

Summary:

Road traffic risk in Norway 2013/14

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The Institute of Transport Economics regularly updates the Norwegian road traffic risk figures. Estimates for the years 2013-2014 show that road traffic risk has been reduced compared to previous years. Risk levels have decreased over time for most road user groups in Norway, but the reductions are largest for car occupants and motorcyclists. Risk levels for bicyclists and pedestrians are unchanged from 2009-2010. Within each road user group, risk levels are still highest among the younger and older road users, but for both age groups there has been a marked risk reduction in particular among car drivers and cyclists. Also gender differences in risk are reduced among car drivers. Finally, by distributing according to day of the week and time of day, we find that injury risks for car drivers and passengers are much higher on Saturday night/Sunday mornings, but the risk increase at night/weekends is much lower than previously.

Accident and risk decrease over time in Norway

The Institute of Transport Economics regularly estimates road traffic risk in Norway using official accident data from Statistics Norway and Norwegian Travel Surveys.

Although the total annual number of accidents and injuries has been fairly stable from the mid-eighties to around 2007, it has declined substantially in later years. In contrast the annual number of Norwegian road fatalities and seriously injured has declined from 1986 onwards. During the last decade the latter number has almost been halved (Figure S1).

The risk of being involved in an accident with personal injury, the risk of injury and the risk of fatality have all decreased over time in Norway (Figure S2). The risk reductions were large in the 1980s and steady during the 1990s and mid 2000s. More recently, from 2007 onward, we see again a large reduction road traffic risk in Norway.

Risk levels have decreased over time for all road user groups in Norway, but the reductions are largest for motorcyclists, and most notably for users of heavy motorcycles (cf. Figure S3). The main reason why users of heavy motorcycles are safer is probably that this driver group is more mature and experienced now than it was in the 1980s.

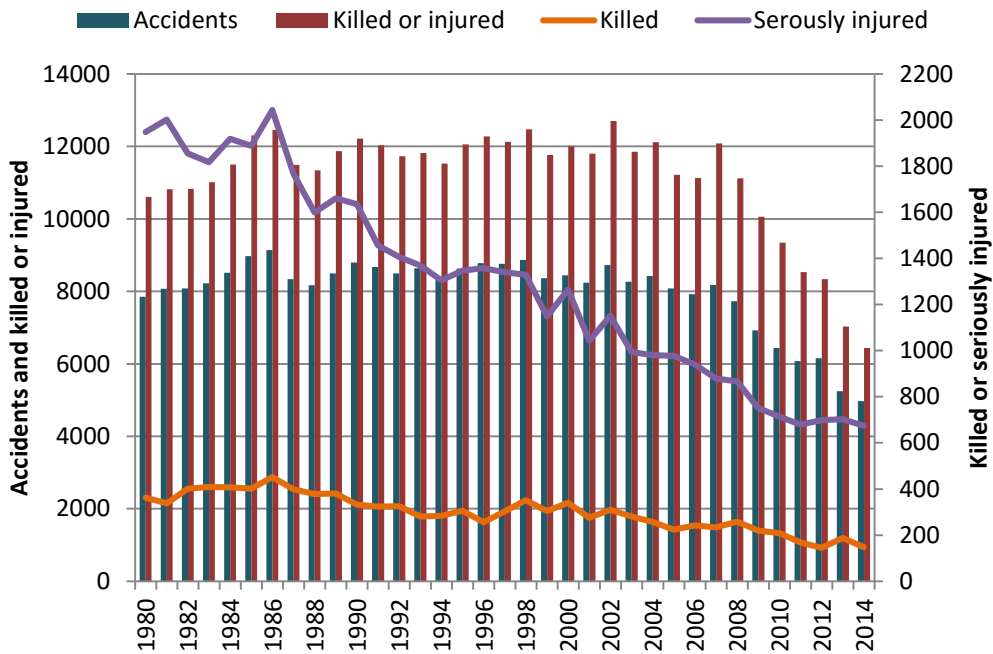


Figure S.1 Accidents, killed or injured and seriously injured in Norwegian road traffic 1980-2014.

