will be noted as a special year. It will, as well, apply to the reports for road safety such as BLIQ and road safety reports for all road authorities and police in the Netherlands. BLIQ reports every year about the trend in road victims and figures about speeding. The aim of the report is to inform government administrators and directors about the development of road safety and to provide them with points of attention for developing policy and monitoring. Normally these year figures are given without any special note, however 2020 is an exception. This research[3] is aimed at determining which remarks the road safety figures of 2020 should have. Next to that, it should give an overview of the effects COVID-19 measures had on the year figures of 2020 and which future lessons there are for road safety.

Accident figures

To determine if the accidents figures are influenced by COVID-19 measures, expected year numbers are calculated for accidents and victims. To give a better insight in the different measures, the month figures are shown.

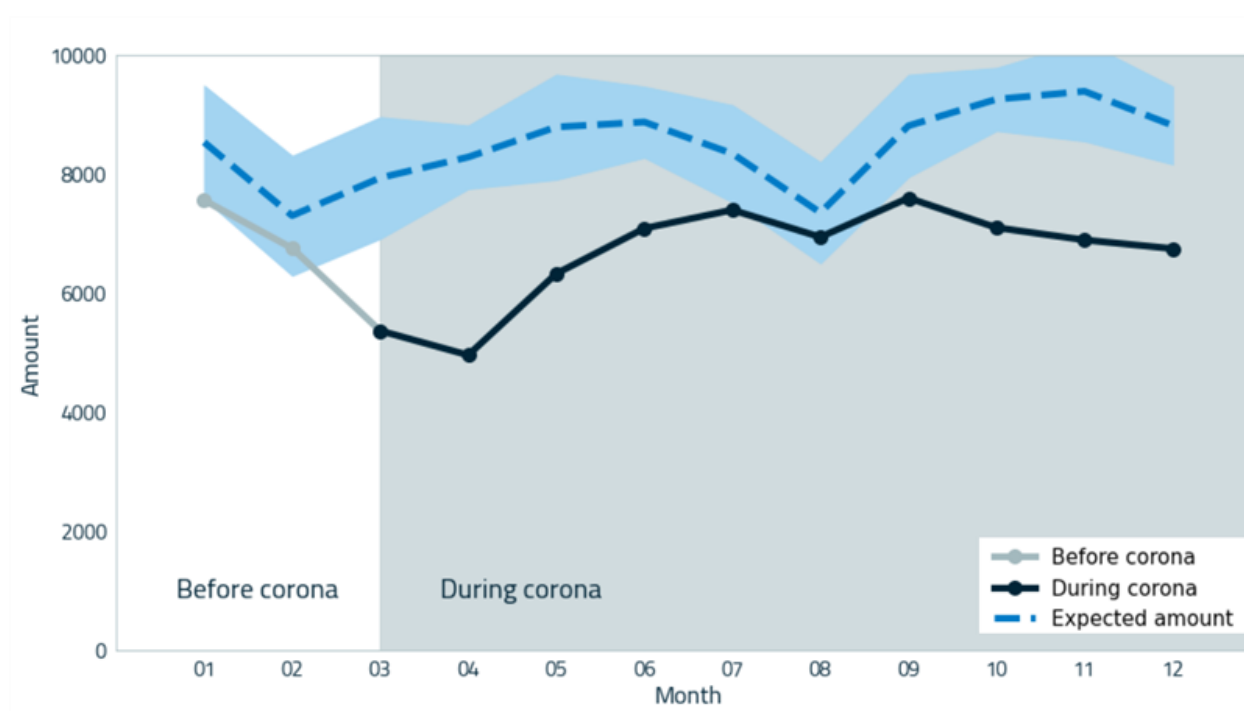
The expected 2020 figures are based on accident records of 2016 up to and including 2019. As accident figures are a reflection of the current road status and because traffic is changing continuously, by trends and measures, different weights are used for the years. The most recent years get a higher weight (appreciation), and the least recent years get a lower weight. This should lead to a more accurate

expectation that can adapt to recent developments.[4]

Road accidents

Graph 1 shows the trend of the total number of accidents. The graph clearly shows that COVID-19 measures reduced the number of road accidents. In the period March – December 2020 there were 23% less accidents in comparison to the expectation. Totally for the whole year it was 21% lower than the expectation.

The effect of the measures on the traffic and therefore road safety are clearly visible. The lockdown in March–April[5] and October–December are clearly visible in the graph.[6] In April there was even a reduction of 40% in accidents than expected. This is interesting as normally the accidents show a (little) increase in this period. As the summer period is approaching and the rules are less strict, the number are increasing again. During the partly lockdown of October–November the number of accidents is decreasing again. In the month November, the total number of accidents is 27% lower than expected.

