

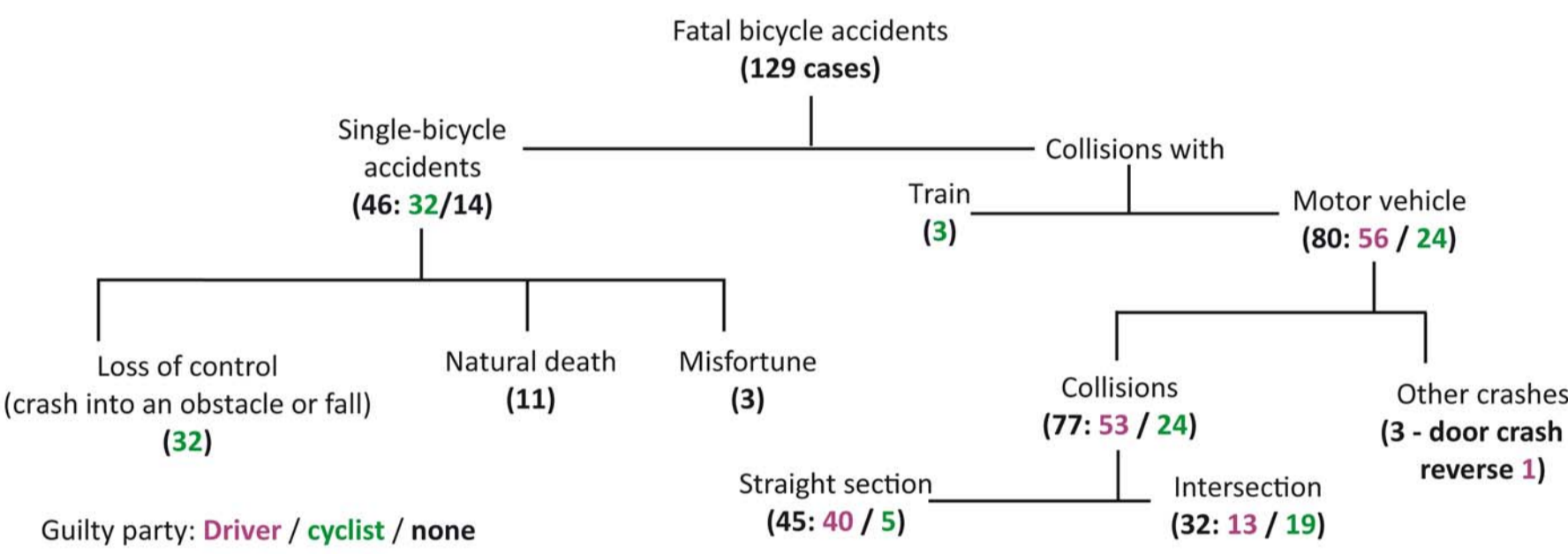
# FATAL CYCLING ACCIDENTS IN THE CZECH REPUBLIC- FACTORS AND CAUSES OF DEATH

## 1 INTRODUCTION

We studied in detail the circumstances and causes of death of 129 cyclists which occurred in the Olomouc and Zlín regions, the Czech Republic, between 2005 and 2013. We analyzed the autopsy reports where the principal cause of death was stated. We obtained a detailed description of the circumstances recorded by police officers for the same group of cyclists.

