



## Accident Trends by Road Type



**Royal Automobile Club Foundation**

**Motoring Towards 2050 – Roads and Reality  
Background Paper No.9**

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In December 2007 the RAC Foundation published its report on 'Roads and Reality' along with a supporting Technical Report. As part of this exercise a series of background papers was produced and these are to be published during the course of 2008/09. This is the ninth of the series.

The Royal Automobile Club Foundation for Motoring Limited is a charity established to promote the environment, economic, mobility and safety issues relating to the use of motor vehicles.

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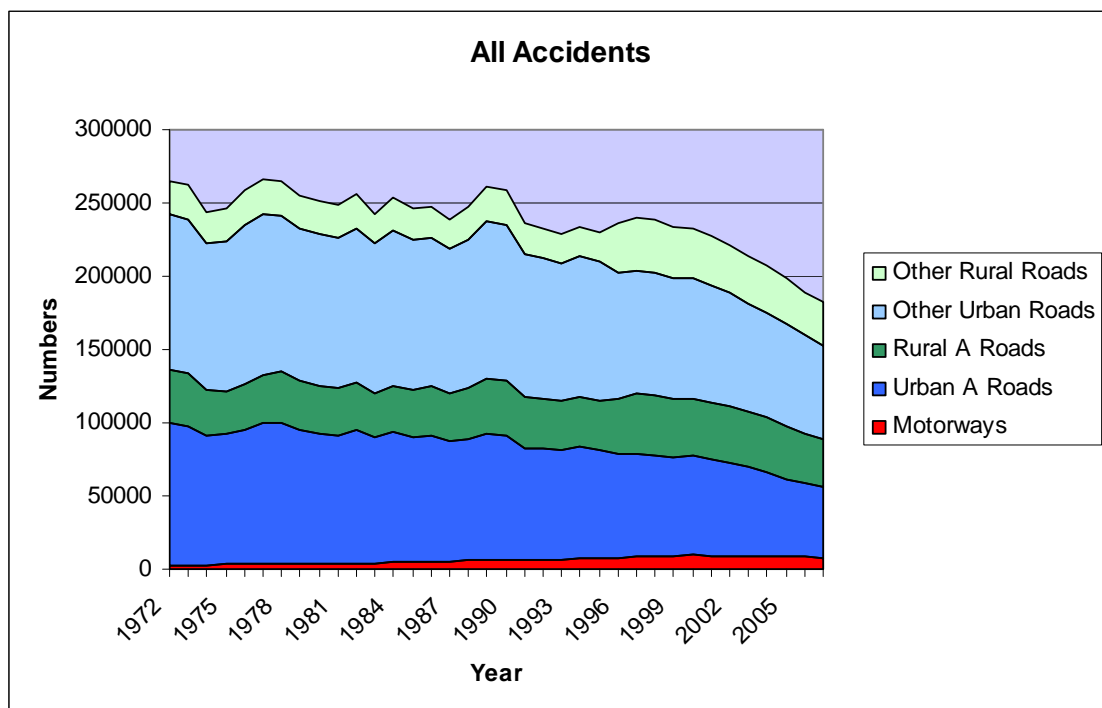
## Introduction

This note examines how road accidents of different severities have changes over the last thirty-five or so years in relation to the types of roads. It looks at trends in accident rates and how these have improved by type of road. Road traffic fatality rates are compared with those of other EU countries and an indicative estimate of the savings in fatal and serious accidents from Motorways is given.

## Total Numbers of Road Traffic Accidents

Not all traffic accidents are reported as many minor collisions are not reported to the police nor even claimed on insurance. How many of these there are, is not known for sure but they are more likely to take place where traffic speeds are low and in locations like car parks. As such they are more likely to be associated with B and unclassified roads than 'A' roads and Motorways. The published accident statistics do not distinguish between all purpose trunk roads and other 'A' roads so the information in this note covers five types of roads:

- Motorways (including A{M} roads)
- Urban 'A' roads
- Rural 'A' roads
- Other Urban Roads
- Other Rural Roads



**Figure 1: Total Number of Reported Road Accidents 1972 - 2007**

Sources: TSGBs 1972-1982, 1992, 2001 & 2008. Note the definitions of built up and non built up roads changes slightly from 1996 onwards and a few 'unclassified' fatalities are excluded.

The definition of urban and rural roads (formerly 'built up' and non 'built up') has been changed in the published accident statistics so there are discontinuities to be taken into account when looking at trends across 1995/996 break. This discontinuity is less significant for accident rates as both traffic volumes and accidents are switched and the roads reclassified should be mainly marginal to each of the relevant categories. These changes do not affect the figures for Motorways or 'all roads'. Figure 1 shows a reduction in fatalities from road accidents of over 60% between 1972 and 2007. This is the continuation of a trend starting in the mid 1960s when the peacetime high of almost eight thousand fatalities a year was reached in 1966<sup>1</sup>.