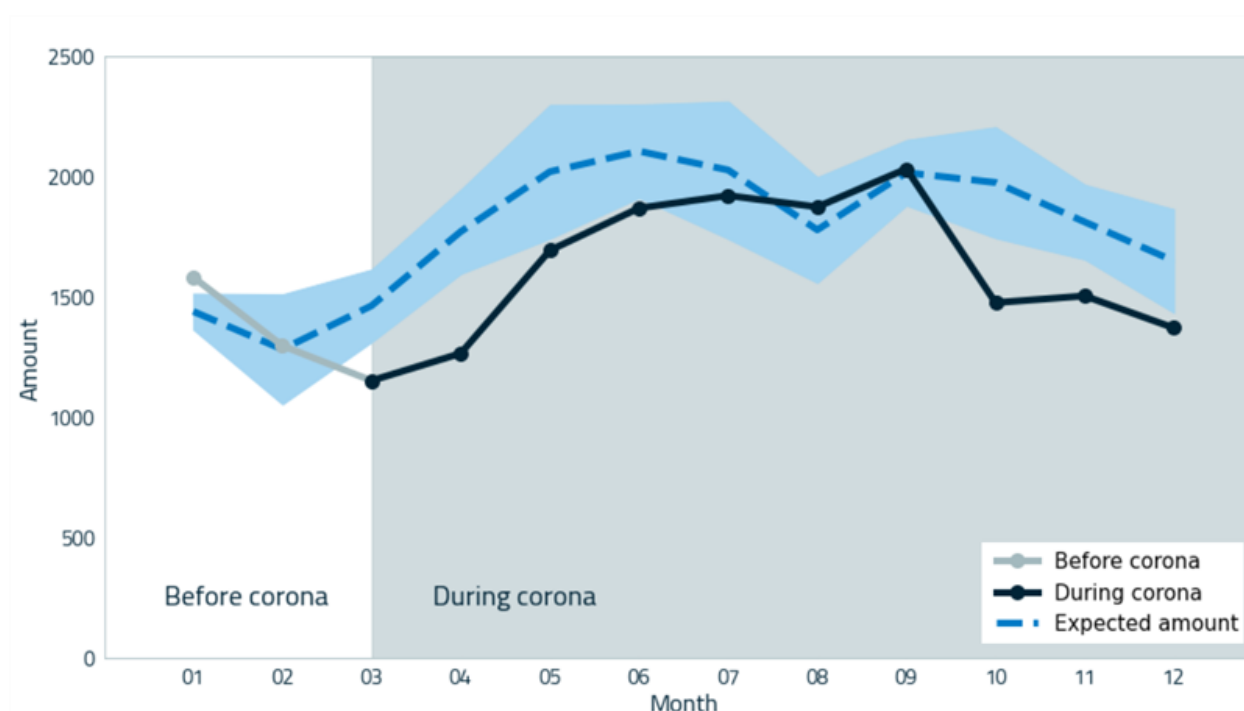


Graph 1: actual number of road accidents (STAR) in 2020 versus the expected gradient with a spread of 95% reliability. Actual per month (01–12): 7,556 – 6,750 – 5,363 – 4,954 – 6,323 – 7,084 – 7,393 – 6,938 – 7,595 – 7,096 – 6,889 – 6,744; expected: 8,531 – 7,298 – 7,934 – 8,282 – 8,787 – 8,871 – 8,340 – 7,349 – 8,808 – 9,254 – 9,387 – 8,816. Months 01–02 are before corona, 03–12 during corona

Graph 1: actual number of road accidents (STAR) in 2020 versus the expected gradient with a spread of 95% reliability (see table in Appendix 1 for the figures).

Road victims

Graph 2 shows the trend of the total number of road victims. It shows, in almost every month, a smaller decrease than the number of road accidents. The total number of road victims is 11% lower in 2020 than expected (8% less fatalities and 11% less injured). In the period March – December 2020 there were 13% less road victims. Remarkable is the increase in April, while the total number of road accidents was decreasing in that same month (29% less road victims versus 40% less road accidents). Since April the trend of road victims is similar to the road accidents with the difference that the figures of road victims are closer to the expected. In May expected behaviour is almost reached and in August and September the number are even higher than the expected numbers (but inside of the boundaries). From October the figures are (again) lower and the decrease is as well in line with the expectation. Notable is the strong increase in September.



Graph 2: actual number of road victims (STAR) in 2020 versus the expected gradient with a spread of 95% reliability. Actual per month (01–12): 1,581 – 1,296 – 1,151 – 1,264 – 1,692 – 1,868 – 1,920 – 1,873 – 2,031 – 1,475 – 1,503 – 1,370; expected: 1,438 – 1,282 – 1,462 – 1,770 – 2,019 – 2,105 – 2,026 – 1,778 – 2,015 – 1,974 – 1,811 – 1,649. Months 01–02 are before corona, 03–12 during corona

Graph 2: actual number of road victims (STAR) in 2020 versus the expected gradient with a spread of 95% reliability (see table in Appendix 1 for the figures).

Risk on road victim

The trend of road victims in comparison to the trend of road accidents seems to be fluctuating in the year. This relationship is visualized in Graph 3: the risk to become a road victim during a road accident. It clearly shows that the risk on road victim is almost every month higher than the expected risk (including spread) except for July and October. The 'risk on' road victim is in December 22% lower than in April. This is in line

with the conclusion from the previous COVID-19 research of VIA[7] '[Less accidents, yet increased unsafety on the road](#)': "Less traffic does not automatically result in safer roads. The consequences of uncommon and unexpected behaviour are quite big in this period, possibly because people do not expect this under these circumstances."

The first lockdown in April-May is clearly visible. In the summer period, when measures were less strict, the real and expected trend are closer to each other. Yet something must have changed, because September shows a (big) significant difference. This situation is quickly suppressed by the partly lockdown of October.

The number of road accidents decreases faster than the number of road victims during the COVID-measures. This leads to a higher risk of becoming a road victim and shows that this risk is significantly higher than normal.



Graph 3: the risk (in %) to become a road victim during a road accident in 2020 versus the expected gradient with a spread of 95% reliability. Actual risk per month, read from the chart (approx.): 01: 13.6 – 02: 13.0 – 03: 14.4 – 04: 17.9 – 05: 18.1 – 06: 17.7 – 07: 17.6 – 08: 18.6 – 09: 18.2 – 10: 14.5 – 11: 14.6 – 12: 13.9; expected risk rises from about 12 in January to about 17 in July–August and falls back to about 13 in December

Graph 3: the risk to become a road victim during a road accident versus the expected gradient with a spread of 95% reliability.

Vulnerable mode of transport

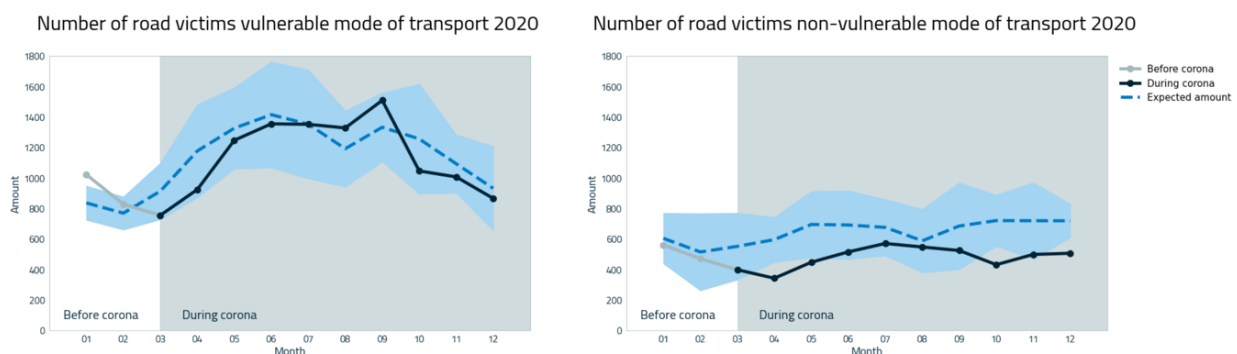
Graph 4 shows the road victims for vulnerable modes of transport (pedestrians and two-wheeled vehicles (including the motor), see the left graph) and the non-vulnerable modes of transport (remaining traffic, see right graph). The COVID-19 measures lower the number of road victims in the non-vulnerable modes

of transport. As well, the measures in spring and autumn are clearly visible. The rule “less traffic, less road victims” applies for the non-vulnerable modes of transport.

