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How many deaths are we prepared to accept?

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1 Background

The question how many deaths we are prepared to accept arises for every form of transport: by road, rail air or water – in some respects similarly and in other respects differently, especially according to the distribution of responsibility for safety among the providers, the operators and the users of the means of transport. The question is addressed here in relation to use of the roads, on which 97 per cent of the deaths in transport in the European Union (EU) occur.

In the year 2000 we accepted more than 50 000 deaths on the roads in the 25 countries that now form the EU (EU25), and we are still accepting well over 40 000 per year in 2005. This is many more than we ought to accept because use of the roads is an unavoidable part of everyday life and it is many more than we need to accept because a large proportion of these deaths can be prevented cost-effectively by known measures. These socioeconomic reasons are well understood by transport professionals, but need to be understood better by opinion-formers, decision-makers and the population as a whole.

One important contribution to this better understanding over the last 10 years has been the *Vision Zero* adopted by the Parliament of Sweden, that no-one should be killed or suffer lasting injury in a road traffic accident (Ministry of Transport and Communications Sweden 1997). This was based on a recognition of responsibility upon road authorities, vehicle

manufacturers and commercial users of the road system to make the system forgiving of errors on the part of individual road users. The Vision Zero has undoubtedly inspired and encouraged those working for road safety in many countries, but it has to be asked how reasonable it is to seek completely to remove the risk of death or lasting injury from use of the roads. Some degree of such risk is accepted in most if not all human activity – for example enjoying swimming entails some risk of drowning, hill walking some risk of falling or exposure. Measures needed to realise the Vision Zero are likely in the end to become unacceptable financially in the light of opportunities to reduce human suffering more cost-effectively in other areas of society – as recognised in the road safety programme for Finland (Ministry of Transport and Communications Finland 2001). They are also likely to reach limits of acceptability in terms of limitations on people's freedom to go about their daily lives. In short,

safety is for living, and living is more than just keeping safe.

The question just how many deaths we are prepared to accept is therefore a matter of practical policy as well as academic debate.

2 Comparing use of the roads with the rest of everyday life

The question is addressed here by comparing the levels of risk of death per hour spent that are currently accepted in using the roads with those currently accepted in the rest of everyday life. A broad brush comparison is made by using statistics collated by the World Health Organisation (2005) on total numbers of accidental deaths and numbers of deaths in road traffic accidents in the year 2000 in the EU25 (except for Belgium and Cyprus, for which the data were missing from the source), Norway and Switzerland.

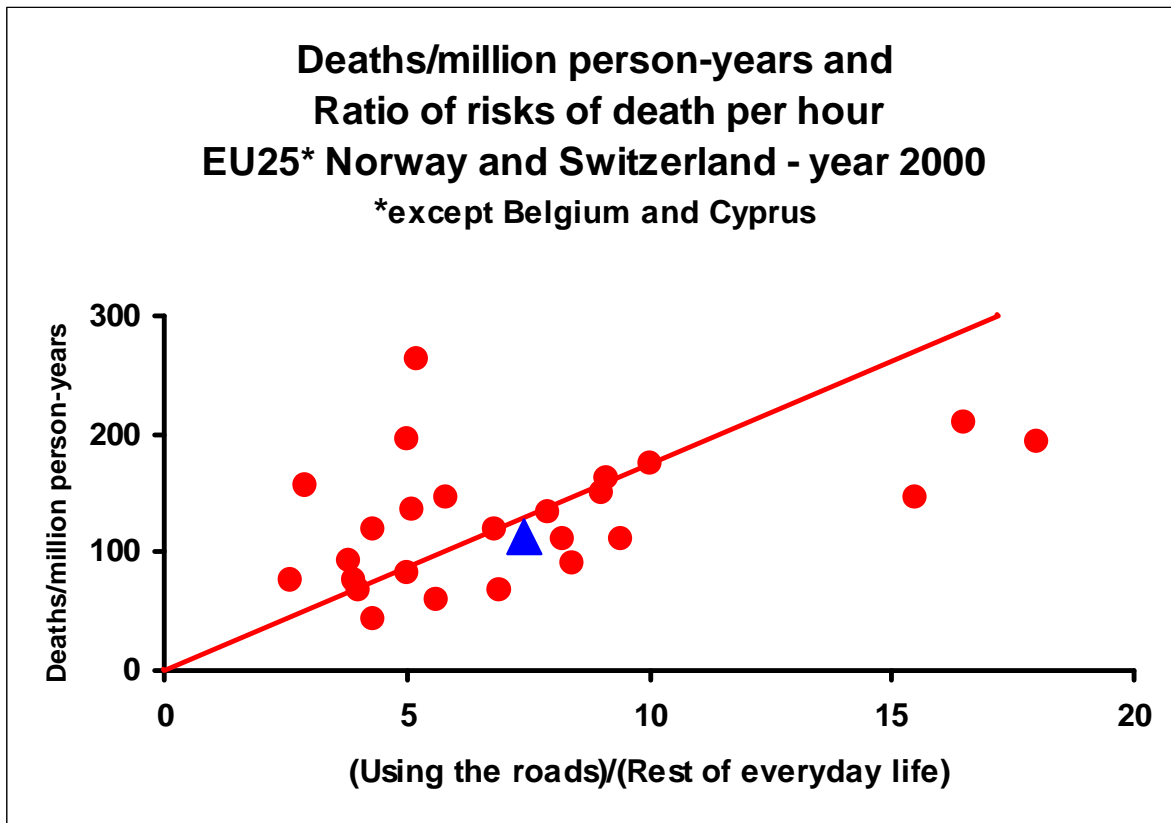
The ratio of the risk of death per hour spent using the roads to that in the rest of everyday life in 2000 is estimated roughly for each country by assuming that people spend on average one waking hour out of 16 using the roads. This implies that for each country

