

**Road Safety Research Report No. 50**

**Children's Traffic Safety:  
International Lessons for the UK**

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## SUMMARY

*Children's Traffic Safety: International Lessons for the UK* attempts to identify good practice and innovation from other countries that could improve the traffic safety of children in the UK. The key findings suggest that the UK has adopted good practice in a number of areas but that current practice needs strengthening. A more widespread approach to modifying the environment is required in the UK to improve the safety of children as pedestrians or bicyclists, and barriers to implementation need to be overcome. Clearer guidelines are needed for implementing low speed limits near schools and in identifying these areas as enforcement zones. In the UK there is a steep social gradient in child pedestrian fatalities and at present there is no routine monitoring of the socio-economic status of all road traffic casualties. This data is needed to assess whether inequality targets are being met. In terms of national profile, the UK does not compare favourably with most other Organisation for Economic Co-operation and Development (OECD) countries in terms of income distribution, relative child poverty and the number of children living in one parent families in which the burden of poverty is high. Tackling the causes and effects of these inequalities on safety must continue to be a priority. A greater understanding is needed of how some countries achieve high levels of safety behaviour (such as wearing seat belts or bicycle helmets) compared to others so that these strategies could be used in the UK. More research is required to understand why safety behaviour is not as good among older children compared to younger children. More consideration should be given to the introduction of legislation on driver responsibility for pedestrian accidents. There could be more national support for promoting safe and sustainable travel to school by linking these themes with explicit and clear curriculum topics and by making safe travel to school an aspect of the school inspection process. In terms of monitoring policy, exposure-based targets could be derived for children for different age, gender and road-user groups. This seems especially important given the UK has policy targets for increasing the amount of walking and bicycling by children. In addition, targets could be set for secondary safety behaviour, such as seat belt or bicycle helmet wearing. There are many examples of innovative advocacy and action research approaches involving children that could be readily transferred to the UK. More information about these approaches would be useful.

# 1. INTRODUCTION

In 2002 the UK Department for Transport (DfT) commissioned the project Children's Road Traffic Safety: An International Survey of Policy and Practice (Christie *et al.* 2004) to complement the report from the OECD's Child Traffic Safety Expert Group.

The aim of the survey was to provide basic high-level data, on a consistent basis, from OECD member countries<sup>1</sup> that identifies and accounts for current patterns of child road safety as pedestrians, vehicle occupants or bicyclists, and that identifies current best practices and countermeasures in place to improve child road safety. There were three key survey elements: an analysis of International Road Traffic and Accident Data (IRTAD) fatality data, an analysis of the relationship between socio-economic and demographic indicators and fatality rates, and a questionnaire-based survey.

This report addresses the lessons to be learned for the UK from this survey of international policy and practice, and covers:

- the background and coverage of the international survey to provide a context for this report, and to understand what distinguished the best performers from the rest;
- how UK fatality rates compare with other countries;
- the relationship between the socio-economic and demographic profile of the UK and children's traffic safety and the implications for policy;
- ways in which the UK is similar or different from the top performers with respect to environment, education, training and publicity, legislation and policy;
- innovative approaches that could be implemented in the UK; and
- the changes in policy needed to become more like the top performers.

1 The 30 nations of the OECD are:

Australia	Hungary	Poland
Austria	Iceland	Portugal
Belgium	Ireland	South Korea
Canada	Italy	Slovak Republic
Czech Republic	Japan	Spain
Denmark	Luxembourg	Sweden
Finland	Mexico	Switzerland
France	The Netherlands	Turkey
Germany	New Zealand	United Kingdom
Greece	Norway	United States of America

## 2. THE INTERNATIONAL REPORT

The international report included analyses of average fatality rates for each country (that contributes to IRTAD) for all road traffic fatalities, and separately for child pedestrians, bicyclists and vehicle occupants.

The main report also attempted to assess the differences in countries in relation to national development indicators. This information was used to look at the correlation between factors such as national wealth and social structure and fatality rates. These indicators were derived from a number of different sources (OECD, UN, CIA). These factors were included because levels of deprivation, urbanisation and population density have been associated with high levels of traffic accident risk in some countries (as explored by Christie 1995a,b; Harland *et al.* 1996).

The questionnaire survey was conducted among high-level officials from national government transport and public road administrations in each OECD country. Full or partial responses were received from 21 of the 30 OECD countries,<sup>2</sup> representing a response rate of 70%. The survey was comprised of a series of five questionnaires entitled:

- Children as pedestrians;
- Children as bicyclists;
- Children as vehicle occupants;
- Children's travel; and
- Policy on child traffic safety.

The questionnaires on pedestrians, bicyclists and vehicle occupants were comprised of sections seeking information on fatality data, those most at risk and intervention approaches encompassing the environment, education, training, publicity and legislation. A key aspect of the analysis was to provide an overview of the extent and range of intervention measures within each country at a municipal or local authority level. Each country also had an opportunity to cite current initiatives and research projects or programmes. The policy questionnaire sought information on strategic approaches to safety, including implementation plans and the agencies involved in the delivery of those plans. The travel questionnaire sought information on children's mobility by mode and by age in terms of distance travelled and number of journeys.

2 The countries that responded to the survey were:

Australia, Canada, Czech Republic, Denmark, France, Finland, Germany, Hungary, Iceland, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, South Korea, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States of America.