The vulnerable modes of transport react different on the measures. Of course, the same COVID-19 measures apply for this group, however the figures are showing less of a decreasing than non-vulnerable modes of transport. It’s remarkable that during both lockdowns the number of road victims for the vulnerable modes of transport is so low. In the graph of the number of travels per day (Appendix 3) are the number of movements of the vulnerable (bicycle) versus non-vulnerable (car) included. The month March and April are notable. There is a significant decrease in traffic volume but the road victims of the vulnerable modes of transport decrease just by a few. The rule “less traffic, less road victims” does not apply for the vulnerable modes of transport.

One explanation might be the higher driving speeds, especially on collector and arterial roads that had less traffic. The figures in the chapter Driving speeds seem to confirm this. From May on the car movements are playing a bigger role (again). Exception is the sharp increase in September of the number of bicycle and pedestrian movements (Appendix 3). This might be explained by the nice weather in September (Appendix 4).

During the period of the second (partly) lockdown (October – December) there is a decrease in the number of cyclists. The weather will probably play a role here as well. This means that the influence of the number of car movements, that stay relatively high, have less effect on the number of vulnerable modes of transports. As well, there might be a relationship between the traffic speeds that are decreasing in these months and the more traffic movements (see the chapter of Driving speeds).



Graph 4: number of road victims in 2020 for vulnerable modes of transport (left) and non-vulnerable modes of transport (right) versus the expected gradient with a spread of 95% reliability. Vulnerable, actual per month read from the chart (approx.): 01: 1,020 – 02: 820 – 03: 760 – 04: 930 – 05: 1,250 – 06: 1,360 – 07: 1,350 – 08: 1,330 – 09: 1,510 – 10: 1,050 – 11: 1,010 – 12: 870, close to or just below the expected amount except for the peak in September. Non-vulnerable, actual (approx.): 01: 560 – 03: 400 – 04: 350 – 05: 450 – 06: 520 – 07: 575 – 08: 550 – 09: 530 – 10: 435 – 11: 500 – 12: 510, below the expected amount of roughly 550–720 throughout

Graph 4: number of victims in the group of vulnerable road users (pedestrians and two-wheelers) in the left graph and non-vulnerable road users in the right graph in 2020 versus the expected gradient with a spread of 95% reliability.

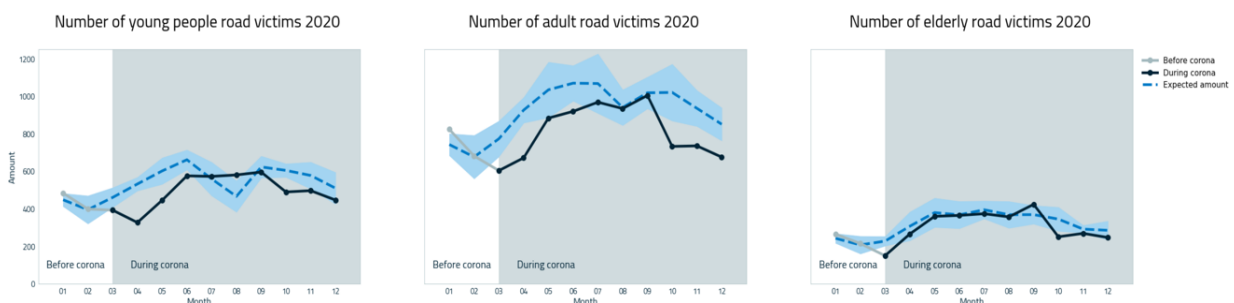
Age

Graph 5 shows the number of road victims for three categories: youth (0 – 24 years – left graph), adults (25 – 64 years – middle graph) and elderly (>65 year – right graph). Notable is the biggest difference for the number of road victims for adults, both absolute as relative. The trend of the number of road victims is similar to the expected trend. However, the lockdowns are clearly visible in the graph.

The elderly, on the other hand, show the least difference. The COVID-19 measures don't seem to hit this group in their normal traffic behaviour. Remarkable as there is significantly less traffic. Potentially the lower participation in the morning and evening rush hours, with less commuter traffic, explain this effect.

The young people's strong decrease during the first lockdown is probably related to the closure of schools. Next to that, August stands out because of higher number of road victims than expected. This can be potentially explained by parents that stayed in the Netherlands with their kids during vacation.

The road usage of young people as result of the COVID-19 measures is directly visible in the road victim figures. It shows that measures that steer for more or less young people on the road can be directly translated to road victim figures. The peak in September is visible at all ages. Especially at adults and elderly. An explanation might be the nice weather of September (Appendix 4). We cannot influence the weather, but it definitely deserves our attention in the future.



Graph 5: number of road victims in 2020 for young people (0–24, left), adults (25–64, middle) and elderly (65+, right) versus the expected gradient with a spread of 95% reliability. Actual per month read from the chart (approx.) — young: 01: 480 – 04: 330 – 06: 580 – 08: 580 – 09: 600 – 12: 450; adults: 01: 830 – 03: 610 – 07: 970 – 09: 1,010 – 10: 740 – 12: 680, clearly below the expected amount during both lockdowns; elderly: 01: 260 – 03: 150 – 06: 370 – 09: 420 – 10: 250 – 12: 250, close to the expected amount

Graph 5: number of victims in three age categories (youth: 0 to 24 years (left graph), adults 25 to 64 years (middle graph) and elderly 65 and older (right graph)) in 2020 versus the expected gradient, with a spread of 95%-reliability.

Speed

It's known that driving fast has a big impact on road safety. The COVID-19 measures don't have a direct effect on the speed of motorised traffic. However, it can be questioned if the strong reduction of traffic, that leads to less busy roads, have the consequence of higher speed. With Floating Car Data, anonymous

speeds records collected by navigation systems, smartphones, etc., the speed of the Netherlands can be determined. With this accurate data it is investigated if the speed[8] on the most important collector and arterial roads has changed during the COVID-19 measures.