Since 1972 the number of all reported accidents has reduced from 266 thousand to 182 thousand (31%) despite an increase in road traffic of 130%<sup>2</sup>. This reduction has been on all types of road except Motorways. However Motorway traffic has grown more than six fold from 15.8bn vkms in 1972<sup>3</sup> to 100.6bn in 2007. Apart from this, the distribution of accidents between road types has changed between 1972 and 2007 as shown below with, in 2007(1972):

- 35% (40%) on other urban roads
- 26% (37%) on urban 'A' roads
- 18% (14%) on rural 'A' roads
- 16% (9%) on other rural roads and
- 4% (1%) on Motorways

The 1972 figures are shown in brackets. The main changes have been a reduction in the proportion of accidents on urban roads and an increase in the proportion on rural roads. Traffic management activity has been more intensive on urban roads so is probably a factor in their relative safety improvement. By the same token, improvements on 'other' roads have been relatively less than 'A' roads. These figures are not strictly like for like because of the reclassification referred to above but a like for like comparison between 1972 and 2001 gives a similar picture.

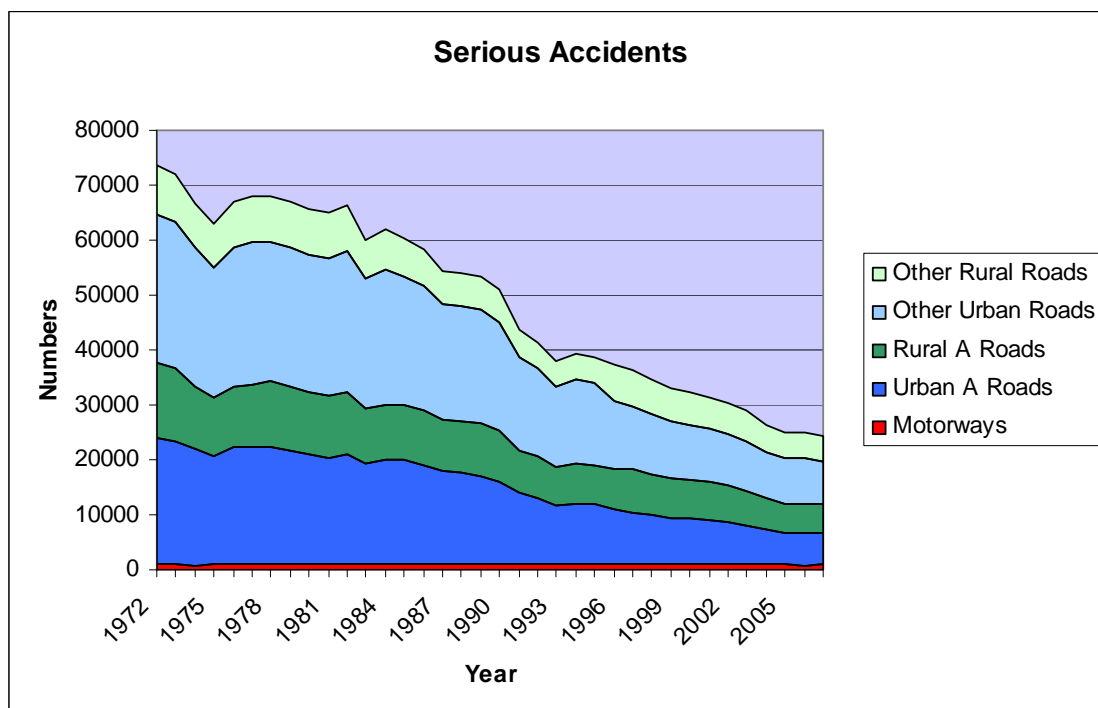
The changes in the numbers of serious accidents are shown in figure 2. Here the reduction has been more marked with a reduction of almost two thirds.

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<sup>1</sup> The Motor Car and Politics, appendix B.

<sup>2</sup> TSGB 2008 table 7.1

<sup>3</sup> TSGB 1964 - 1974, table 29.