The travel questionnaire provided some comparable exposure data for some countries for children aged between 10–14. This data was used to derive fatality rates per unit of exposure. This analysis was extremely important and showed that whilst league tables based on fatality rates per head of population are not entirely misleading for pedestrians and vehicle occupants, they are inappropriate for bicycling as discussed below.

## 2.1. Methodological issues

A particular strength of this study is that it has included exposure data. This has been based on the questionnaire sent to key informants on children's travel. The travel survey yielded both quantitative and qualitative data on exposure, with the latter including information on the degree of accompaniment of children. The need for information on exposure was identified 20 years ago by the OECD report *Traffic Safety of Children* (OECD 1983). Information on the amount of walking, bicycling and travelling in cars that occurs in different age groups of children is essential before we can really understand whether countries can be classified as relatively 'safe' or 'unsafe'. This is particularly important in relation to bicycling where there is a very great range in bicycling activity between different countries. When exposure is included, the countries which can be classified as relatively 'safe' or 'unsafe' are very different from league tables based on injury fatality rates. Countries with low levels of bicycling emerge as relatively unsafe for bicyclists.

This study, however, reveals how difficult it is to incorporate exposure data. Although many countries do collect children's travel data, it is often not produced in a standardised form that facilitates international comparisons.

The questionnaire survey to key respondents was completed wholly or partially by 21 countries, representing a response rate of 70%. The absence of the contribution from 9 countries may have influenced the comparison of countries. However, the countries that did participate were able to provide a good range of the best, moderate and less good performers. The questionnaire survey to key informants in the OECD countries provides a snapshot of current policy and practices, but it has not been able to capture how policies have evolved within different countries. Future research could attempt to do this for specific countries. Macro-level policies cannot normally be subjected to controlled experiments, and tools and methodologies to study these are underdeveloped. The survey of policies and practices was much easier to accomplish in smaller unitary countries than in larger federal ones. For the United States, in particular, with the enormous variations between states in legislation and programmes, this was a very difficult task.

Furthermore, the survey tools did not tap into cultural differences in attitudes to safety. Some countries may have a greater compliance with legislation or a greater willingness to adopt protective behaviours, such as wearing a seat belt or a bicycle helmet. There is some evidence of the differences in attitudes among drivers in



European countries which may impact on the road safety of vulnerable users (e.g. the Social Attitudes to Road Traffic Risk in Europe project, see <http://sartre.inrets.fr/>). In addition, research comparing the pedestrian behaviour of children in Great Britain, the Netherlands and France showed that young British children were more likely to be accompanied by their peers when walking, whereas children in France were more likely to be accompanied by an adult (Bly *et al.* 1999). The area of cultural attitudes to safety warrants further investigation.

The survey also focuses on primary and secondary safety. Primary safety is concerned with the prevention of accidents and secondary safety is concerned with the use of protective strategies, that are devised to limit injuries once an accident has occurred such as wearing a seat belt or bicycle helmet. The study does not look at tertiary safety, that is practice and policy directed at the consequences of injury, such as the organisation of emergency services, medical treatment and rehabilitation services that deal with road traffic casualties. Whilst tertiary safety is not concerned with the road safety of a country, it may well influence the fatality rates that have formed the basis of the comparison between countries. There may be real differences between countries in tertiary safety, which means that some children are more likely to die or survive once an accident has occurred.

## 2.2. What distinguished the best from the rest?

Statistical analyses were not appropriate for the relatively small number of countries that participated in the survey. Instead, a group of top performers were defined as being the five countries that had the lowest fatality rates overall, and for each mode. The characteristics of these top performers were compared to the rest of the countries.

This assessment identified characteristics that distinguished top performing countries who responded to the survey in the child road-safety league and those lower down the league table.

In relation to children as *pedestrians*, the top performers were Sweden, the Netherlands, Finland, Germany and Denmark. In contrast to the other countries, the majority of these countries report that they:

- have speed reduction measures (including environmental modification and low speed limits) and signalised crossings in *most* local authorities or municipalities;
- have these measures outside *many* schools;
- have outside play areas, such as parks or playgrounds, in *most* residential areas;
- conduct national publicity campaigns once a year or more, aimed at child pedestrian safety; and

- have legislation that assumes driver responsibility for accidents involving child pedestrians in residential areas.

The characteristics shared by both the top performers and the majority of other countries were also identified in the survey.

In relation to children as *pedestrians*, top performers and the majority of other countries:

- promote pedestrian education and training initiatives nationally or in most states;
- have compulsory road-safety education; and
- conduct regional publicity aimed at child pedestrian safety.

In relation to children as *bicyclists*, our conclusions about top performers are limited, for reasons given earlier in the discussion related to exposure to bicycling. However, the majority of countries do the following:

- have bicycle lanes separate from traffic in most or many areas;
- promote bicycling education and training initiatives nationally or in most or some states; and
- conduct national and regional publicity aimed at child bicycling safety.

In relation to children as *vehicle occupants*, the top performers were Switzerland, the United Kingdom, the Netherlands, Sweden and Norway. In contrast to the other countries, the majority of these countries report that they:

- achieve high seat-belt wearing rates (around 90% or higher) in the front or rear of private vehicles;
- have identified the high-risk groups; and
- have compulsory seat-belt wearing on school buses.

In relation to children as *vehicle occupants*, the top performers and the majority of other countries:

- promote vehicle occupant education and training initiatives nationally or in most states; and
- that conduct national publicity aimed at child vehicle occupant safety have seat-belt legislation.