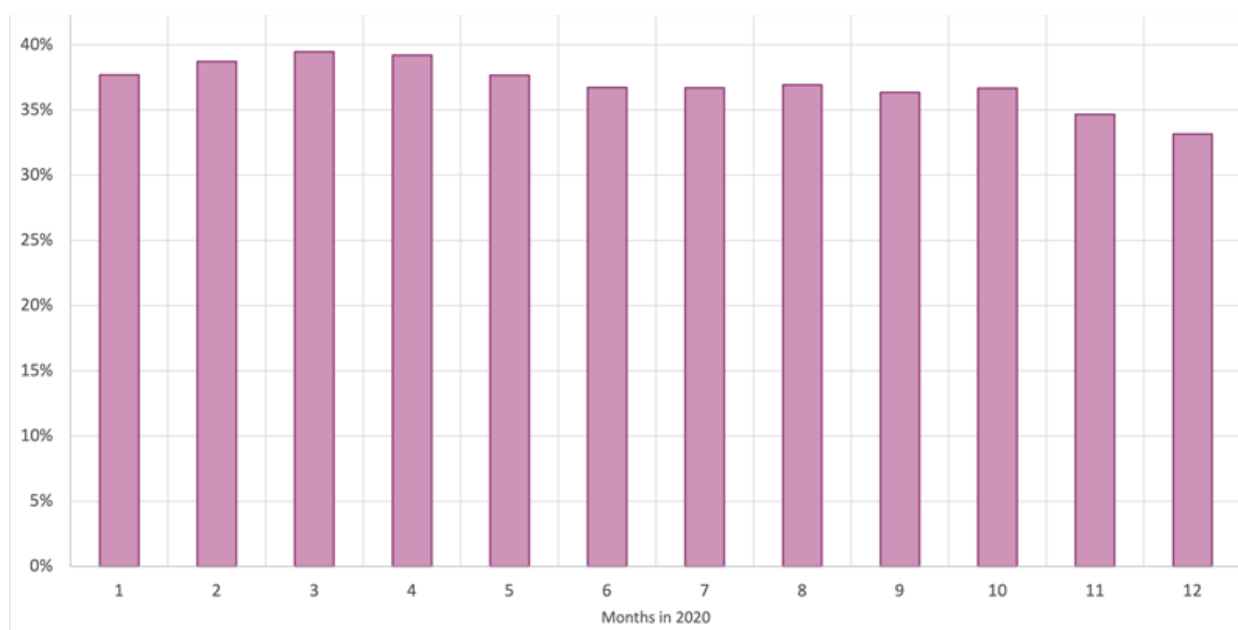
To measure the impact of the speed, two indicators are important:

- The share of speed limit offenders.
- Degree of limit exceedance of the V85.[9]

Speed trend

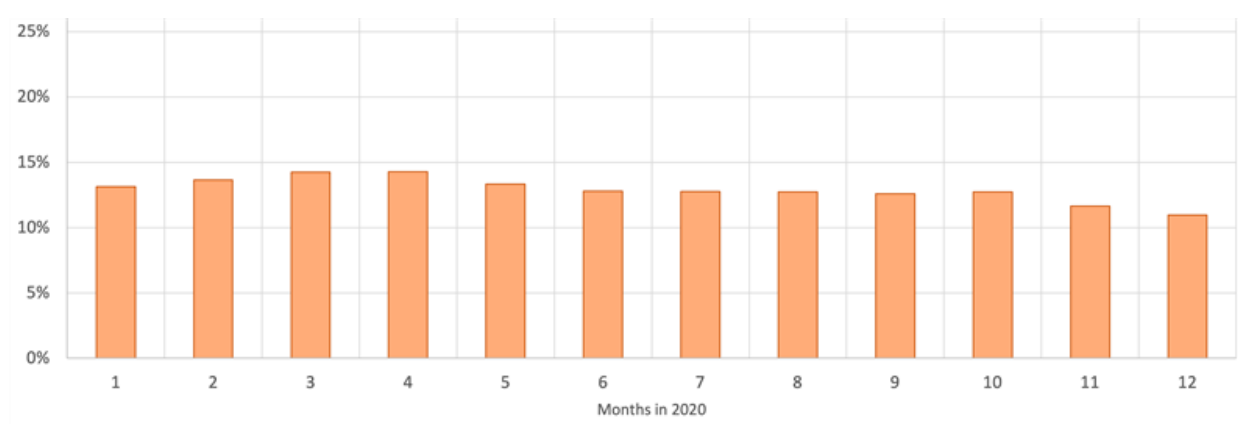
Graph 6 shows the share of speeds limit offenders and Graph 7 shows the degree of limit exceedance. The first thing that stands out is the trend of both graph: they are similar for the 12 months in 2020. Apparently, the decrease of traffic intensity in March and April (see week 5 up to and including 13 in Appendix 6 for the trend of traffic intensity), as consequence of the first lockdown[10], leads to a traffic behaviour where not only a bigger share of traffic exceeds the limit, but also with higher speed. At the moment that the car movements are increasing, after relaxations of the COVID-19 measures, the share of speed limit offenders and the degree of limit exceedance decrease again. Even lower than in January 2020. If these speed graphs are compared with Graph 3 (risk on becoming road victim), the trend seems to be similar in the 12 months. The risk on becoming road victim is 22% lower in December than in April, the share of speed limit offenders decreases by 15% and the degree of limit exceedance of the V85 is 23%.

Remarkable is the relatively steep decrease (10% less speed limit offenders and 14% lower limit exceedance) of the speed in November and December while the share of personal transport (Appendix 6) is almost not decreasing in this period. A steep decrease is also visible in the number of road victims for adults (Graph 5). There is no clear explanation for this pattern. One of the hypotheses is that the speed figures are for collector and arterial roads inside and outside of built-up areas, the roads that mainly transport non-local traffic, and it is these roads that deal with most traffic without delay of commuting traffic. However, these roads are at their maximum capacity. Therefore, it is limited to drive too hard in these roads.



Graph 6: percentage of violators of the speed limit on arterial & collector roads in the Netherlands per month in 2020 (source: Traffic Analytics, HERE). Read from the chart (approx.): 1: 37.8% – 2: 38.8% – 3: 39.5% – 4: 39.3% – 5: 37.8% – 6: 36.8% – 7: 36.8% – 8: 37.0% – 9: 36.4% – 10: 36.7% – 11: 34.7% – 12: 33.2%

Graph 6: the degree of violators of the speed limit on arterial & collector roads throughout the Netherlands per month in 2020 (source: HERE).



Graph 7: the percentage by which the speed limit is exceeded (V85) on arterial & collector roads in the Netherlands per month in 2020 (source: Traffic Analytics, HERE). Read from the chart (approx.): 1: 13.2% – 2: 13.7% – 3: 14.3% – 4: 14.3% – 5: 13.4% – 6: 12.9% – 7: 12.9% – 8: 12.8% – 9: 12.7% – 10: 12.9% – 11: 11.7% – 12: 11.0%

Graph 7: the degree of limit exceedance on arterial & collector roads throughout the Netherlands per month in 2020 (source: HERE).