**Figure 2: Number of Reported Serious Road Accidents 1972 - 2007**

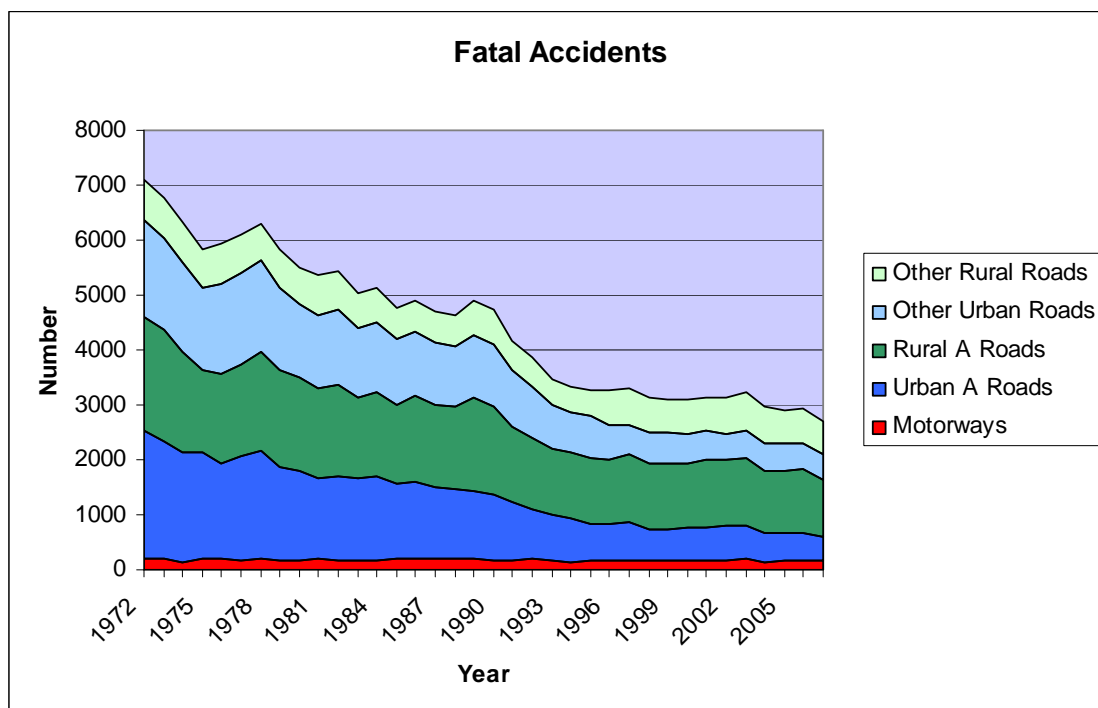
Sources: TSGBs 1972-1982, 1992, 2001 & 2008. Note the definitions of built up and non built up roads changes slightly from 1996 onwards and a few 'unclassified' fatalities are excluded.

The distribution between road types between 1972 and 2007 is also different as follows:

- 32% (37%) on other urban roads
- 24% (32%) on urban 'A' roads
- 21% (18%) on rural 'A' roads
- 19% (12%) on other rural roads and
- 3½% (1%) on Motorways

A higher proportion of serious accidents occur on rural roads – as is to be expected with higher speeds and the improvement in the relative safety of urban 'A' roads is to be seen here also. Again the Motorway share has increased although the absolute number of serious accidents on Motorways in 2007 was smaller than in 1972 (by 5%).

There are far fewer accidents involving fatalities than serious and minor accidents, but clearly they have much more damaging consequences. Again we see from figure 3 an absolute reduction in numbers (59%) but not quite as marked as for serious accidents.



**Figure 3: Number of Reported Fatal Road Accidents 1972 - 2007**

Sources: TSGBs 1972-1982, 1992, 2001, 2007 & 2008. Note the definitions of built up and non built up roads changes slightly from 1996 onwards and a few 'unclassified' fatalities are excluded.

The incidence of these by road type in 2007 and 1972 were as follows:

- 38% (29%) on rural 'A' roads
- 17% (33%) on urban 'A' roads
- 16½% (25%) on other urban roads
- 23% (10%) on other rural roads and
- 6% (3%) on Motorways

Rural 'A' roads top the league for fatal accidents and their share has significantly worsened since 1972 as has that of other rural roads. All types of urban roads have seen relative improvements in the numbers of fatal accidents and Motorways have again seen a relative worsening – largely as a result of their much higher traffic volumes.

Between 1972 and 2007 the number of people killed fell by 62%<sup>4</sup> but the mix of fatalities between different types of road user has changed as follows:

- Car, van, bus & lorry occupants 46% → 53%
- Pedestrians 40% → 22%
- Motorcyclists 9% → 20% and
- Cyclists 5% → 4½%.

<sup>4</sup> TSGB 2008 table 8.1.

The reduction of pedestrian fatalities is notable and improved pedestrian facilities, school road safety programmes and improved protection by traffic management will have been contributing factors. The increase in the proportion of motor cyclist fatalities is also noteworthy especially as motorcycle use grew less between 1972 and 2007 than road traffic generally<sup>5</sup>.

### Accident Rates

Figure 4 shows the relative accident rates by type of road in 2007. Clearly Motorways have the least risk of any kind of accident and urban 'A' roads the highest.