Comparing overall fatality rates in relation to *children's travel*, the overall top performers were Sweden, the United Kingdom, Norway, the Netherlands and Germany. In contrast to the other countries, the majority of these countries report that:

- many children aged 6–9 are accompanied by adults whilst travelling.

In relation to *children's travel*, the top performers and the majority of other countries report that:

- most children aged 0–5 are accompanied by adults whilst travelling.

Comparing overall fatality rates in relation to *policy* on children's traffic safety, the top performers were Sweden, the United Kingdom, Norway, the Netherlands and Germany. In contrast to the other countries, the majority of these countries report that they:

- have advisory environmental planning guidance for the safety, security and freedom of movement of children.

In relation to *policy* on children's traffic safety, the top performers and the majority of other countries:

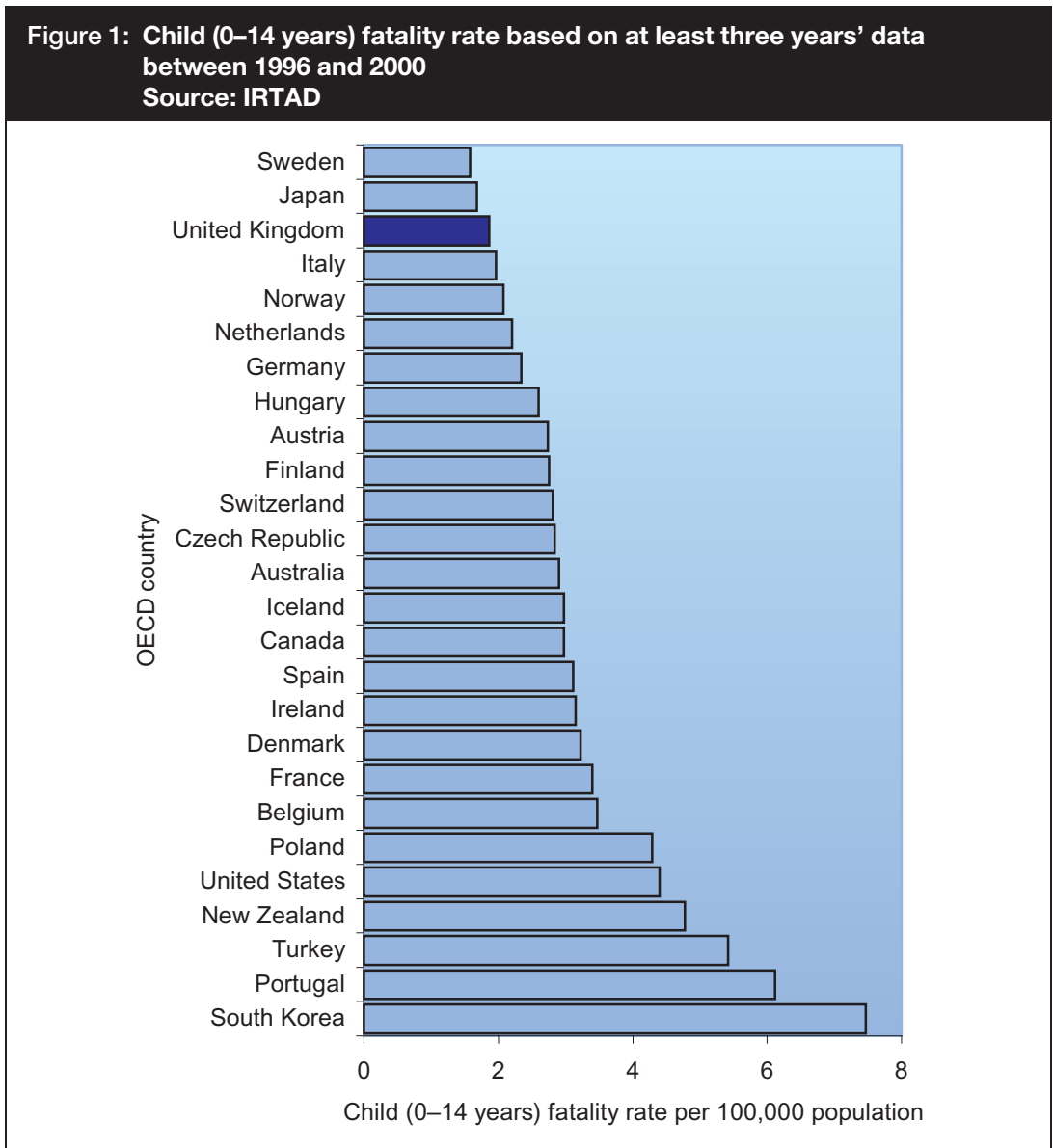
- implement children's traffic safety through a number of agencies, including the police, schools, local authorities and voluntary agencies; and
- have implementation plans that include measures related to low speed limits, publicity aimed at drivers and safety equipment.

### **2.3. How do UK fatality rates compare with other countries?**

The road safety of the UK in relation to other OECD countries was compared in two ways. First, population-based rates were used to construct a safety performance league table by overall fatality rate and mode. Secondly, exposure-based fatality rates were constructed for those countries that could supply information on the levels of walking, bicycling and vehicle occupancy among children.