The results of the first (March – April) and second (October – December) lockdown seem to be contradictory, but they actually show very interesting results. It seems like growing traffic intensity on the collector and arterial roads have a direct effect on speeds, expressed in the share of speed offenders, the speed exceedance of the V85 and the number of road victims. At a lower traffic intensity, the speed rises

which increases the risk of becoming a road victim. At a “not quite a traffic jam yet” traffic intensity the speed decreases (10% less speed limit offenders and 14% lower limit exceedance in comparison to October) and therefore the risk on becoming road victim (3% in December in comparison to October).[11] This is in line with current research that proved that the risk of a severe accident increases between 3 to 5% at a 1 km/u increase in average speed.

Accident DNA gives insights

Besides the cause of accidents, the circumstances are also important. When it is clear which circumstances are often in play, measures can be developed and executed. The last COVID-19 research [12] also searched for circumstances that explained the higher risk on becoming road victim: *“Giving a simple explanation for the increase in risk is not possible. Often this can only be explained by multiple components. By combining the age groups and the ways of transportation of the involved parties and looking at the results of the before presented graphs and searching for recognisable behaviour patterns logical explanations arise for the increase and decrease of the risk in severe outcome if involved in an accident”*. In the end 6 circumstances are described as the logical explanation.

At the start of COVID-19 measures a lot of published articles described the change of behaviour, from Corona racer to buying online. However, for this research has the availability of a whole year of data. To infer new conclusions about potential circumstances that are relevant to investigate (based on accidents records) a new method has been developed: the accident DNA.

The DNA research

DNA is composed group of similar accidents. It determines what type of similar accidents characteristics, based on accidents and involved parties[13], happen inside of a pre-defined area or region. This can be defined as the accident DNA.

To determine the accidents DNA, data science techniques and tools have been used. These tools make it possible to use large quantities, in this case 3 years of data (2017-2019) of data and deduce a model from it in the search of unique combination: accident circumstances. These calculations are impossible manually. What makes this data science techniques unique and special is that on top of creating the model, an interpretation of accident types can be made. These accidents are not all the same but look alike. This gives unique possibilities and insights in road safety.

Applications

A road accident is the result of a “critical combination of circumstances”.[14] This means that the development of traffic should be reflected in the circumstances and characteristics of road accidents. With the DNA it is possible to determine and research accidents characteristics as well as measure if the

groups increased or decreased. This gives a new dimension to working with road accidents and makes it possible to earlier flag, recognize and monitor.

The DNA connects with the comprehensive way of working with measures aimed at education, enforcement and infrastructure (In the Netherlands these are known as the 3 E's). This means that the DNA makes it possible to distinguish between target groups, traffic behaviours and specific locations. The DNA for the Netherlands has 40 accident groups. These 40 groups can be analysed on every road authority level, from national scale to neighbourhoods.

DNA-groups

Next to recognizing DNA-groups it is important to answer the question if DNA-groups are stable (constantly present circumstances), decreased or even increased (signal function). For example, the E-bike is increasingly involved at different ages groups. To give more credit to groups that are expanding in size, and thus are a bigger threat to road safety, a weight[15] has been used here also. The last years are more important and therefore have a higher weight. This makes the DNA especially suitable to research which accident types are decreased and increased by the COVID-19 measures.

DNA-matrix

To determine which DNA-groups have the biggest impact on road safety, a DNA-matrix has been created. The matrix allows the user to see the relationship between different variables and to prioritize. The following two indicators, based on ranking and suitable for comparing all 40 DNA-groups in the Netherlands, were applied:

- Vertical axes: DNA-score. This is the total score based on the total number of road accidents, victim accidents, fatal accidents (years 2016 – 2020) and risk number.
- Horizontal axes: Trend score. Based on the last 12 months of DNA-scores.



Matrix 1: DNA-matrix for determining DNA-groups with the highest or lowest Accident score and greatest rise or fall. Scatter plot of the 40 DNA-groups with the DNA-score on the vertical axis and the trend (decreasing – neutral – increasing) on the horizontal axis. Red dots in the upper right quadrant (high score, increasing) include the labelled groups XXXI, XVII and XVIII; orange dots in the upper left, yellow dots in the lower right and green dots in the lower left (low score, decreasing) include the labelled groups XXXV, VII and XXXIV

Matrix 1: DNA-matrix for determining DNA-groups with the highest or lowest Accident score and greatest rise or fall.

Matrix 1 show the 40 DNA-groups based on the highest and lowest DNA-score and with the highest increase or decrease. The DNA-groups with the highest priority, the red dots in the right corner of the matrix, describe the circumstances that happen a lot with severe accidents. These groups are as well increasing and most of this happened during the Corona period. The DNA-groups with the lowest priority, the green dots in the left corner in the matrix, describe the circumstances that happen a little bit less often and are limited in cases with severe outcome. Next to that, they are decreasing.

Top 3 with highest priority:

1. DNA-group XVII



DNA-group XVII shown as characteristic icons: single vehicle accident with slow traffic, 1 driver, young, adult and elderly involved, 100% victim accidents, 100% vulnerable mode of transport, working day, morning & afternoon, daylight, dry weather, 50 km/u, road section, other asphalt

Describes the circumstance: Accident with 1 driver at a single vehicle accident with slow traffic. 100% victim accidents, where 100% is a vulnerable mode of transport. Of this 25% is young, 45% is adult and 30% is elderly. The accidents took place at a working day in the morning & afternoon with daylight and dry weather. The location was a road section with a maximum speed of 50 km/u on the road surface 'other asphalt'.

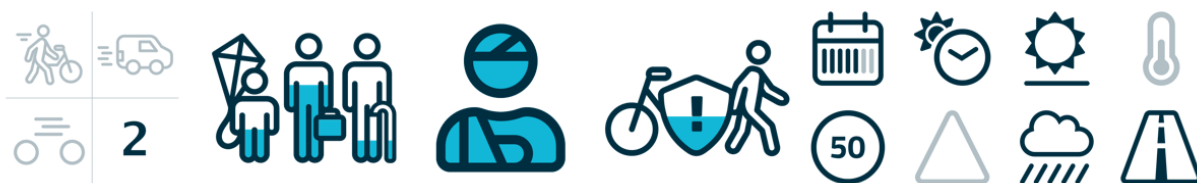
2. DNA-group XVIII



DNA-group XVIII shown as characteristic icons: single vehicle accident with fast traffic, 1 driver, young, adult and elderly involved, 100% victim accidents, 21% vulnerable mode of transport, working day, morning & afternoon, daylight, dry weather, road section, other asphalt

Describes the circumstance: Accident with 1 driver at a single vehicle accident with fast traffic. 100% victim accidents, where 21% is a vulnerable mode of transport. Of this 19% is young, 64% is adult and 18% is elderly. The accidents took place at a working day in the morning & afternoon with daylight and dry weather. The location was a road section on the road surface 'other asphalt'.