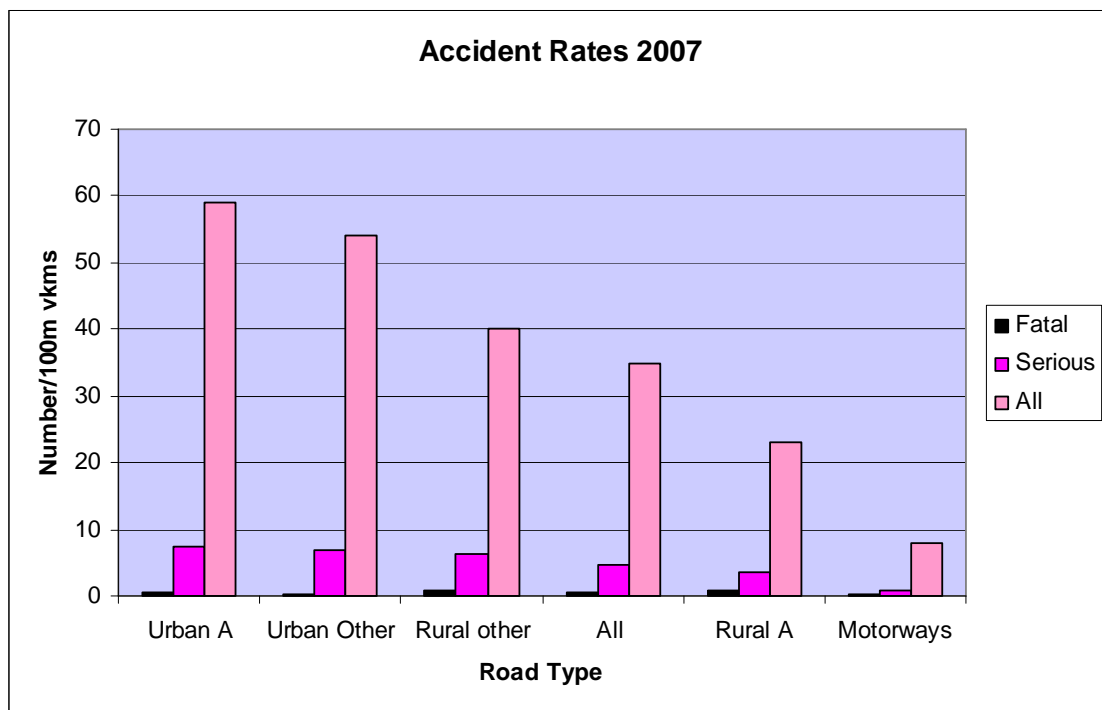


Figure 4: Relative Accident Rates by Type of Road 2005

Source: TSGB 2008, table 8.3.

TYPE OF ROAD	FATAL	SERIOUS	ALL
Motorways	1	1	1
Other urban roads	2.6	8.2	6.8
Urban 'A' roads	3.8	9.3	7.4
Rural 'A' roads	4.7	4.3	2.9
Other rural roads	5.8	7.7	5
All	3.5	5.7	4.4

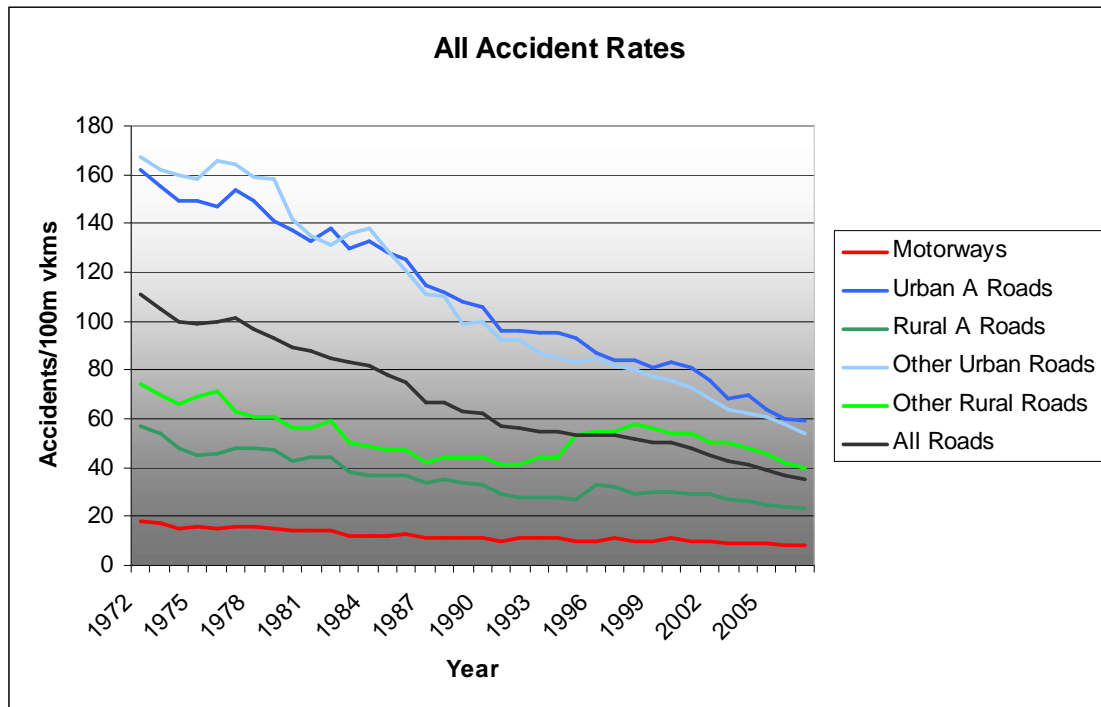
Table 1: Relative Accident Risk by Road Type 2007