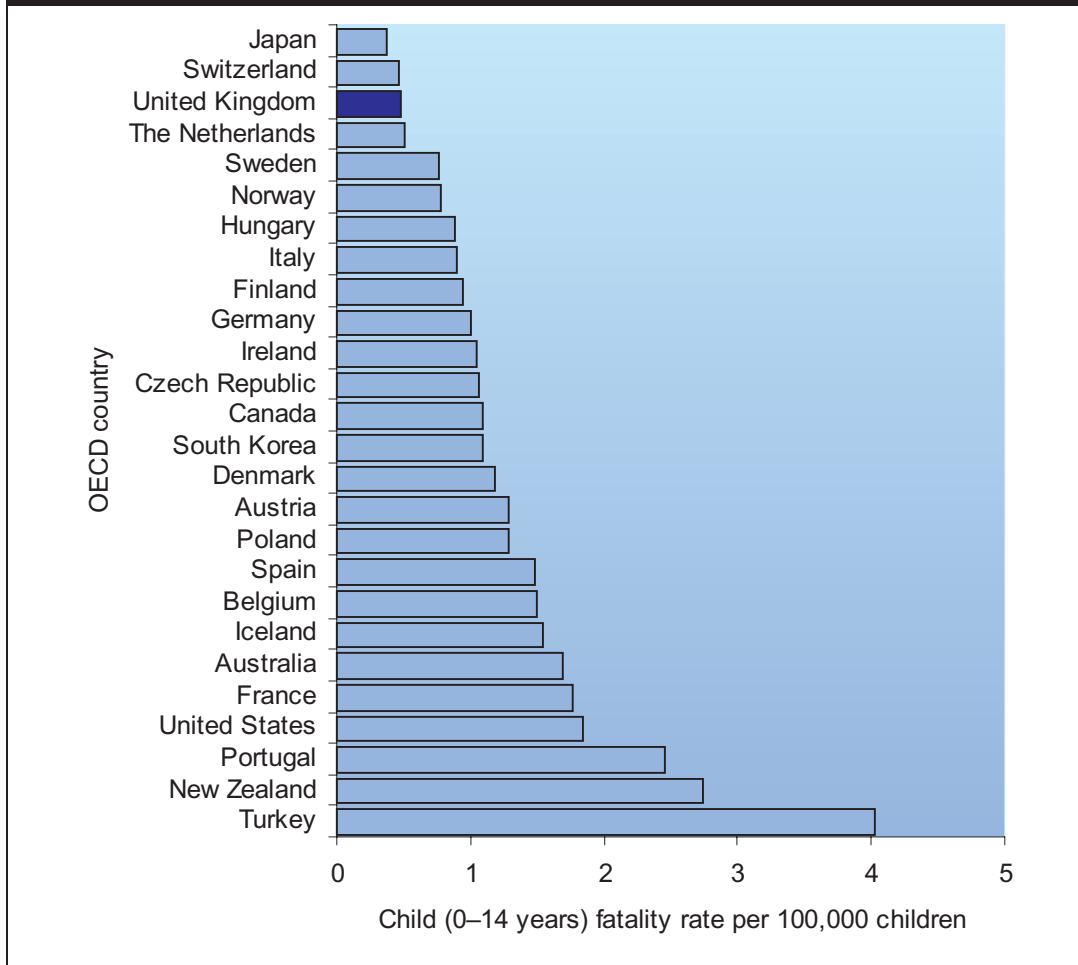
For population-based rates, out of the 26 countries that contribute data to IRTAD,<sup>3</sup> the UK appears to perform well and is third overall (see Figure 1). However, this rating is strongly influenced by the very good performance of the UK in the area of children as vehicle occupants (see Figure 2) and disguises the poor performance for pedestrians, where the ranking is seventeenth (see Figure 3).

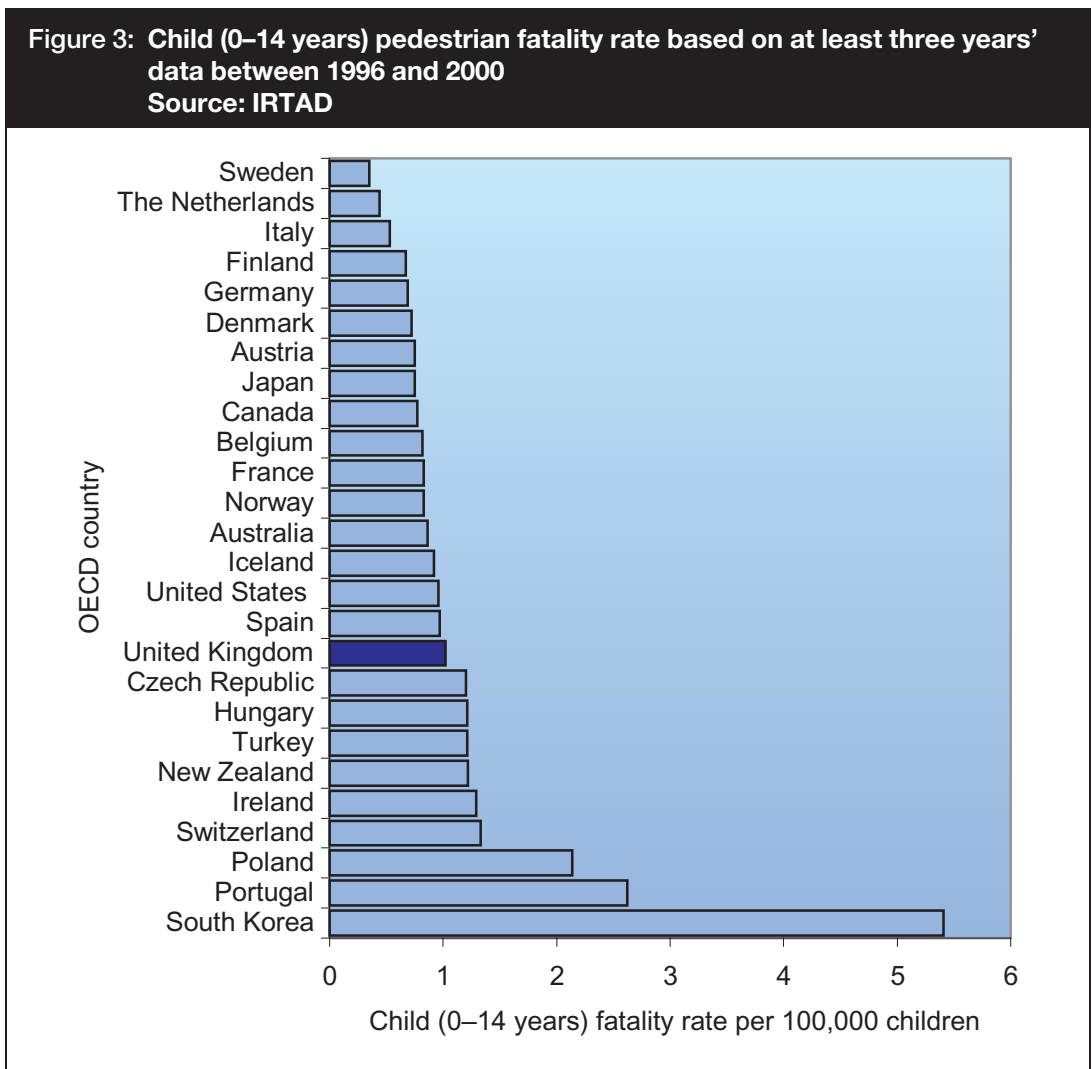
3 The fatality rates are based on all available data for 1996–2000, meaning that fatality rates were based on at least three years of data between 1996–2000, with the exception of Turkey where the rate is based on data for 2000 only.