## 3 BASIC DATA DESCRIPTION

### ACCIDENT CIRCUMSTANCES

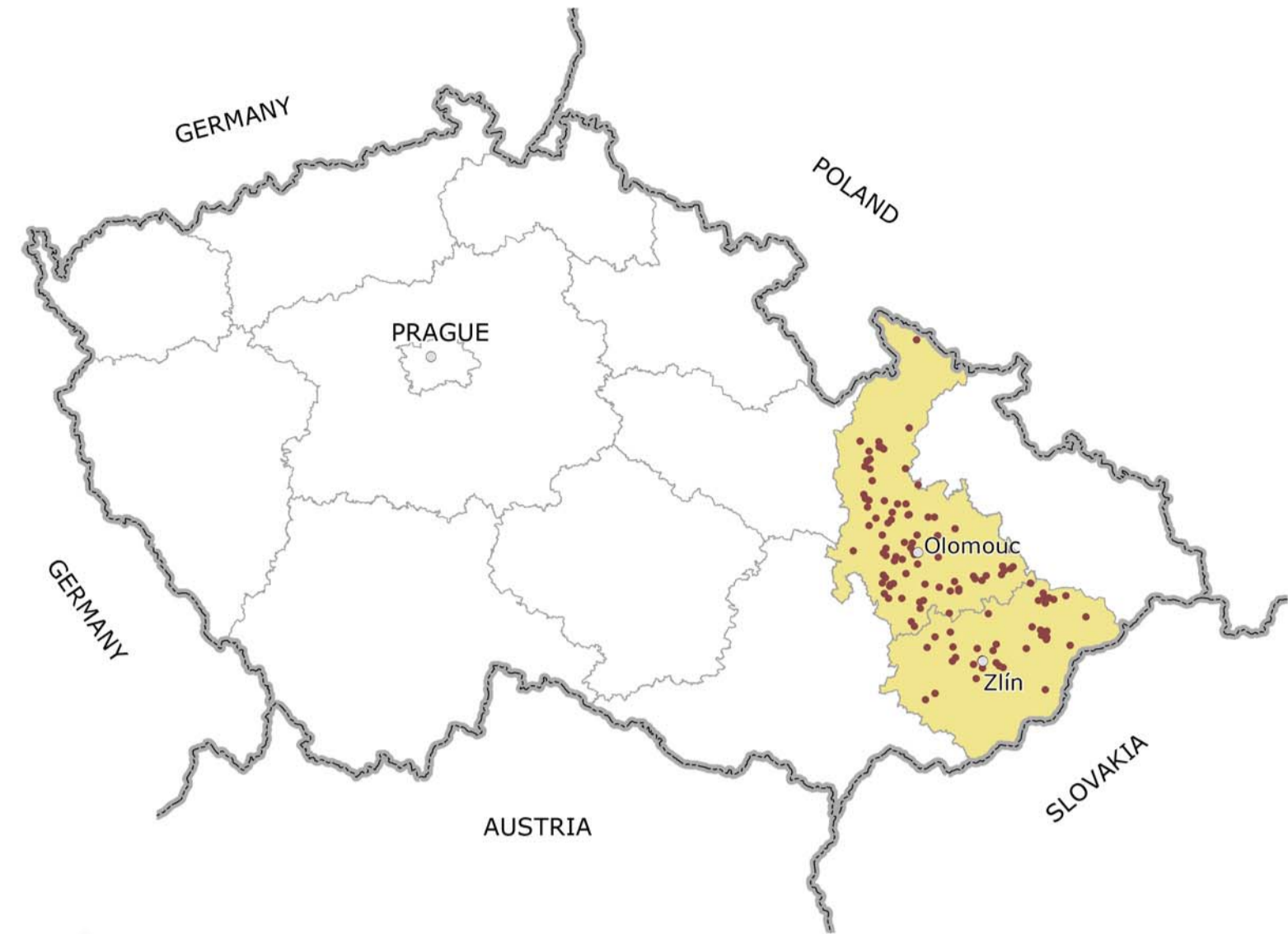
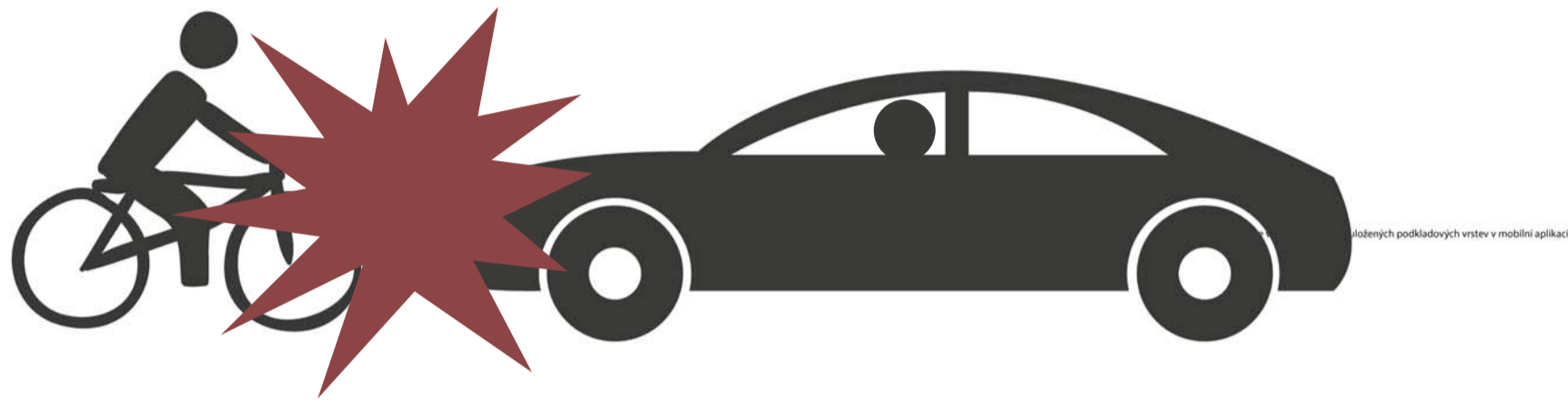


Single-vehicle (bicycle) accidents are always categorized in police reports as the fault of the cyclist. 32 were falls from a bicycle or crashing into an obstacle. Natural death means that the effort exerted pedaling by the cyclists usually caused a coronary case.