3. DNA-group XXXI



DNA-group XXXI shown as characteristic icons: 2 drivers, young, adult and elderly involved, 100% victim accidents, 49% vulnerable mode of transport, working day, morning & afternoon, daylight, precipitation, 50 km/u, other asphalt

Describes the circumstance: Accident with 2 drivers. 100% victim accidents, where 49% is a vulnerable mode of transport. Of this 24% is young, 61% is adult and 15% is elderly. The accidents took place at a working day in the morning & afternoon with daylight and precipitation. The location was a road section with a maximum speed of 50 km/u on the road surface 'other asphalt'.

Characteristic for these three DNA-groups with the highest priority is the involvement of vulnerable modes of transport with a mix of all ages. However, elderly in XVIII and XXXI are less present. Accidents took place outside of the rush hours on a working day, most of the time inside built-up areas.

Notable is that with corona measures the vulnerable road users are more vulnerable. An important conclusion in the Netherlands, as well as for the rest of the world, because there is a lot of promotion for slow traffic in cities to keep cities accessible and liveable by keeping out the cars. Next to the promoting there should be more attention to the safety of these vulnerable group of road users. Especially if the policies are effective and roads get less crowded. This gives space to motorised traffic to drive faster; this makes the road less secure.

Top 3 with lowest priority:

1. DNA-group XXXV



DNA-group XXXV shown as characteristic icons: single vehicle accident with fast traffic, 1 driver, adults involved, 0% victim accidents, 9% vulnerable mode of transport, working day, rush hours, daylight, dry weather, road section, other asphalt

Describes the circumstance: Accident with 1 driver at a single vehicle accident with fast traffic. 0% victim accidents, where 9% is a vulnerable mode of transport. Of this 0% is young, 100% is adult and 0% is elderly. The accidents took place at a working day in the morning & afternoon rush hours with daylight and dry weather. The location was a road section on the road surface 'other asphalt'.

2. DNA-group VII



DNA-group VII shown as characteristic icons: single vehicle accident with fast traffic, 1 driver, adults involved, 0% victim accidents, 8% vulnerable mode of transport, working day, morning & afternoon, daylight, dry weather, road section, other asphalt

Describes the circumstance: Accident with 1 driver at a single vehicle accident with fast traffic. 0% victim accidents, where 8% is a vulnerable mode of transport. Of this 0% is young, 100% is adult and 0% is elderly. The accidents took place at a working day in the morning & afternoon with daylight and dry weather. The location was a road section on the road surface 'other asphalt'.

3. DNA-group XXXIV



DNA-group XXXIV shown as characteristic icons: collision of fast traffic against fast traffic, 2 drivers, young, adult and elderly involved, 0% victim accidents, 4% vulnerable mode of transport, working day, evening & night, daylight, dry weather, 50 km/u, other asphalt

Describes the circumstance: Accident with 2 drivers at a collision with fast traffic against fast traffic. 0% victim accidents, where 4% is a vulnerable mode of transport. Of this 20% is young, 74% is adult and 6% is elderly. The accidents took place at a working day in the evening & night with daylight and dry weather. The location was a road with a maximum speed of 50 km/u on the road surface 'other asphalt'.

Characteristic for these three DNA-groups with the lowest priority is the accidents with no victims. The material damage accidents of the fast traffic with adults on a working day are spread out over the day. The conclusion that these types of accidents are less frequent and with lower priority are not fully unexpected. The measure "stay home" has the most effect on commuter traffic and therefore fast traffic. This might be phrased as "less traffic – less material damage accidents".

Conclusion

Accident figures

From the comparison between expected and real figures it turned out that the total number of road accidents decreased in 2020 by 21%. During the lockdown in April there was even a reduction of 40% and in November this was 27%. The total number of road victims was 11% lower than expected in 2020 (8% less fatalities and 11% less injuries). Notable is the increase of road victims in April while the total number of road accidents decreased; 29% less road victims versus 40% less road accidents.

2020-01	7556 (-11%)	1581 (10%)	8531	1438
2020-02	6750 (-8%)	1296 (1%)	7298	1282
2020-03	5363 (-32%)	1151 (-21%)	7934	1462
2020-04	4954 (-40%)	1264 (-29%)	8282	1770
2020-05	6323 (-28%)	1692 (-16%)	8787	2019
2020-06	7084 (-20%)	1868 (-11%)	8871	2105
2020-07	7393 (-11%)	1920 (-5%)	8340	2026
2020-08	6938 (-6%)	1873 (5%)	7349	1778
2020-09	7595 (-14%)	2031 (1%)	8808	2015
2020-10	7096 (-23%)	1475 (-25%)	9254	1974
2020-11	6889 (-27%)	1503 (-17%)	9387	1811
2020-12	6744 (-24%)	1370 (-17%)	8816	1649
Total	80685 (-21%)	19024 (-11%)	101658	21329