For bicycling, the league tables are misleading and therefore it is difficult to make statements about safety. It was not considered appropriate to develop a grouping of best performers for bicyclists because safety is usually dependent on exposure and the levels of exposure differ greatly between different countries.

**Figure 2: Child (0–14 years) car passenger fatality rate based on at least three years' data between 1996 and 2000**  
Source: IRTAD

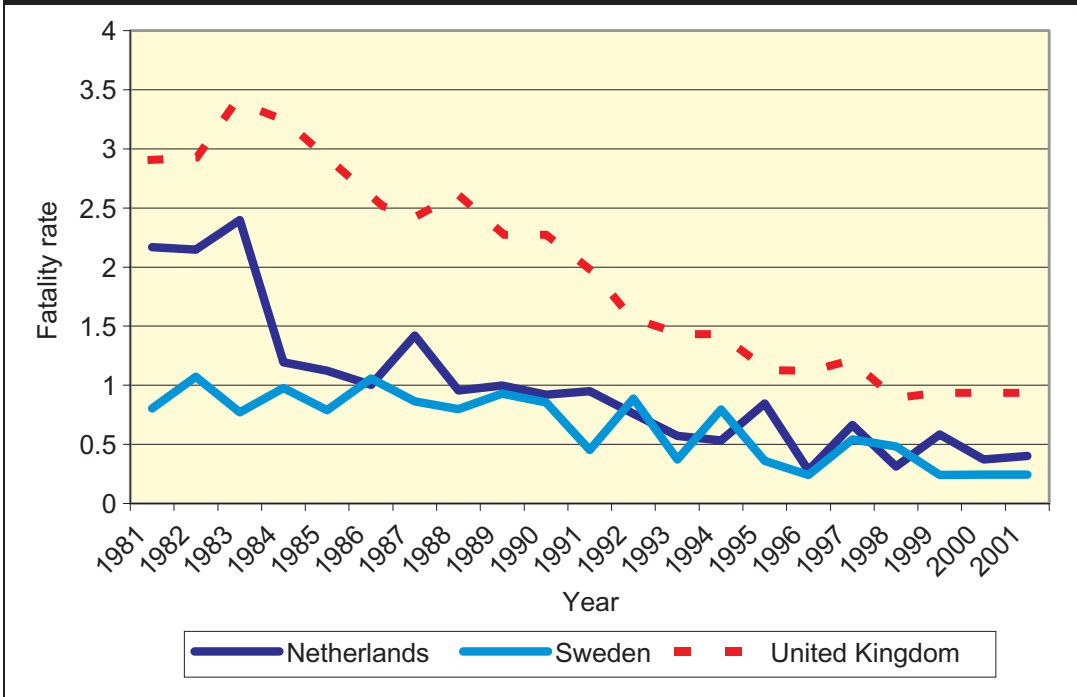




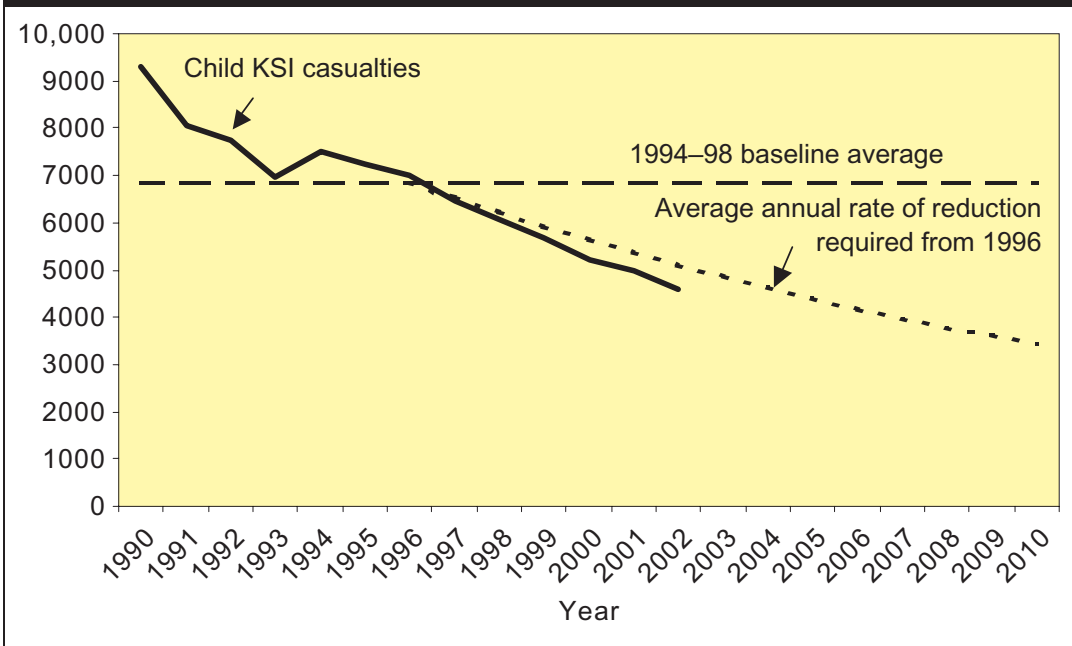
## 2.4. Trends in child road traffic fatalities

The IRTAD data also provided trend information to explore the changes in rates over time. Figure 4 shows the trends in child pedestrian fatalities for the UK and the top performers, Sweden and the Netherlands. Looking at the trend data, it can be seen that pedestrian fatalities are decreasing over time for all countries and the difference