## 2 DATA SOURCE

Autopsy reports from the Institute of Forensic Medicine and Medical Law, University Hospital in Olomouc

Police reports on traffic accident circumstances



The bodies of the cyclists were transported to the Olomouc hospital which is the regional center responsible for the autopsies after every (not only traffic) accident, which take place within the Olomouc and Zlín regions.

### GUILTY PARTY IN COLLISIONS

Guilty party in bicycle-motor-vehicle collisions (80 cases):

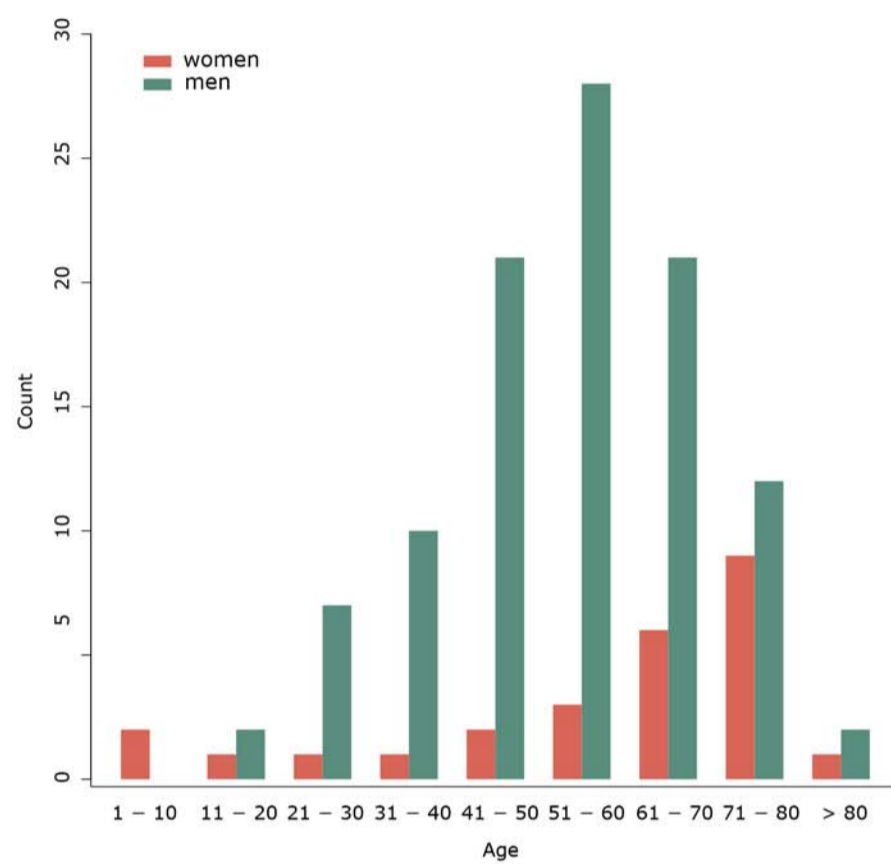
**24** Cyclists **56** Drivers

We omitted 5 cases of collisions with motorcycles

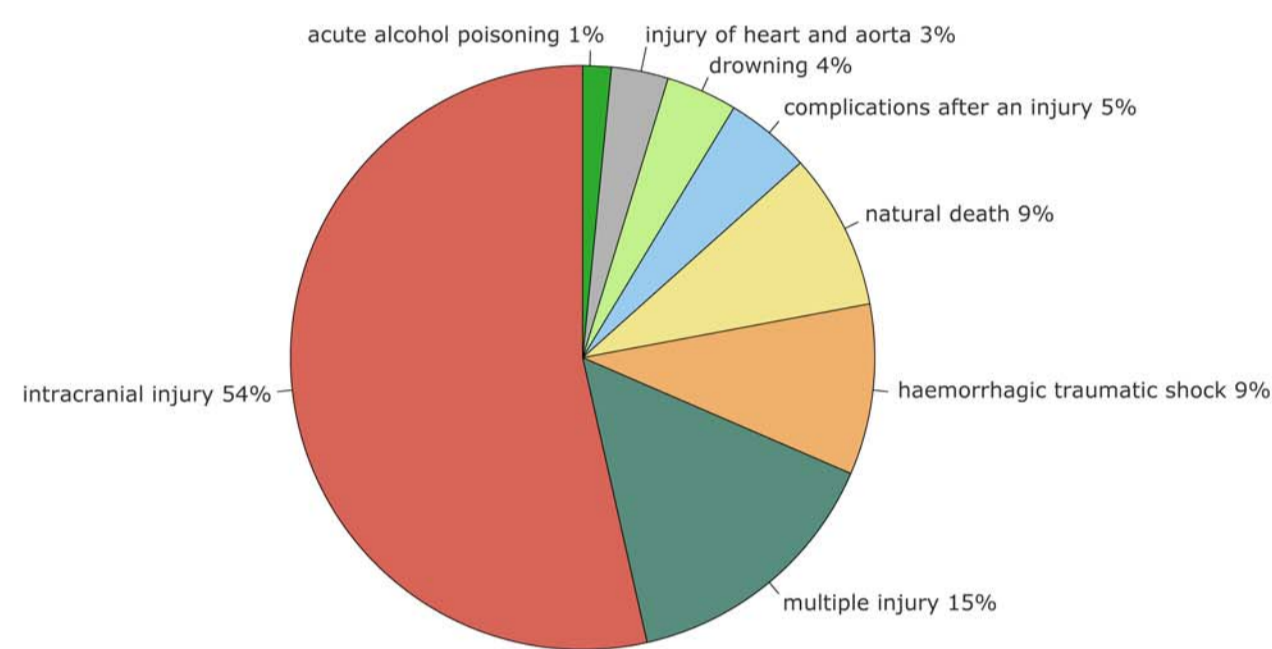
| Guilty party in collisions | Speeding | Overtaking | Not giving the right of way | Improper driving style |
|----------------------------|----------|------------|-----------------------------|------------------------|
| Cyclists                   | 0        | 0          | 18                          | 3                      |
| Driver                     | 14       | 5          | 6                           | 7                      |
| Driver - heavy v.          | 3        | 4          | 4                           | 7                      |