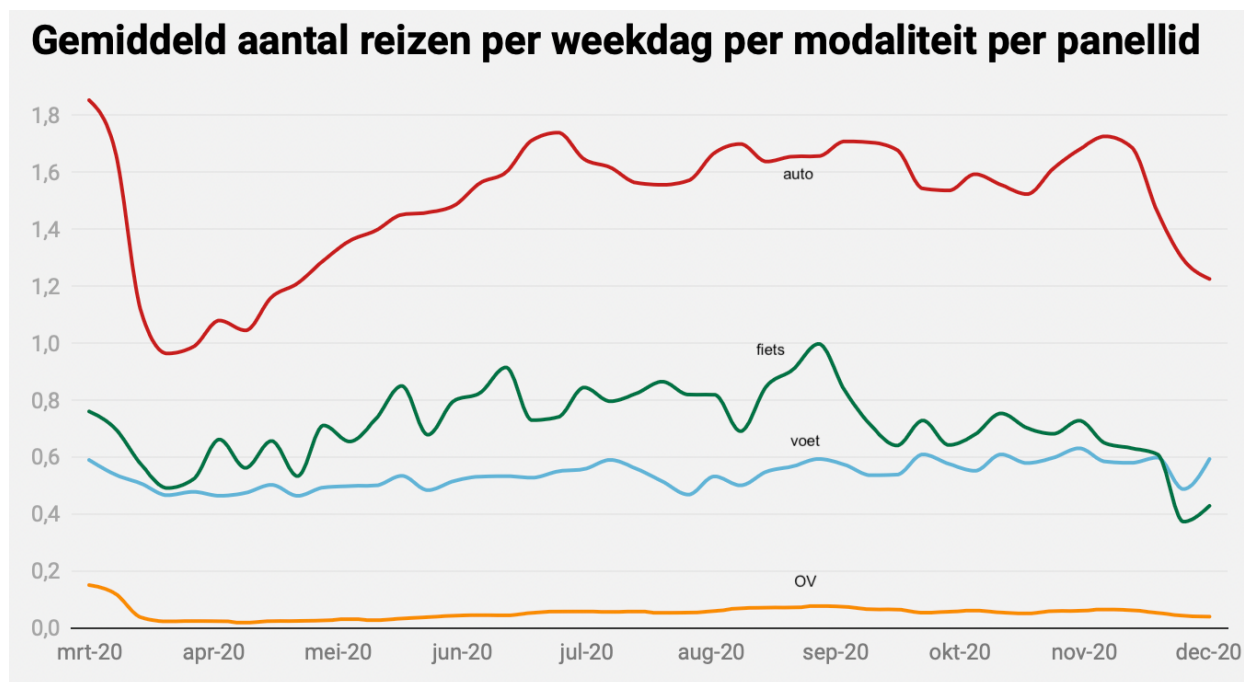
Appendix 2: monthly overview of COVID-19 measures (source (Dutch): [rijksoverheid.nl – coronavirus tijdslijn](https://rijksoverheid.nl/coronavirus-tijdslijn))

Month	Development
January 2020	First signs of corona
February 2020	First corona infection in the Netherlands
March 2020	Measures against the spread of coronavirus, intelligent lockdown
April 2020	Extension of measures announcement and extension of test policy
May 2020	Economic impact, financial support and relaxation measures
June 2020	Relaxation of corona measures and testing for everyone
July 2020	A "one-and-a-half-meter summer" and slowly increasing infections
August 2020	"We are done with the virus, but the virus is not done with us yet"
September 2020	Tighter measures are nevertheless necessary
October 2020	Second wave and partial lockdown
November 2020	Strengthening and extension of the partial lockdown

December 2020

Lockdown during holidays and mutation of virus pops up in United Kingdom

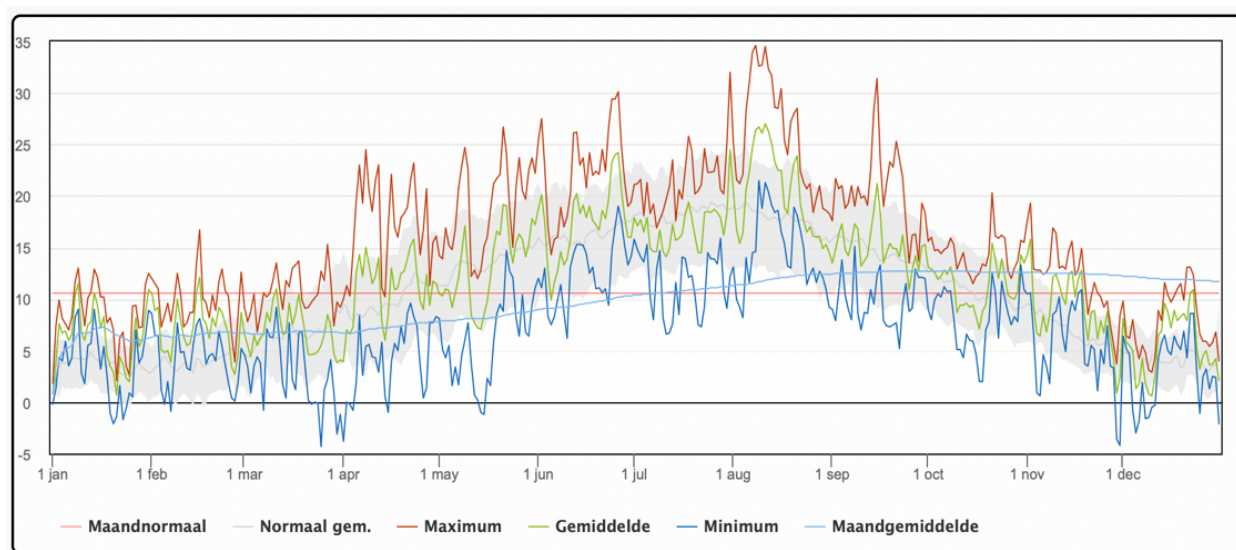
Appendix 3: average number of trips per weekday per modality per panel member (source (Dutch): dat.nl/nvp)



Appendix 3: average number of trips per weekday per modality per panel member, March to December 2020 (chart in Dutch: auto = car, fiets = bicycle, voet = on foot, OV = public transport). Car falls from about 1.85 in early March to about 0.97 in April, recovers to about 1.6–1.7 from June to November and drops to about 1.2 in December; bicycle rises from about 0.5 in April to a peak of about 1.0 in early September and falls to about 0.4 in December; on foot stays between about 0.45 and 0.6; public transport falls from about 0.15 to below 0.1

Appendix 3: average number of trips per weekday per modality per panel member.

Appendix 4: The weather in the Netherlands of 2020 in degrees Celsius (source: weerstatistieken.nl/de-bilt/2020)



Appendix 4: daily temperatures in De Bilt in 2020 in degrees Celsius (chart in Dutch: maximum, average and minimum per day, with the monthly normal, normal average and monthly average). Daily maximums reach about 35 °C in early August, with a second warm spell of up to about 30 °C in mid-September; winter months stay mostly between about -5 and 15 °C

Appendix 4: The weather in the Netherlands of 2020 in degrees Celsius.

Appendix 5: 'Fietsberaad' research: In 2020, Corona played a part in the choice of a cycling holiday for half of the cycling holidaymakers (in Dutch, as in the original report)

Soort: Nieuws Fietsberaad Datum: 29-03-2021

Bij de helft van de fietsvakantiegangers speelde in 2020 Corona mee bij de keuze voor een fietsvakantie.