Source: TSGB 2008, table 8.3.

<sup>5</sup> 51% compared with 131% (TSGB 2008, table 7.1).

The ratios of risks by severity and road type in 2007 are set out in table 1. For all accident severities Motorways have the lowest risk. However for fatalities – where speed is a major factor – the Motorway advantage is less. Rural roads have the highest fatality risk; and for non ‘A’ roads this is higher than ‘A’ roads. Serious accidents are most common on urban roads – doubtless reflecting the greater level of pedestrian activity and the same is true for ‘all accidents’.

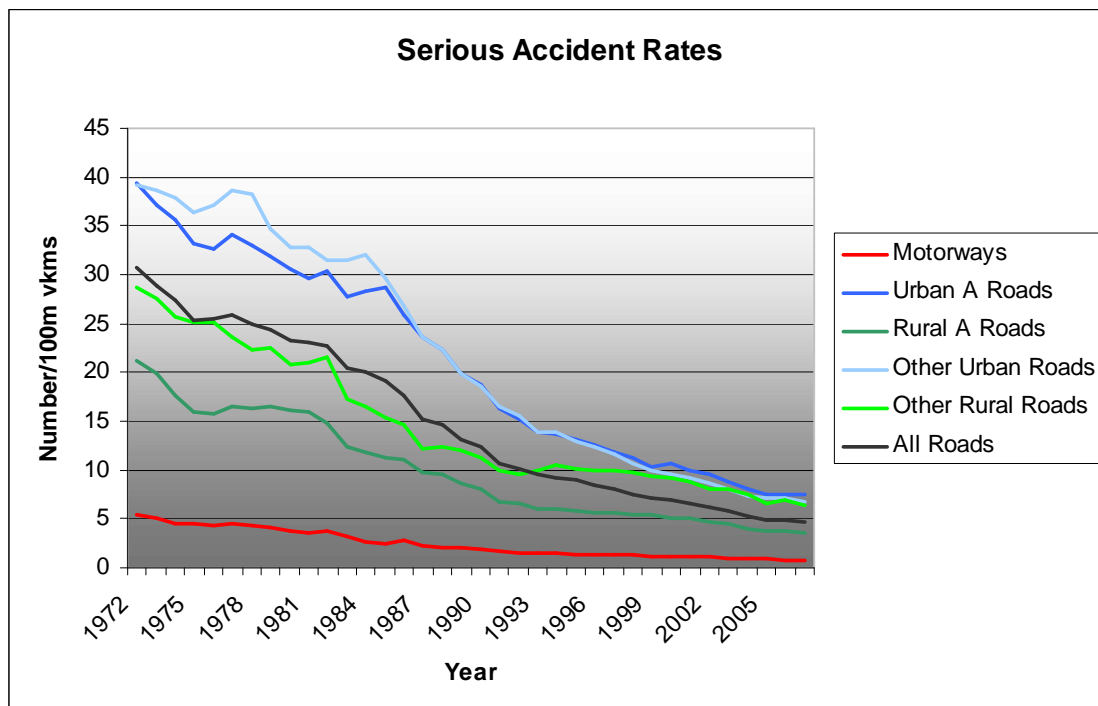
Road accident risk rates have declined markedly over the last thirty-five years as can be seen from figure 5 with overall rates falling by two thirds. This results from reductions in risk on each type of road and a change in the balance of traffic between different types of roads. In particular the much greater use of Motorways over this thirty five year period has contributed significantly to the improvements in overall accident rates.



**Figure 5: All Reported Road Accident Rate Trends – 1972 – 2007**

Sources: TSGBs 1972-1982, 1992, 2001, 2007 & 2008.