A typical mistake of cyclists was not giving right of way at intersections. The kinds of collisions varied according to the vehicle type. The "Improper driving style" category includes collisions which took place on straight sections where drivers hit cyclists due to not paying attention or falling asleep.

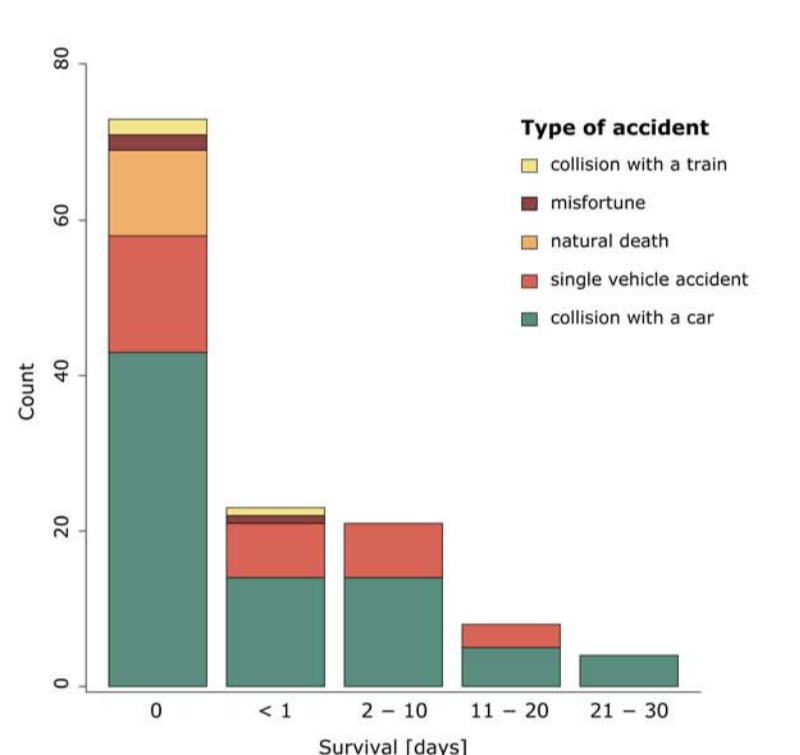
### AGE AND GENDER



### PRINCIPAL CAUSES OF DEATH



### TIME OF DEATH



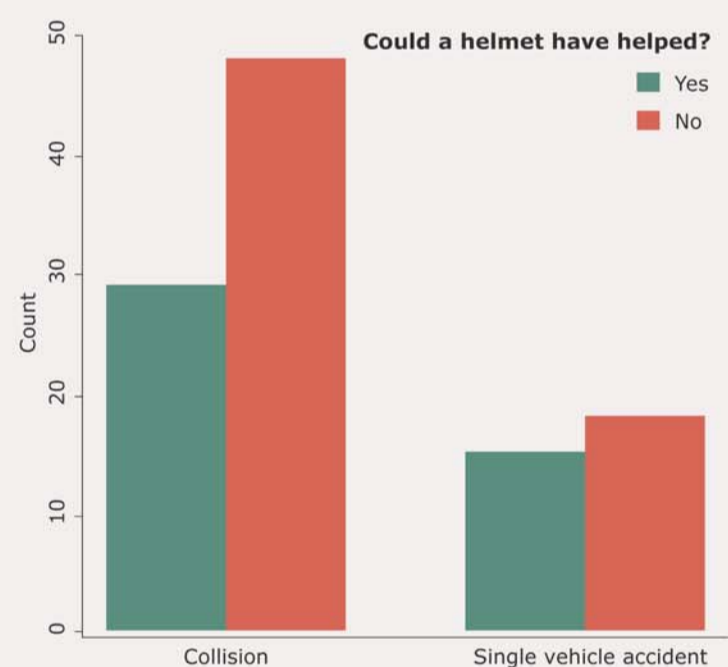
Cyclists died immediately in cases of natural death and also in the majority of collisions with motor vehicle cases (41 %). The survivors differed based on the principal cause of the accident.