$$\begin{aligned} & (\text{Risk of death per hour using the roads}) / (\text{Risk of death per hour in other waking hours}) \sim \\ & 15 \times (\text{Deaths in 2000 in road traffic accidents}) / (\text{Other accidental deaths in 2000}) \end{aligned}$$

The resulting values range from about 3 to 18, and the value for the present EU of 25 states as a whole (omitting Belgium and Cyprus) is about 7.

The value of this ratio is taken as the abscissa in the following Figure, and the ordinate is the number of deaths in road traffic accidents per million person-years in the year 2000, i.e for each country:

(Deaths in 2000 in road traffic accidents) / (Mid-year 2000 population in millions)



The point marked as a triangle is for the present EU of 25 states (omitting Belgium and Cyprus). The three exceptional points in the upper left part of the diagram relate to small countries in similar particular circumstances. The otherwise strong correlation between this ratio of deaths per hour and the number of deaths on the roads per million person-years indicates that the variation between countries stems largely from variation in risk on the roads. Variation between countries in the risk of death per hour elsewhere in everyday life is smaller; points higher in the diagram than the regression line shown represent countries where the rest of everyday life is riskier, those below the line countries where the rest of everyday life is less risky.

This broad brush indicator could be refined in at least two ways: by distinguishing between different forms of use of the roads, and by excluding from the estimates for everyday life the deaths occurring to certain high-risk groups and the corresponding person-hours spent. The

differences revealed by the former are well known. For example, Evans (1997) quotes estimates for Great Britain in the early 1990s that, relative to the risk of death per hour when travelling by car, the risk when walking is 33 per cent higher, when cycling 300 per cent higher, and when motorcycling 1900 per cent higher, whilst the risk when travelling by bus is more than 99 per cent lower. For some purposes it is of course important to distinguish between these levels of risk, but in the context of comparing use of the roads and the rest of everyday life (in which there are also differences in risk between different activities) it seems appropriate to consider all kinds of road user together – just as road safety strategies seek to reduce death and injury to road users of all kinds. A further reason to do this is that almost everyone uses the roads as a pedestrian, the great majority do so in cars, and many use public transport or cycle at least occasionally. The one possible exception is motorcycling, for which the enormously higher risk is incurred by a well-defined minority of road users. Excluding deaths and person-hours spent in motorcycling from the estimation of risk of death per hour spent using the roads would certainly reduce the estimated risk for every country, and therefore also reduce the ratio of this risk to the risk in the rest of everyday life. But the reduction could not be greater in percentage terms than the percentage of those killed on the roads who are motorcyclists – typically between 10 and 20 per cent. Even with motorcycling excluded, therefore, the risk of death per hour spent using the roads is at least several times, and in some countries of the order of 10 times, that in the rest of everyday life.

Concerning deaths among particular high-risk groups in the rest of everyday life, the only exclusions likely to affect the indicator ratio substantially are of older people, say those over 75, who are subject to greatly increased risks of accidental death because of their frailty. For example, Evans (1997) has estimated for Great Britain in the period 1982-92 that the risk of death to people over 75 in their homes was about 210 per billion person-hours. This is comparable with the risk of death while using the roads in Great Britain in the early years of the 21st century, which is about 170 per billion person-hours. Similarly, Elvik (2005) has estimated the latter risk in Norway in 1998-2002 to be 176 per billion person-hours. For older people in the home and in leisure activities outside the home he has made the following estimates for Norway in the year 2000.

Estimated risks of death per billion person-hours to older people in Norway in the year 2000

Agegroup	In the home	In leisure activities elsewhere
67-79 years	66	192
80 years and older	461	598

Complete estimation of the effect of excluding the numbers of deaths and person-hours for people over 75 from the estimation of the ratio of risk in using the roads to the risk in the rest of everyday life requires more detailed data. But the main effect is upon the number of “other accidental deaths” in the denominator of the ratio. The author has deduced from Evans’ findings that this is over 3000 out of about 9000 for the United Kingdom (UK) and Elvik’s paper gives figures that imply about 800 out of about 1350 for Norway. The effect on the ratio is therefore likely to be to increase it by about 50 per cent for the UK and by at least 100 per cent for Norway. Similar calculations for other countries are also likely to lead to appreciably higher values of the ratio than those shown in the Figure.