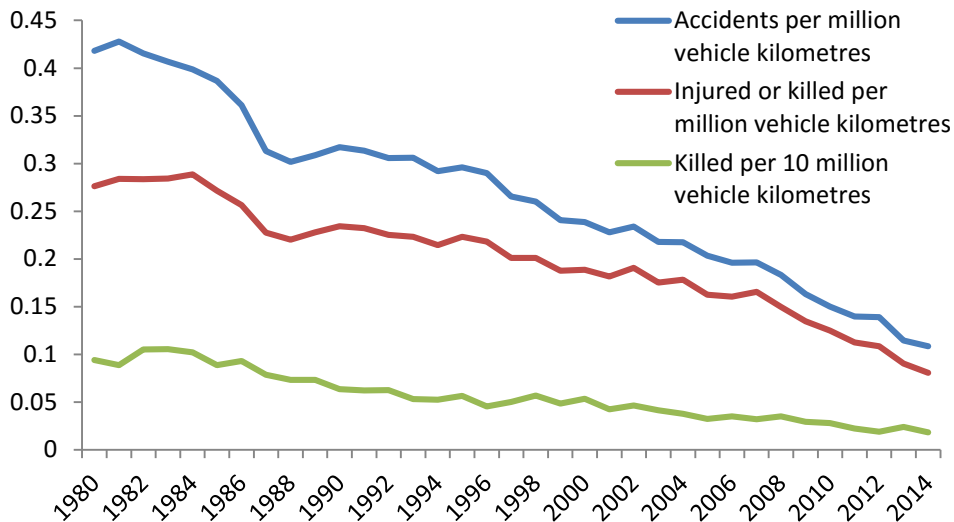


Figure S.2 Accident risk, injury risk and fatality risk in Norwegian road traffic 1980-2014.