## 4 RESEARCH QUESTIONS

? Could a bicycle helmet save the life of the cyclist?

**YES** In case of a fall from a bicycle (28 cases) and crashing into an obstacle (4 cases) the helmet could save 15 lives (46 %)

**NO** Only 5 cyclists wore a helmet. In all cases the helmet would not have helped them, however. The same was true in another 69 cases when the injury was not limited to the head.



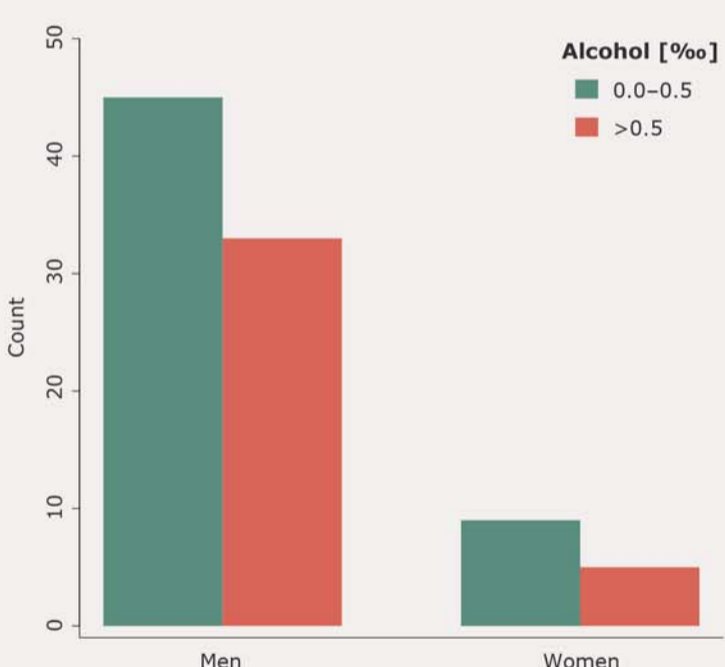
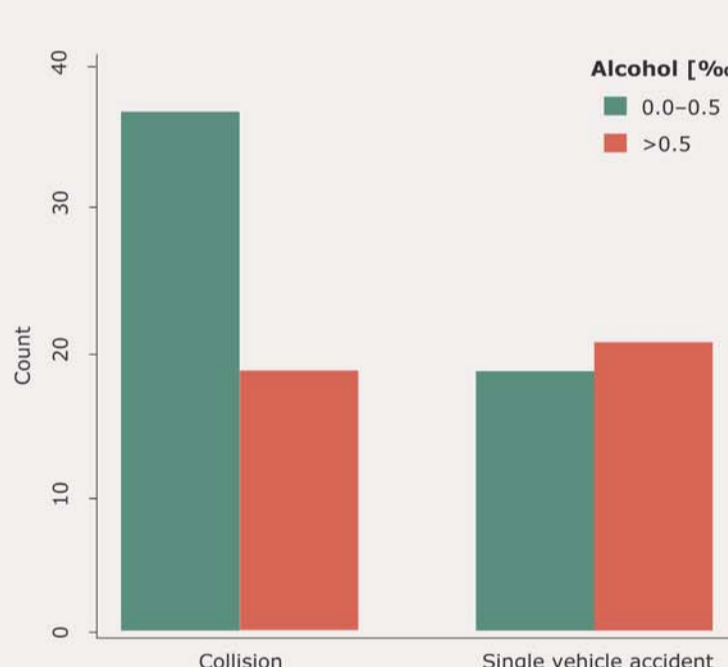
A special situation occurred with cyclists who drowned after they fell into a stream. A number of them hit their heads, lost consciousness and drowned.

We studied in detail all the autopsy reports for the cases when the principal cause of death was the intracranial injury.

? Was alcohol among the significant causes of accidents?