Other possible exclusions, such as people in high-risk occupations, can have little effect on the ratio because of the small proportions of deaths and person-hours concerned. For example, Evans (1997) found only one employment group in Great Britain having a risk of death per hour at work comparable with that on the roads, namely extraction of ores at 123 deaths per billion person-hours. Similarly for Norway, Elvik (2005) estimated a rate of 147 deaths per billion person-hours for mining and quarrying. The only other groups for which even the upper 95 per cent confidence limit of his estimate was similar to the value on the roads were fisheries, production of minerals and production of rubber products. These four employment groups together accounted for only 23 accidental deaths at work in Norway in the years 2000-2003, or about 6 deaths per year. In any case, the effect of excluding such groups, and groups engaged in especially risky leisure activities, would be to reduce the denominator of the ratio by a greater proportion than it would reduce the factor of 15 in the numerator, thus increasing the estimated ratio slightly.

3 A consequent pragmatic vision for road safety

The comparison just investigated points to a pragmatic vision for road safety – that is

to reduce the risk of death per hour spent using the roads to the average risk of death while engaging in other everyday activities.

(Motorists’ Forum of the Commission for Integrated Transport UK 2003)

If this reduction could be achieved, the resulting balance in using the roads between satisfaction with life and desire for safety would no longer be exceptional, but would instead reflect the balance that has evolved in the rest of everyday life. Road safety would then call for only the same level of attention in policy as other aspects of public safety.

But the speeds attained by motor vehicles, their masses and the level of responsibility for safety carried by the millions of individual users of the roads make their use inherently riskier than most other everyday activities. Moreover, even a pragmatic vision may well envisage something rather better than it is really practicable to achieve. A realistic ultimate target might therefore be to reduce the risk per hour spent using the roads to no more than double the average for the rest of everyday life. This would require at the very least one more halving of the annual number of deaths on the roads in the EU25 after attainment of the current target of halving from the number in the year 2000.

4 Translating the vision into reality

These two halvings and more represent a formidable challenge to all of us who are concerned with road traffic, and especially with road safety. Practical steps towards meeting this challenge have been identified by several European countries in their national road safety strategies – for example the strategies for Austria (Ministry for Transport, Innovation and Technology Austria 2002) and Great Britain (Department of the Environment, Transport and the Regions UK 2000) – and at a more general level by the EU (European Commission 2003). Probably the most systematic approach to the problem is that of The Netherlands, where the principles of so-called *sustainable safety* (actually lasting safety) for reducing death and injury on the roads have been set out (Wegman and Elsenaar 1997)

These principles arise from recognition that road traffic accidents are failures of a system that consists of roads and their environment, vehicles and their equipment, and road users with their capabilities and limitations. The three principles are:

- infrastructure adapted to the limitations of the users;
- vehicles adapted to protect people and simplify driving; and
- road users properly educated, informed and deterred.

Measures to apply them in practice have been developed with the help of decades of research in engineering, psychology and statistics. As a result, the greatest obstacles to progress are no longer technical ones; they lie in a deepseated tolerance of existing levels of death and injury on the roads.

5 Overcoming tolerance of today's levels of death and injury

Quicker progress towards lasting safety requires tolerance among the public and among decision-makers of today's levels of death and injury on the roads to be confronted. In this context it is interesting to consider the current levels of tolerance in Europe of different kinds of harmful behaviour in public. The personal assessment of the author is that this tolerance

- of misuse of firearms is very low;
- of transmission of disease is also low;
- of crime against people and property is also in general low;
- of misuse of substances is variable over time and among substances; and
- of misuse of motor vehicles is, at least among substantial proportions of the population and not least among some commercial interests, high.

In addition, the practical possibilities for reducing cost-effectively the negative effects of misuse of vehicles are much clearer than, for example, in the case of substances like alcohol and drugs.

People and society therefore need to be persuaded

- actively to face up to the *scandal of tolerance* of today's levels of death and injury in road traffic accidents, and
- to regard postponement or rejection of socioeconomically effective safety measures as *giving away lives*.

In this way

- governments and road users could be persuaded to spend more on road safety;
- groups with power or influence could become readier to help in promoting road safety;
- people could become readier to accept more road safety measures; and
- more politicians could be ready actively to work in word and deed for road safety.

Bringing about changes like these may well require new kinds of research into road safety: research helped by our colleagues in the social and political sciences into the reasons why these changes have not already happened, and how people, groups, institutions and decision-makers can be influenced in order to bring them about.

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