

Summary:

Has progress in improving road safety come to a stop?

The background for the study presented in this report is a concern that the trend towards fewer road accident fatalities appears to have slowed down in recent years. The highest number of road accident fatalities ever recorded in Norway was 560 in 1970. The lowest number recorded since then was 255 in 1996. A lower number has since not been observed, but it is likely that there will be fewer than 255 traffic fatalities in Norway in 2005. This report presents a study that tries to answer the following questions: What can explain the fact that the trend towards fewer traffic fatalities has slowed down in recent years (after about 1992)? Is it still possible to reduce the number of traffic fatalities, or have all effective road safety measures been exhausted?

Analysis of long term trends in fatalities, injuries and injury severity

In order to explain changes over time in the number of road accident fatalities, injured road users, and the proportion of all those injured who are killed or seriously injured, multivariate analyses have been performed. These analyses were restricted to the period from 1979 to 2003, as complete data for years before 1979 could not be obtained. Three dependent variables were used in the analyses:

1. The annual number of fatalities.
2. The annual number of injured road users (police reported).
3. The proportion of all killed or injured road users who were fatally or seriously injured.

The following explanatory variables were used:

1. The total volume of travel, stated in million person kilometres travelled, including travel on foot or by bicycle.
2. The number of kilometres driven by young drivers (aged 18-24 years).
3. The number of kilometres driven by heavy vehicles.
4. Kilometres travelled walking or cycling.
5. Sale of new cars (thousands per year).
6. Seat belt wearing among drivers (percentage wearing seat belts, stated as a weighted mean of urban and rural wearing rates).

7. The number of fixed penalties (traffic tickets) issued per million vehicle kilometre of driving.
8. The number of vehicle kilometres driven on motorways.

The first four explanatory variables are intended to describe travel exposure and its composition with respect to groups that have different accident rates or a different potential for causing injury in accidents. The sale of new cars is an indicator of the business cycle. The wearing of seat belts greatly influences the probability of fatal or serious injury in the event of an accident. The number of fixed penalties issued per million vehicle kilometre of driving is intended as an indicator of the amount of police enforcement. Finally, the number of kilometres driven on motorways indicates the share of driving taking place on the safest roads.

The analyses of fatalities and injured road users were made by fitting Poisson regression models. A Poisson model was found to be adequate in both analyses, there being no statistically significant over-dispersion in the data. In the analysis of changes in the proportion of accident victims who are killed or seriously injured, a linear regression model was applied.

Good explanatory models are hard to find

With just 25 observations (data for 25 years) and 8 explanatory variables, it is difficult to develop good explanatory models for the trends observed and any irregularities in these trends. Emphasis was put on trying to explain the long term trend for fatalities. The analysis found that the somewhat slower decline in the number of fatalities observed in the period 1992-2003, compared to the period 1979-1991, may be related to a decline in police enforcement (from a peak in 1993), and a decline in the sale of new cars (from a peak in 1986). The results are, however, highly uncertain and suggestive rather than conclusive.

In all analyses, it turned out that the dependent variable had a stronger statistical association with a trend term than with any of the explanatory variables. The trend term captures the effects of omitted variables that have, over time, systematically influenced the number of fatalities, the number of injured road users, or the severity of injuries in a certain direction. The trend term was negative for fatalities and the proportion of fatal or serious injuries. It was positive for the number of injured road users.

The explanatory power of the models fitted is only marginally better than that of simple trend lines fitted directly to the data without making use of any explanatory variables at all. This indicates that the omitted variables, which constitute the trend term, have a dominant influence on long term trends. These unknown variables include road safety measures that have been introduced during the period covered by the study.

The simplest questions are the most difficult to answer

One of the most frequently asked questions regarding road safety, is why the number of fatalities or injured road users has gone up, or down, from one year to the next. It is almost a paradox that this simple question is one of the most difficult to answer in road safety research. There are many reasons for that.

In the first place, random fluctuations can lead to fairly large changes from year to year in the number of killed or injured road users. This applies in particular to the number of traffic fatalities. In the second place, the number of factors that influence road safety is vast; reliable data are available on just a few of these factors. In the third place, changes in a given year may depart markedly from a long term trend.

During the period from 1979 to 2003 there was a reduction in the number of road accident fatalities in Norway. An increase was observed, however, in 11 out of 24 years. The change in the number of fatalities from one year to the next was statistically significant at the 5% level in only 5 years out of 24. The following lessons can be learnt from the study presented in this report:

1. Changes in the number of fatalities from one year to the next are in most cases well within the bounds of random variation only.
2. This fact is not inconsistent with the existence of a long term trend for numbers to go up or down. After 1970, the long term trend for traffic fatalities in Norway has been for the numbers to go down.
3. Departures from a long term trend in any year, or even a string of years, do not necessarily imply that the trend has come to a halt or turned. Periods of stagnation were observed in Norway between 1981 and 1990, and between 1996 and 2004.
4. The fact that quite long periods of stagnation may occur, suggests that at least 10 years of data are needed to reliably determine a long term trend with respect to traffic fatalities.
5. It is only to a small extent possible to identify factors explaining variation in the rate of decline of traffic fatalities in Norway after 1970. Simple trend lines, not incorporating the effects of any explanatory variables, fit the data almost as closely as a Poisson-model including eight explanatory variables plus a trend term.

Have all effective road safety measures been spent?

It is still possible to influence the number of road accidents and road accident victims by means of road safety measures. Estimates that have been developed as part of the preparation of the National transport plan for the 2010-2019 term shows that, in principle, the number of road accident fatalities in Norway can be reduced by 50% by 2020. The number of seriously injured road users can also be reduced substantially, but not by 50%. A smaller reduction of the number of slightly injured road users is also, in principle, attainable.

Has progress in improving road safety come to a stop?

There is no evidence suggesting that all effective road safety measures have already been introduced to their full potential. New safety measures are being developed, in particular new vehicle safety features. A more effective use of traditional traffic engineering measures has still got a potential for improving road safety.