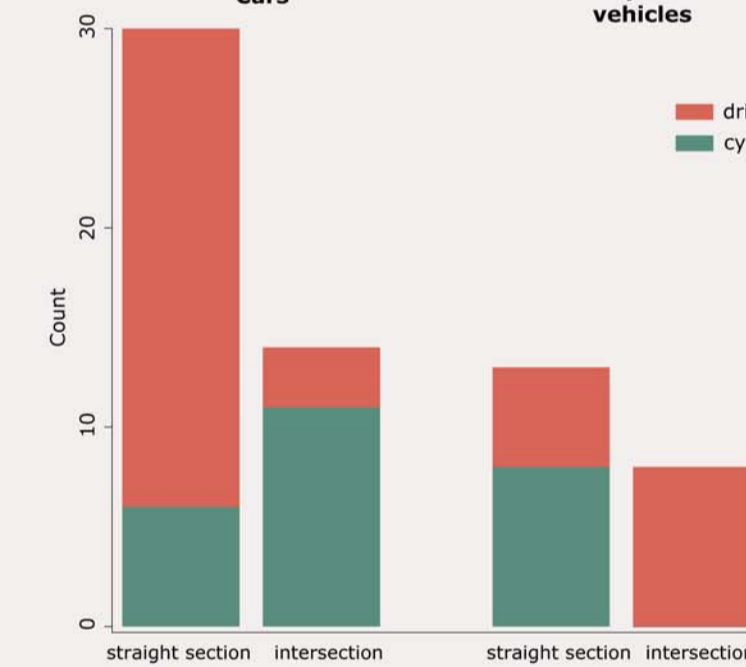
**YES** The alcohol tests showed a concentration higher than 0.5 ‰ in 19 cases (51.4 %) concerning cyclists who fell from their bikes or crashed into an obstacle.

**NO** We did not find a significant difference in the presence of alcohol between men and women.



? Were heavy-motor vehicles more dangerous to cyclists than cars?

**YES** Heavy vehicles are dangerous for cyclists. This is particularly the case for collisions at intersections where the heavy-motor-vehicles caused significantly more collisions with cyclists than other vehicles.



It is a well known fact that a heavy-motor vehicle driver has a limited view. Cyclists when riding by such a truck are therefore not visible to its driver. Critical situations occur when a truck is preparing to turn right. When a heavy vehicle turns right its driver may overlook the cyclist and run over his/her body. This situation occurred twice at roundabouts and once when a driver was crossing a sidewalk. One accident was also caused by a heavy vehicle which suddenly began to reverse and ran over who was behind the heavy-motor vehicle.

? Is it possible to identify any accident patterns?

**YES** We have found several types of recurring situations which ended with a fatal cycle accident: Group A – **Intersections**, Group B – **Straight section**, Group C – **Curves**

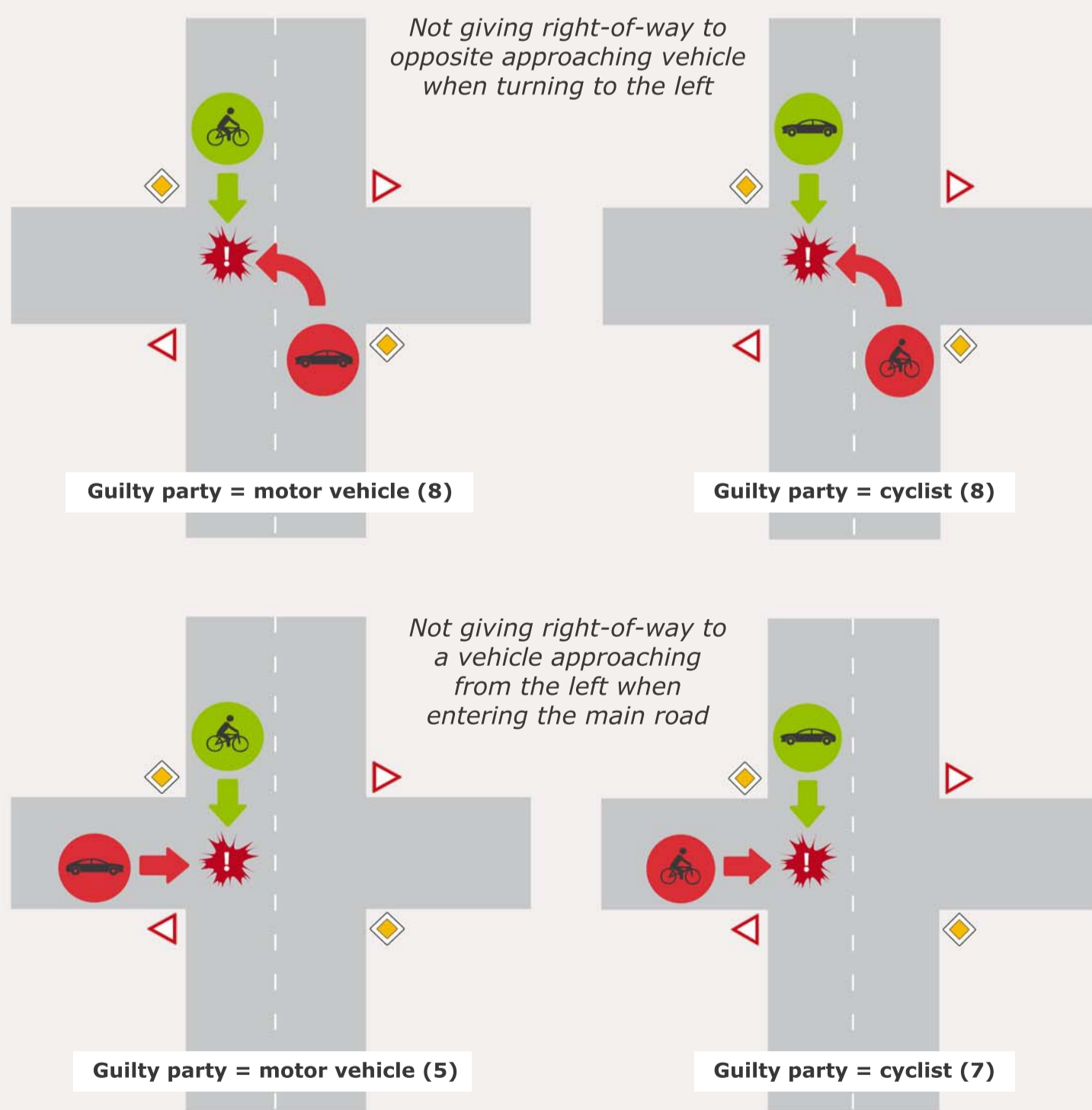
**NO** Accident patterns were limited predominantly to collisions with motor vehicles. Single-vehicle accidents occurred in the majority as falls from bicycles under various circumstances.