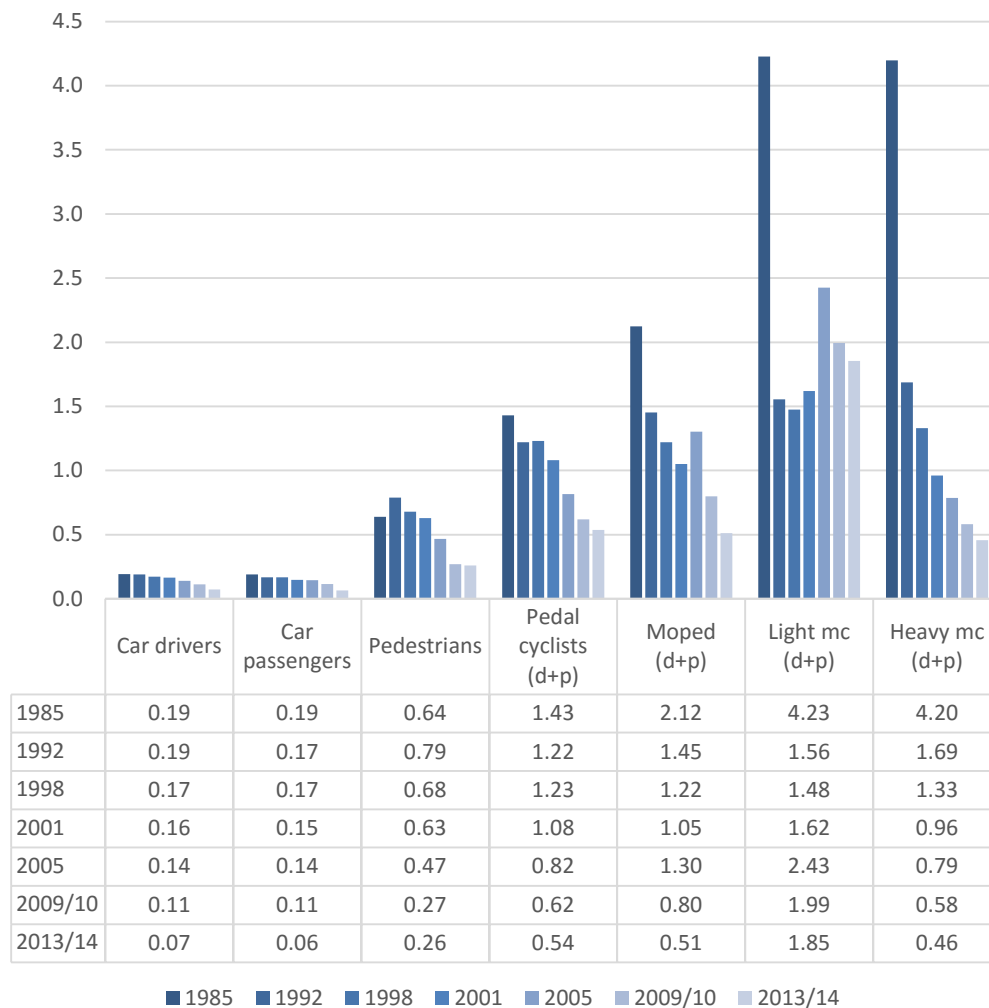


Figure S.3 The number of injured or killed per million person kilometres in Norway in 1985, 1992, 1998, 2001, 2005, 2009/10 and 2013/14 by road user group. (d+p) indicates drivers and passengers.

For all road user groups the reductions in risk over time are substantial. They are particularly large over the last ten years, from 2005 to 2013/14. However, for pedestrians there is no risk reduction in the latest period from 2009/10 to 2013/14 and for pedal cyclists the reduction is modest in this latest period.

The explanation for the dramatic risk reduction for heavy motorcycles from the mid-eighties onward is probably that this type of vehicle was typically driven by young and immature men in their mid-twenties in the 1980s whereas today the average age of heavy motorcycle drivers is around fifty years.

The young and the elderly are most at risk

Among car drivers the young and the elderly have higher accident risk, with the youngest drivers being most at risk. Among pedestrians and pedal cyclists, it is the elderly who are most at risk. The risk of fatality as a pedestrian is particularly high among the elderly cf. figure S4.

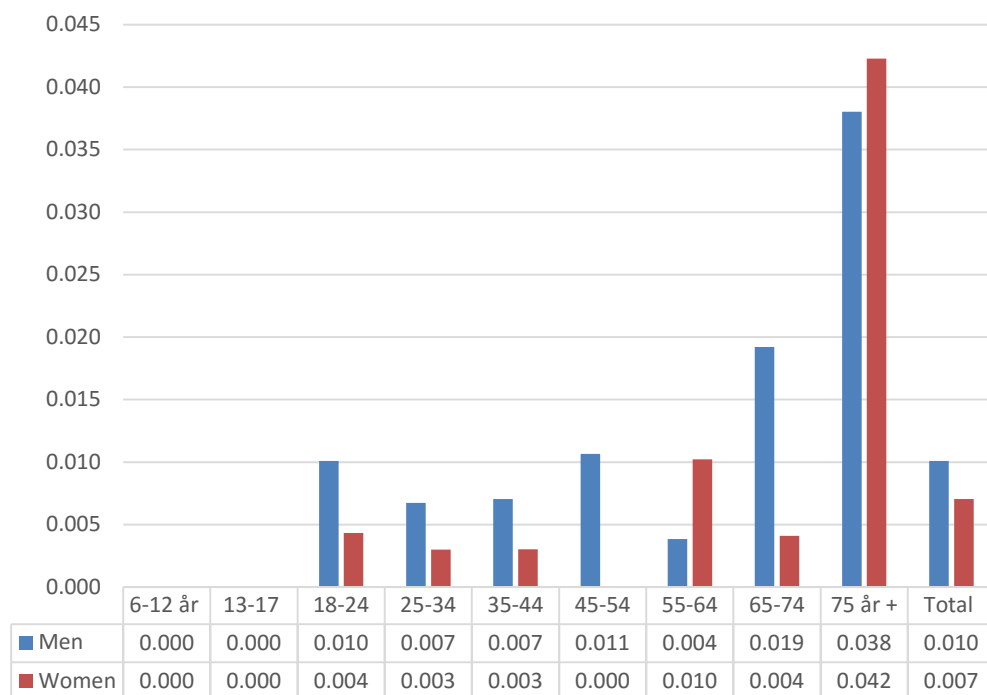


Figure S.4 Pedestrians killed per million person kilometre in 2013/14 distributed by age and gender.