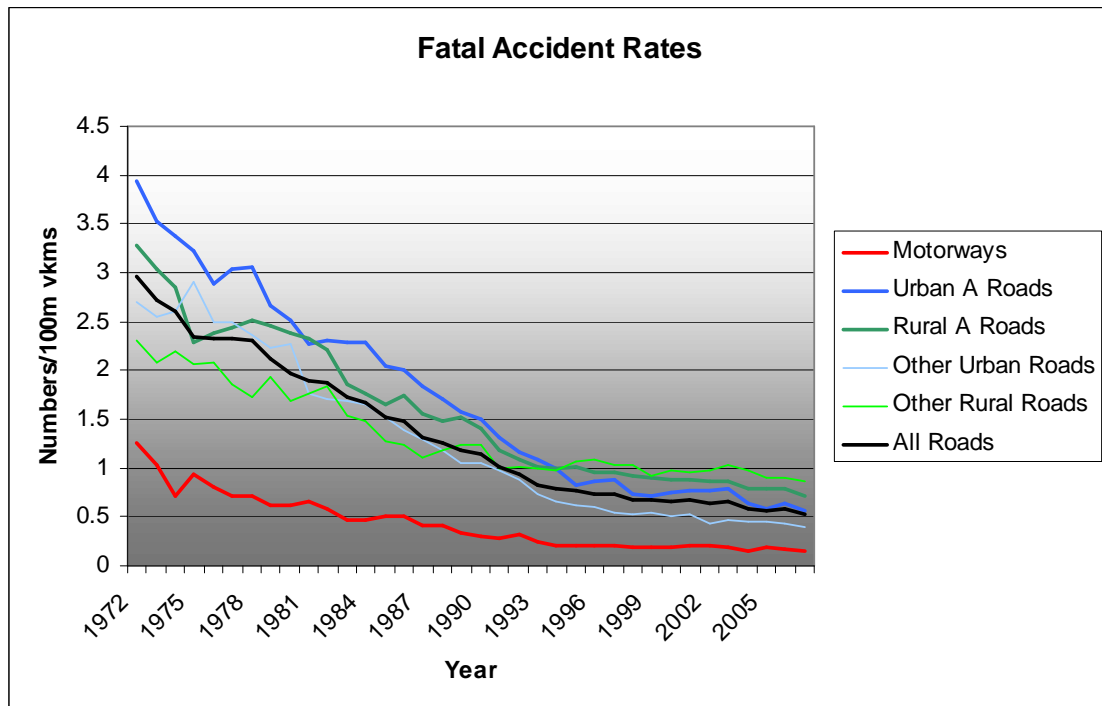
**Figure 6: Serious Accident Trend Rates by Road Type 1972 - 2007**

Sources: TSGBs 1972-1982, 1992, 2001, 2007 & 2008.

Serious accident rates (figure 6) have fallen much faster than this and are now only 15% of their 1972 level and the risk of a fatal accident (figure 7) has declined by over four fifths.

These trends go back beyond 1972. In 1938 the accident risk was 7½ time that in 2007 and the risk of a road fatality was fifteen times as great in relation to traffic flows<sup>6</sup>. The extent to which rates have improved is not uniform between types of road or severity of accident.

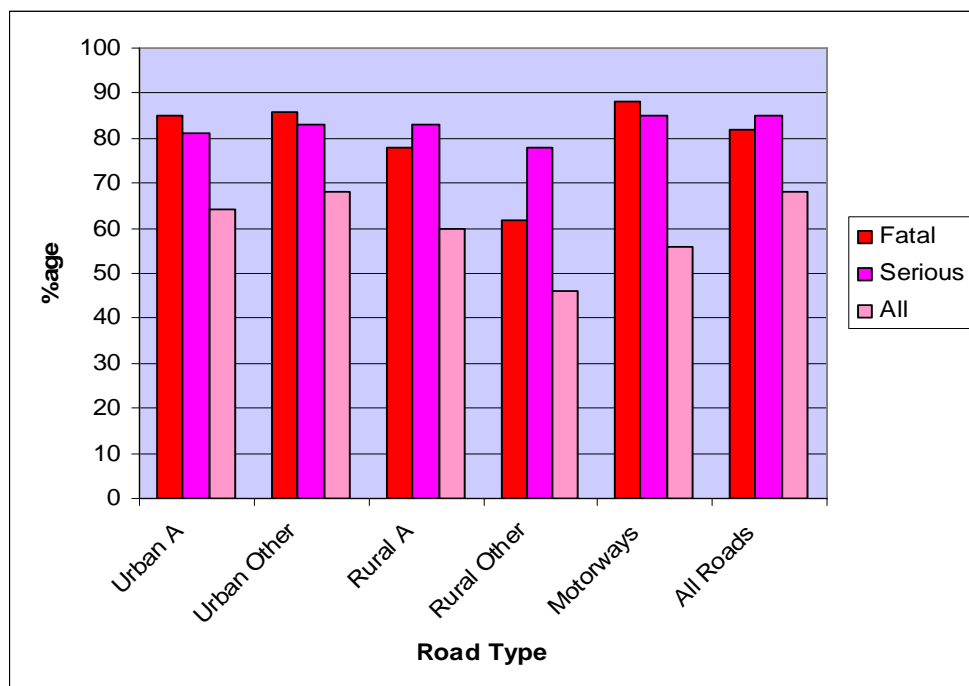
<sup>6</sup> TSGB 1992, tables 9.4 & 9.7.