Other fatal accident situations were less frequent than those in the pictures on the right. We cannot, however, state that the risk in such situations is lower than in others with the higher frequency. No exposition data are available. We do not know, therefore, how many cases did not end with the fatal accident of the cyclist.

Other accidents with low frequencies were as follows:

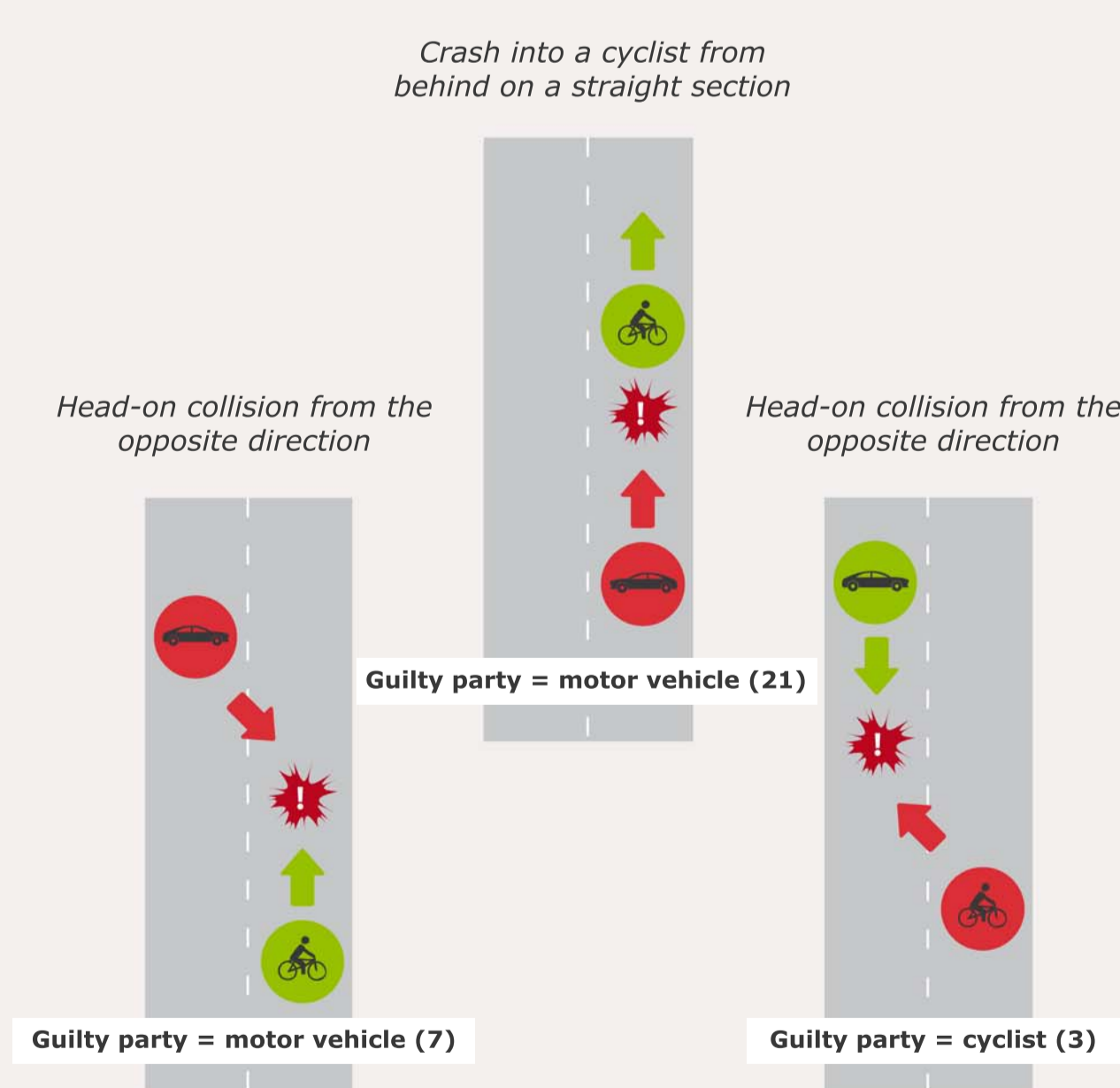
- Two cyclists were killed by a fallen tree when cycling. This took place in forests on trails.
- Two cyclists died when they crashed into the unexpectedly opened doors of parked cars.
- Five cyclists fell into a stream and drowned. They all had more than 1.5 ‰ alcohol in their blood.