Uit de jongste cijfers van het Landelijk Fietsplatform blijkt dat ruim de helft (55,9%) van de Nederlanders van 16 jaar en ouder (8,1 mln personen) in 2020 tijdens één of meer vakanties in eigen land heeft gefietst. Bij 2,5 miljoen Nederlanders was echt sprake van een fietsvakantie in eigen land. Onder een fietsvakantie wordt dan verstaan dat men meerdere keren vanuit de vakantie locatie is gaan fietsen (2,1 miljoen Nederlanders) of dat men op de fiets van locatie naar locatie is gefietst (885.000 personen). Ruim de helft van de fietsvakantiegangers geeft aan dat corona de keuze voor een fietsvakantie in meer of mindere mate heeft beïnvloed.

Van de Nederlanders die tijdens de vakantie in eigen land recreatieve fietstochten ondernamen, maakte 58% gebruik van de knooppuntroutes. Eén op de drie (33%) trektochtfietsers in Nederland maakte voor hun tocht gebruik van een LF-route.

Het aandeel vakantiegangers in de leeftijd 16-50 jaar die vanuit een vakantieadres fietsten groeide van 43% in 2019 tot 49% in 2020. Het aandeel 60-plussers liep terug van 42% naar 33%. Als mogelijk verklaring hiervoor denkt het Landelijk Fietsplatform dat de oudere doelgroep er voor koos om vanwege de risico's en de drukte wat meer thuis te blijven. Daarentegen besloot de jongere doelgroep wat meer in eigen land te blijven. Ook gingen ze vaker met de kinderen op pad. Maar wat precies de trend is valt nog moeilijk in te

schatten op basis van deze cijfers. Corona heeft uiteraard meegespeeld, maar bijvoorbeeld ook de snelle opkomst van e-fiets kan van invloed zijn geweest. Uit eerder onderzoek is wel bekend dat in 2018 ruim 3,1 miljoen Nederlanders wel eens fietste in de vakantie en dat bijna 1,1 miljoen mensen zelf aangaven 'fietsvakanties' in eigen land te maken. Maar bij dat onderzoek lag de nadruk sterk op LF-gebruikers en de cijfers zijn niet goed vergelijkbaar.

Bron: fietsberaad.nl/kennisbank/2,5-miljoen-nederlanders-op-fietsvakantie-in-eigen-land

Appendix 6: development of passenger traffic in 2020 compared to 2019 (index 100) (source (Dutch): cbs.nl – mobiliteit, welvaart in coronatijd)

Personenverkeer t.o.v. 2019

2019 = 100



Bron: CBS, NDW

2019 is in elke week op 100 gesteld.

Appendix 6: passenger traffic per week compared to 2019 (2019 = 100), for weekdays and weekends in 2020 and the first weeks of 2021 (chart in Dutch; source: CBS, NDW). In 2020 the index is around 100 until week 11, drops to about 35–50 in weeks 13–16, recovers gradually to about 95–100 in weeks 29–31 and stays around 65–90 from week 40 to week 53; in the first weeks of 2021 it is around 50–80

Appendix 6: development of passenger traffic in 2020 compared to 2019 (index 100).

Notes

1. STAR (Smart Traffic Accident Reporting) is an initiative of the police, union of insurances and traffic engineer IT agency VIA. The mission of STAR is to build a reliable database of relevant accidents by means of collaboration. A collaboration where we want to involve as many data sources, professionals and citizens as possible. The results will be shared with all stakeholders. In this way we want to stimulate a policy based on facts to, in the end, increase traffic safety without traffic victims. For more information: www.star-traffic-accidents.eu

2. [Less accidents, yet increased road unsafety on the road](#). Research on the effects of COVID-19 measures on road safety in the Netherlands. Vught, May 15, 2020. VIA Traffic Solutions Software, Erik Donkers & Sjoerd Broos.
3. For this we worked with the STAR-accident figures of the police (2016 – 2020) and HERE Floating Car Data for speed of 2020 in the VIA Software.
4. The following weight has been used: 2016: 0,1, 2017: 0,2, 2018: 0,3 and 2019: 0,4.
5. See Appendix 2 for the overview of COVID-19 measures per month.
6. Statement Police: Because of less accidents with only material damage there was still enough time to deal with all alerts for regular registration, despite of the extra efforts of the police in the COVID-19 period.
7. See: [Less accidents, yet increased road unsafety on the road](#). Research on the effects of COVID-19 measures on road safety in the Netherlands. Vught, May 15, 2020. VIA Traffic Solutions Software, Erik Donkers & Sjoerd Broos.
8. With FCD, the speed of a road section is measured over the day, 365 days a year. This includes delays due to incidents, search behaviour and traffic. In order to obtain an accurate picture of whether speed is a problem on a road section, the delays have been filtered out.
9. For this, the V85 was used, a traffic engineering measure of the speed that is exceeded by at least 15% of the traffic.
10. In March 2020, the 100 km / h rule during the day (from 6 a.m. to 7 p.m.) was introduced as an environmental measure. For this study, the motorways were assessed on the maximum speed that matches the design speed of the road, in many cases 130 km / h.
11. The possibilities of HERE's speed data are still under development. Using the CROSS method, to combine speeds and accidents, it is possible to obtain comparable insights at a local level. As an example, see the road safety map at www.bliq.report.
12. [Less accidents, yet increased unsafety on the road](#). Research on the effects of COVID-19 measures on road safety in the Netherlands. VIA Traffic Solutions Software, Erik Donkers & Sjoerd Broos.
13. Only accidents for which the required DNA characteristics are available have been included for the derivation of the DNA. If an accident is missing a characteristic (i.e. not filled in), no DNA can be derived for this accident. The aim is to find accidents that are similar, so it can happen that there are accidents in a group that are slightly different from the general description of the group. As a result, there may be one or more accidents that do not fully comply with the described accident type. The goal is also to find similar accidents and not accidents that are quite the same. It is therefore possible that several accident DNA types occur at one geographic location.

14. nl.wikipedia.org/wiki/Erik_Asmussen

15. The following weight has been used: 2016: 0,07 - 2017: 0,13 - 2018: 0,20 - 2019: 0,4 - 2020: 0,33.

Sources

- STAR-accident figures of the police (2016 – 2020), VIA Software.
- HERE Floating Car Data for speed of 2020.
- [Less accidents, yet increased unsafety on the road](#). Vught, May 2020. VIA Traffic Solutions Software, Erik Donkers & Sjoerd Broos.
- [Rijksoverheid – Coronavirus tijdlijn](#)
- dat.nl/nvp
- weerstatistieken.nl/de-bilt/2020
- [Fietsberaad / Landelijk Fietsplatform](#)
- [CBS – Mobiliteit, welvaart in coronatijd](#)