**Figure 7: Fatal Accident Trend Rates by Road Type 1972 - 2007**

Sources: TSGBs 1972-1982, 1992, 2001, 2007 & 2008.

It is evident from figure 8 that severe and fatal accident rates have improved more than those for all types of accidents - except in the case of minor rural roads where fatality rates improvements have lagged behind those in accident rates as a whole. Perhaps surprisingly, the improvements in serious and fatal accident rates have been slightly greater on Motorways, than other types of roads, where they were the lowest to start with.



**Figure 8: Improvements in Reported Accident Rates 1972 – 2007**

Sources: TSGBs 1972-1982, 1992, 2001, 2007 & 2008.

### Future Prospects

Whilst accident rates have been improving the rate of improvement of fatal and serious accidents has been falling since the 1980s, as shown in table 2.

TYPE	1972-77	1977-82	1982-87	1987-92	1992-97	1997-02	2002-07
Fatal	22%	21%	29%	29%	22%	14%	16%
Serious	16%	12%	33%	34%	21%	23%	23%
All	9%	16%	21%	16%	5%	15%	22%

**Table 2: Accident Rate Improvements (all roads) by 5 Year Period, 1972 - 2007**

Sources: TSGBs 1972-1982, 1992, 2001, 2007 & 2008.

It is clear from table 2 that it was during the 1980s that most improvements in fatal and serious accidents rates were made. Between 1982 and 1992 traffic on Motorways more than doubled whilst traffic on other roads grew by only 37%<sup>7</sup>. This switch in the balance of traffic between safer Motorways and other roads must have been a significant factor in this improvement.

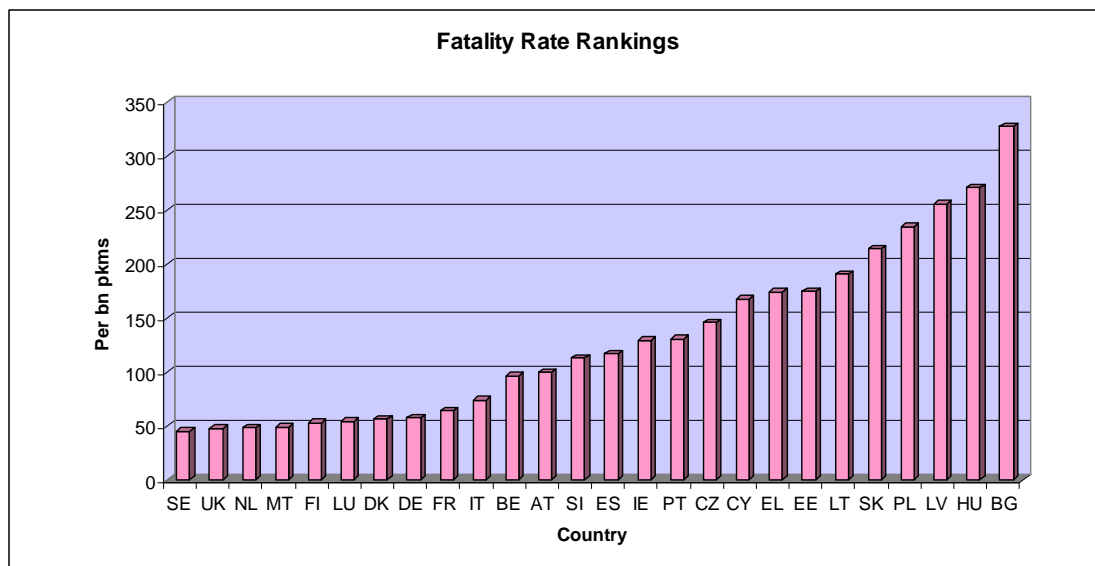
<sup>7</sup> TSGBs 1993, table 4.10.

Following the achievement of the 1987 target to reduce road casualties by one-third by 2000 compared with the average for 1981-85, in March 2000 the Government adopted a target of reducing road accidents which comprised: <sup>8</sup>:

- A 40% reduction in the number of people killed or seriously injured compared with the average for 1994-1998 – 2007 actual -36%.
- A 50% reduction in the number of children killed or seriously injured compared with the average for 1994-1998 – 2007 actual 56%.
- A 10% reduction in the slight casualty rate compared with the 1994 – 1998 baseline – 2007 actual -32%<sup>9</sup>.

Two of the three targets have been met. To meet the fatalities reduction target the rate would have to improve by about 2% a year between 2007 and 2010 which is less than has been achieved between 2002 and 2007.