### A – Intersections



The main cause of accidents was connected with right of way. These accidents occurred almost entirely at intersections.

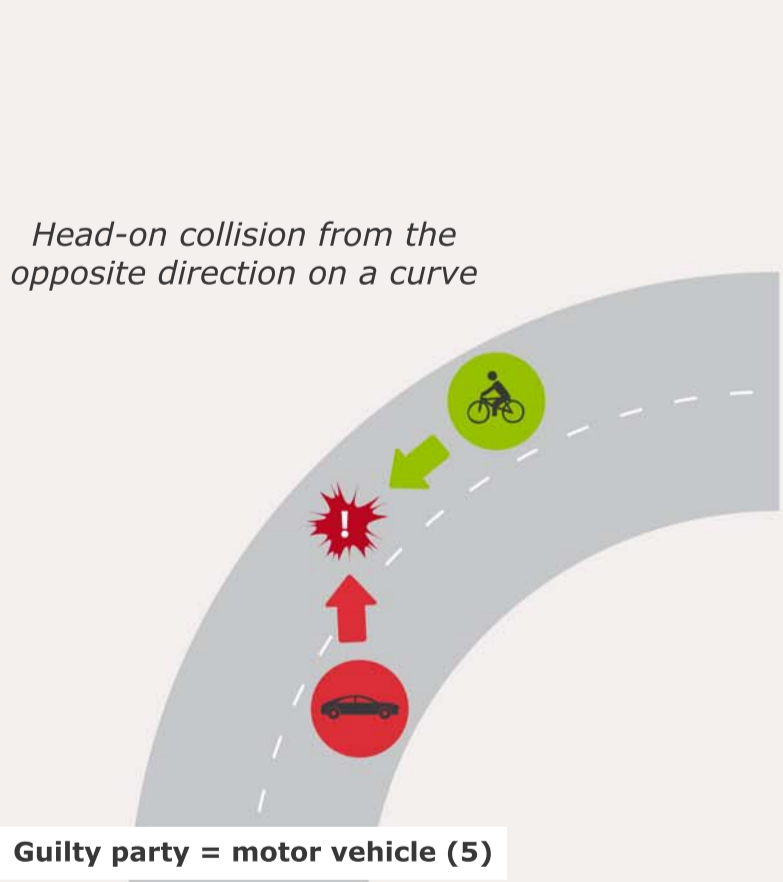
### B – Straight sections



**Hit from behind** In this type of accident pattern a car driver hit a cyclist from behind on a straight road section or on a curve. The driver was always the guilty party.

**Head-on collisions** In this type of accident pattern a car driver hit a cyclist in the head-on direction on a straight road section or on a curve. Both the driver and the cyclist were the guilty parties.

### C – Curves



Curve (both left and right turn curve): a driver left his/her part of the road and caused a head-on collision or hit a cyclist from behind.

## 5 CONCLUSIONS

- Cyclists should be aware that a heavy-motor-vehicle driver has only a limited view from the cab.
- Cyclists were often the guilty party at intersections.
- Cyclists should improve their visibility as much as possible if they need to ride on a road with motor vehicles.
- Cycling helmets can help save lives. Several falls and even several collisions could have had non-fatal outcomes if the cyclist had worn a helmet.
- Drivers of motor vehicles were the guilty parties in 66 % of the collisions with the cyclists.
- Alcohol was behind 54 % of all the falls from bicycles.

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