between the UK and the top performing countries is narrowing. Great Britain has been very successful in making progress towards its targets to reduce the proportion of children killed and seriously injured in road traffic accidents by 50% in 2010. Figure 5 shows casualty reduction progress against the 2010 target and that if the rate of progress continues, the targets are likely to be exceeded. However, there is still a gap between the UK and countries such as Sweden and the Netherlands, and more needs to be achieved to match their relatively low fatality rates for child pedestrians.

**Figure 4: Trends in child (0–14) pedestrian fatality rate per 100,000 child population: UK compared to top performers (survey respondents)**



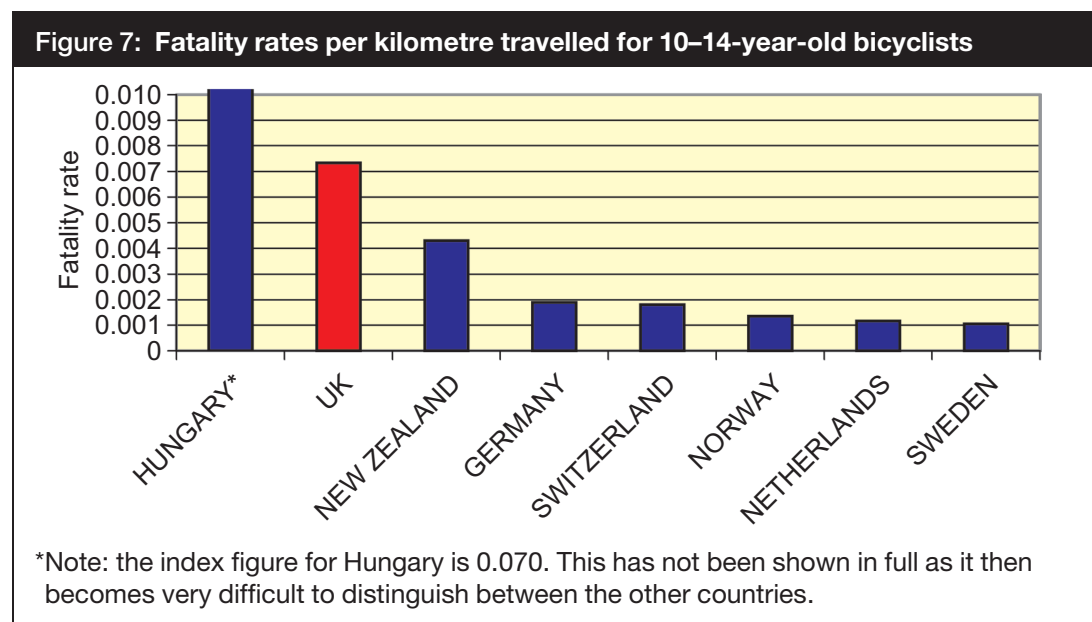
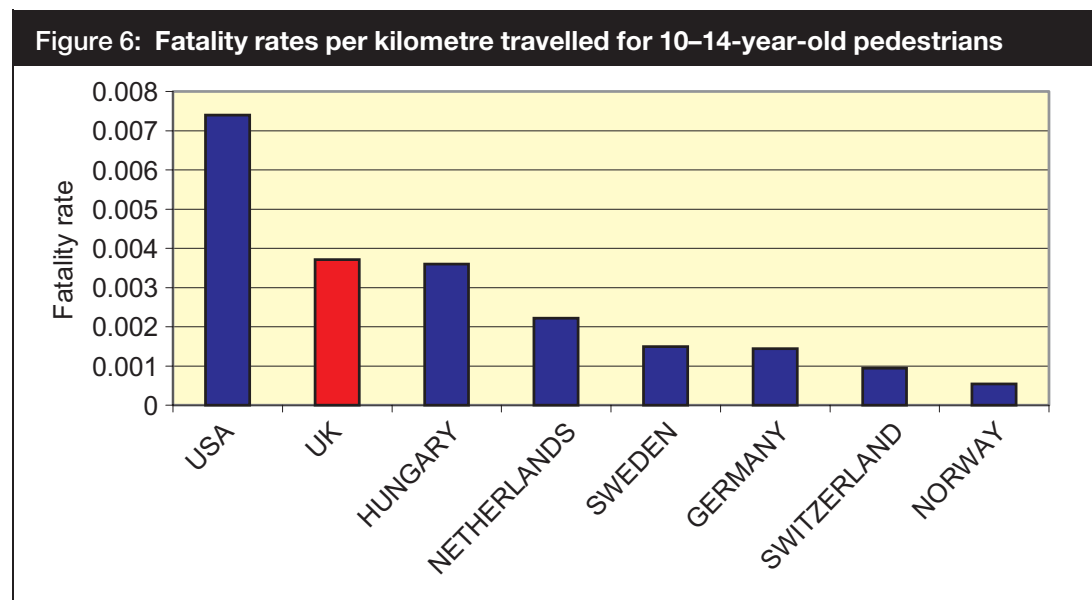
**Figure 5: Children killed or seriously injured (KSI), 1990–2002: progress against target from baseline midpoint**