Among car drivers young people are traditionally most at risk, and this is still the case. In particular the youngest car drivers have an increased risk of an accident involving serious personal injury or death. The average injury risk for car drivers is much more evenly distributed according to age, but with higher risks among the younger and the older drivers. However, the distribution over age has become much more even over time, cf. figure S.5.

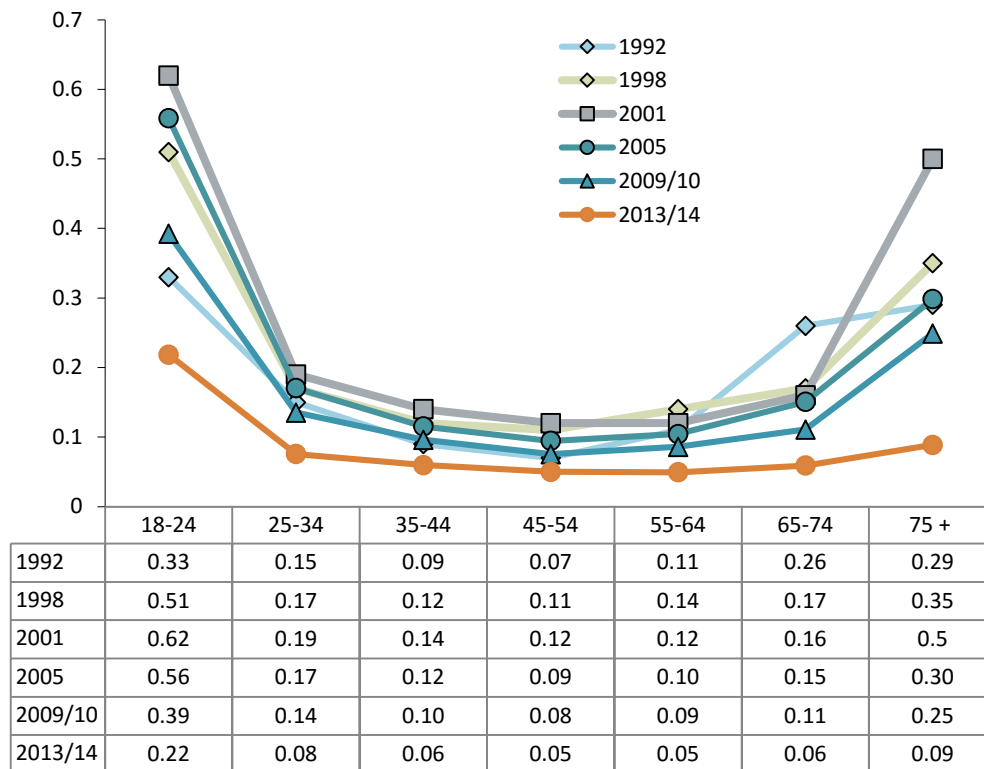


Figure S.5 Car drivers killed or injured per million person kilometres distributed by age in 1992, 1998, 2001, 2005, 2009/10 and 2013/14.

Risk differences between men and women

Among car drivers there has traditionally been marked risk differences between men and women. Male drivers have a higher risk of being killed in road traffic than female drivers do. On the other hand female drivers are more at risk of having a personal injury. The reason for these differences is probably that accidents involving male drivers on average take place at higher speeds and consequently are more serious than those involving female drivers.

If one considers the risk of being involved in an accident with personal injury, regardless of whether the injured party is the driver or not, male and female drivers are on average at risk to the same degree. There are however clear differences among age groups but small differences between genders within age groups, cf. figure S6.