How much further accident rates can be reduced is uncertain. There are continuing improvements in vehicle safety and traffic safety management. It also seems likely that fresh initiatives will be taken to target high risk groups such as young male drivers. On the other hand cycling is being encouraged and this has a fatality rate ten times that of road users as a whole; and motor cycle use, which has a fatality rate of over thirty times<sup>10</sup> that of all road users, has been growing of late<sup>11</sup>.



**Figure 9: EU Road Traffic Fatality Rate Rankings 2007.**

Source: *EU energy and transport in Figures Statistical Pocketbook 2008*, table 3.7.2.

<sup>8</sup> Tomorrows Roads Safer for Everyone, para. 1.4.

<sup>9</sup> Road Casualties Great Britain 2007, table 1a.

<sup>10</sup> Road Casualties Great Britain 2007, table 9.

<sup>11</sup> TSGB 2008, table 7.1 shows a 40% increase between 1997 and 2007.

Expansion of the Motorway system is now almost entirely confined to the widening of and more intensive management of traffic on existing routes. This will limit the extent to which traffic growth occurs on Motorways partly because they are becoming more congested and partly because the limited network is unsuitable for the many journeys poorly disposed to it.

Looking at road death rates across EU countries shows that Britain compares well with the other member states as can be seen from figure 9. Whilst this does not mean that there is little room for more progress to be made it does indicate that there is not the same scope for improvement that is to be found in the eastern European countries where motorisation has developed later than in the UK.

The estimates in tables 3 and 4 give an illustration of the beneficial effects of Motorways on the number of fatalities and serious injuries on Britain's roads. The 'without motorways' scenario assumes that main road traffic is suppressed by 11%<sup>12</sup> because of the higher levels of congestion that would prevail and, in both cases actual 2007 rates for each road type are used. On this basis around three hundred fatal accidents and around eighteen hundred and fifty serious accidents would be avoided.

SCENARIO	WITH MOTORWAYS		WITHOUT MOTORWAYS	
	Bn vkms/year	Fatal	Bn vkms/year	Fatal
Motorway	100.6	154	0	0
Rural A	143.5	1,025	200	1,429
Urban A	81.3	462	90	511
All main roads	325.4	1,641	290	1,940

Table 3: Comparison of With & Without Motorway Scenarios on 2007 Main Road Fatal Accident Totals

SCENARIO	WITH MOTORWAYS		WITHOUT MOTORWAYS	
	Bn vkms/year	Serious	Bn vkms/year	Serious
Motorway	100.6	835	0	0
Rural A	143.5	5,180	200	7,220
Urban A	81.3	6,073	90	6,723
All main roads	325.4	12,088	290	13,943

Table 4: Comparison of With & Without Motorway Scenarios on 2007 Main Road Serious Accident Totals

<sup>12</sup> Motorways comprise about 15% of the 160k or so lane kilometres of Britain's main roads.

## Conclusions

The numbers of road accidents have fallen substantially over the last thirty five years: 30% overall with serious and fatal accidents falling more by 67% and 62% respectively. Reductions have occurred on all types of roads except Motorways. Here, where traffic has increased more than six fold over this period, the numbers of fatal and serious accidents have actually fallen although the number of 'all types' of accidents has increased by two and three quarter times.

Accident *rates* have fallen even faster – by 68% overall, with fatal and serious accident rates falling by more than four fifths. The reduction in the number of road accidents has been caused by individual types of roads getting less dangerous and the balance of traffic moving towards safer types of road – especially Motorways; which were the safest type of road in the early 1970s and, as far as fatal and serious accidents are concerned, have improved the most since then (85% and 88% respectively).

Accident rates vary substantially between roads, with Motorways' rate being over 7 times lower than urban 'A' roads – where (all types of) accident frequencies are highest. For fatal accidents Motorways are  $4\frac{3}{4}$  times as safe as the Rural 'A' roads which are the usual alternative route and  $3\frac{1}{2}$  time as the road network as a whole. In respect of serious accidents Motorways are  $4\frac{1}{3}$  times as safe as the Rural 'A' roads which are the usual alternative route and  $5\frac{3}{4}$  time as all roads.

Future accident number will be determined by the share of traffic on the different road types and the improvement of safety levels on each of these. The government's 2000 targets for accident reduction by 2010 have already been met in respect of slight casualties and children killed or seriously injured; and are close to being met in respect of the reduction in the number of all people killed or seriously injured.

Whilst there is potential for further reductions in traffic accident rates how much this will yield is uncertain. Compared with other EU state road traffic fatality rates, the UK is amongst the best and future improvements will require continuing efforts in vehicle design, driver training, highway engineering and traffic management and enforcement.

With present policies the significant contribution to improving road safety that Motorways have brought in the past are unlikely to be as great in the future. It is estimated that Motorways could be saving about three hundred fatal accidents and around eighteen hundred and fifty serious accidents a year.

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