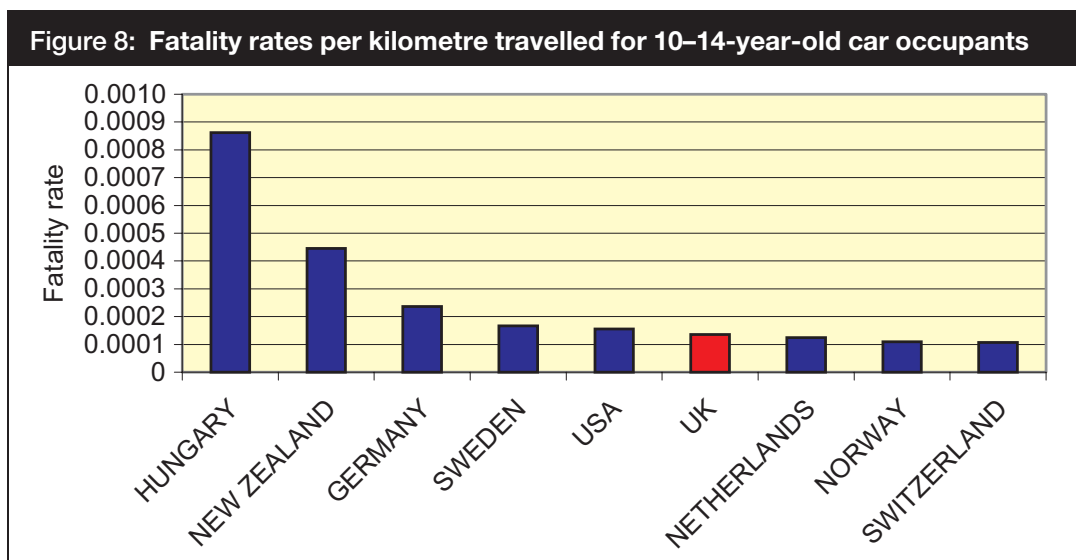
## 2.5. Exposure-based fatality rates

### 2.5.1. Comparing the UK with other countries

Exposure-based fatality rates could only be derived for data common to a number of countries. Comparable travel data could only be derived for 10–14-year-old children for the following countries: Germany, Hungary, the Netherlands, New Zealand, Norway, Sweden, Switzerland, the UK and the USA. These show that whilst the fatality rate per 100,000 km travelled is relatively low for child vehicle occupants, the UK still performs poorly for child pedestrians and bicyclists (see Figures 6–8). A similar picture is seen for fatality rates per trip.







## 2.6. UK trends in casualty reduction, exposure and exposure-based fatality rates

In interpreting the downward trend in population-based fatality rates, there is an issue of whether or not this reflects changes in exposure and whether the downward trend is a result of fewer children walking or bicycling. In order to examine this issue, national travel data was used to derive exposure-based fatality rates.<sup>4</sup> These trends are shown separately next to population-based rates and exposure levels for children of different ages travelling by different modes.

### 2.6.1. Child pedestrians

Trends are shown for child pedestrian deaths, child pedestrian kilometres travelled and child pedestrian fatality rates per unit of exposure. These trends are shown for 0–5, 6–9 and 10–14 year groups and all ages between 0–14 (see Figures 9–12). The trends show that for all age groups the number of fatalities per population and unit of exposure are decreasing, suggesting that walking has become safer. For all age groups the amount of walking has decreased but appears to be stabilising.

<sup>4</sup> National travel data was not collected between 1985/86 and 1989/91.