The risk of being involved in an accident with personal injury has an age distribution that is similar in its U-shape to the risk of being killed or injured as car driver (given in figure S.5).

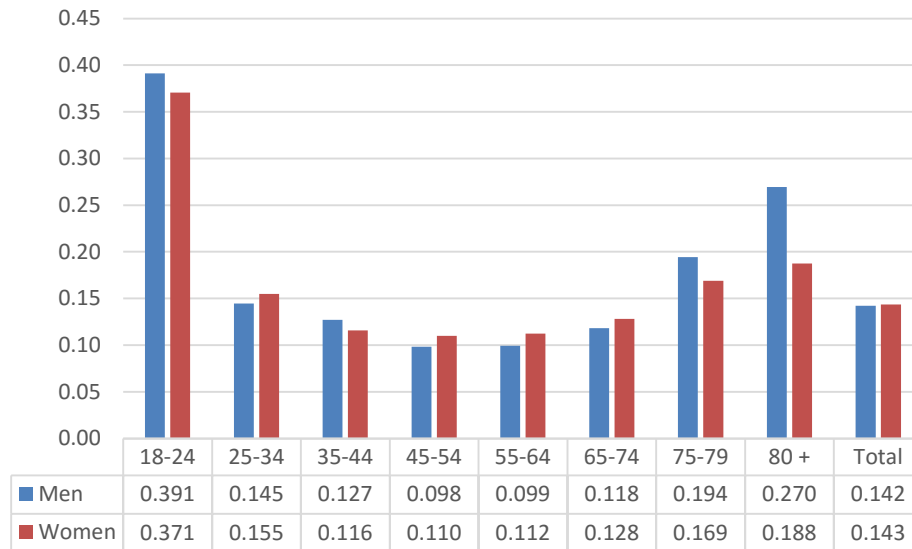
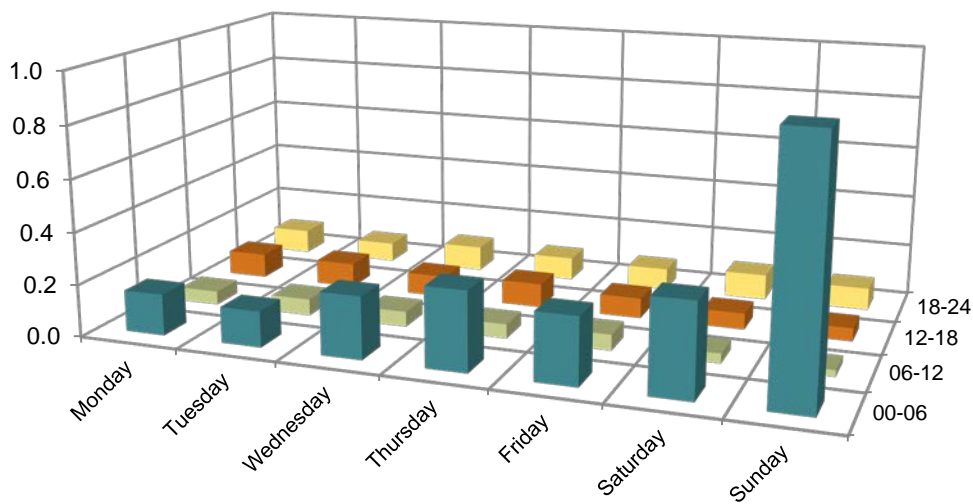


Figure S.6 Car drivers involved in accidents with personal injury per million person kilometres, distributed by age and gender, 2013/14.

High risks on Saturday night/Sunday morning

If we look at the injury risks for car drivers and passengers on different days of the week and at different times of day, we find that the risk is very high in the early hours of Sunday morning cf. figure S.7.



| | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|-------|--------|---------|-----------|----------|--------|----------|--------|
| 00-06 | 0.16 | 0.14 | 0.24 | 0.30 | 0.26 | 0.35 | 0.96 |
| 06-12 | 0.05 | 0.06 | 0.06 | 0.05 | 0.06 | 0.04 | 0.03 |
| 12-18 | 0.09 | 0.09 | 0.08 | 0.09 | 0.08 | 0.06 | 0.05 |
| 18-24 | 0.09 | 0.07 | 0.10 | 0.09 | 0.08 | 0.10 | 0.09 |

Figure S.7 Car drivers and passengers killed or injured per million person kilometres by day of week and time of day in 2013/14.

Similar results were found also in 1998, 2001, 2005 and 2009/10. However, relative to overall risk, injury risk is more than 30 times greater in the early hours of Sunday mornings in 2009/10 whereas in 2013/14 the risk is 12 times greater.

The traditional high risk in the early hours of Sunday mornings can to a large degree be explained by the fact that driving during these hours has been associated with young and immature drivers, possibly influenced by alcohol and drugs.

Now it seems that in particular the risk of young male drivers is substantially reduced compared to previous years, and associated with this there has also been a substantial decrease in the number of accidents with young car occupants at night.

Many factors contribute to reducing risk

Risk calculations show that traffic has become much safer over time, and especially in recent years there has been a marked risk reduction in road traffic in Norway especially for drivers and passengers. This applies to the greatest extent to young male drivers. Compared with the risk level in 2009/10 the youngest men have more than 40 percent lower risk of being injured as car drivers.

One mechanism that may have contributed to this is that the car fleet is becoming safer, and this has probably also been reflected now in older cars typically driven by younger drivers. Another trend is that young people have become more law-abiding than previously. In addition, they also spend more time at home and hence are less exposed to traffic. Our data from the national travel survey reveals that 18-19 years old drive car far less than before.

Also among elderly drivers the risks are also reduced. It may partly a result of better crash protection in newer cars. Elderly drivers are the most vulnerable groups and as such most likely to benefit from improved crash protection in vehicles and better barriers in the road system. It may also be a factor that many seniors now have experience as drivers from their entire adult life, whereas previously had many started to drive in their middle ages, among other things because of severe restrictions in the car supply until 1960.

Parallel with the improvements in the cars' crash protection the road authorities continuously and systematically improve the road network providing better road user protection with physical barriers separating traffic, concerting intersections to roundabouts, building bypass roads around cities and towns etc. Another important factor may be that emergency medicine is constantly improved and that notification of ambulance accidents happen more quickly than previously. In addition, the speed on the roads has decreased in recent years. It may be because the motorist population gets older, it may be due to effects of traffic controls, endorsements of driving licenses etc. Surveys of road user attitudes and behavior shows a tendency that more accept security restrictions in traffic speed limits, more people use safety equipment etc. It seems that we are on the way to get a better safety culture in traffic in Norway.

Appendix: Methodology

In order to calculate the risk figures, average travel distances per day for various combinations of road user, age and gender are computed. These average values are extrapolated to represent a whole year (each day multiplied by 365) and to represent the whole population (averages multiplied by population numbers within each age/gender combination).

Accident figures collected from Statistics Norway are distributed according to similar age/gender/road user groups, and risk is computed by dividing the accident/injury/fatality numbers by the exposure figures.

For large groups such as pedestrians and car drivers, this method is fairly robust. For combinations of road user/age/gender containing few cases there can be large random variations in both the accident data as well as in the exposure data. There are for instance large random variations in the risk estimates for the youngest drivers. Thus in order to give more robust results 18-19 year-olds have been grouped together with 20-24 year-olds in the figures.

For small road user groups like motorcyclists, the exposure data collected in the Norwegian national travel survey are so scarce that they cannot be utilized to calculate risk figures. For motorcyclists and moped users, risk calculations are based on "Transport Volumes in Norway" published by The Institute of Transport Economics. Here exposure data for motorcyclists and moped users are calculated using survey estimates of annual mileage and vehicle register data for the number of vehicles. Thus for motorcyclists and moped users detailed risk figures distributed by age/gender are not available. For motorcyclists the estimates are based on recent surveys, but for moped users the surveys that serve as basis for the calculations are old and need updating. Thus for moped users the risk figures are more uncertain.