Figure 9: 0-5-year-old UK pedestrians

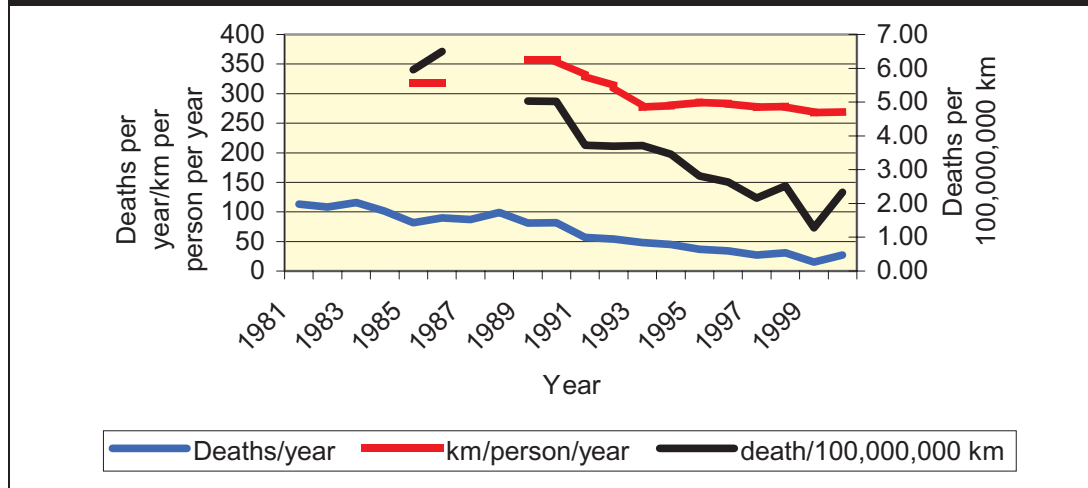


Figure 10: 6-9-year-old UK pedestrians

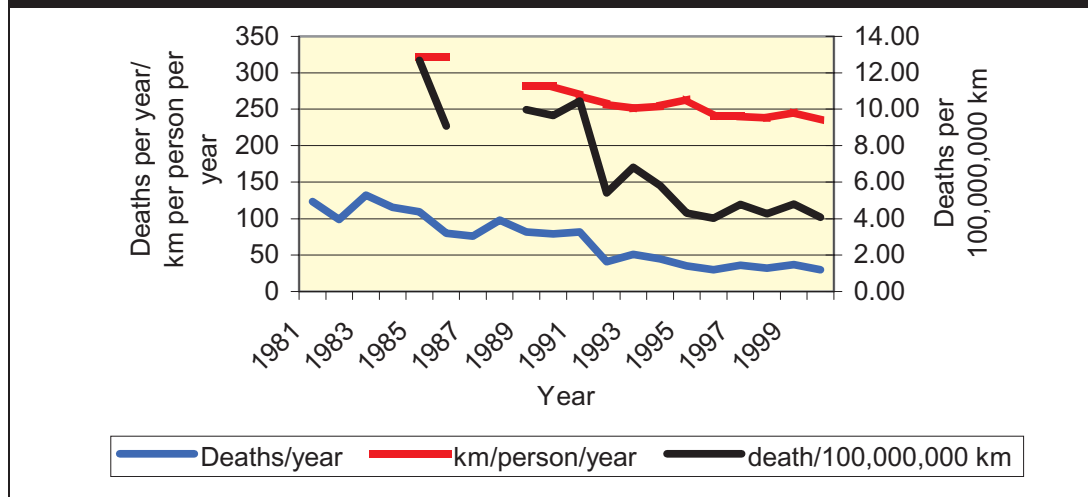
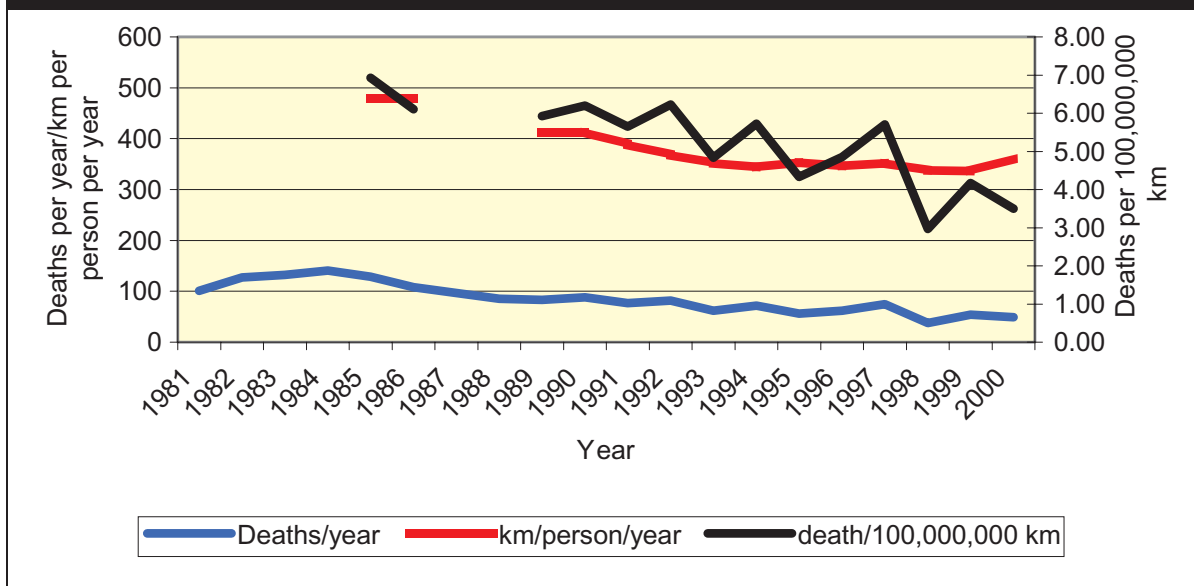
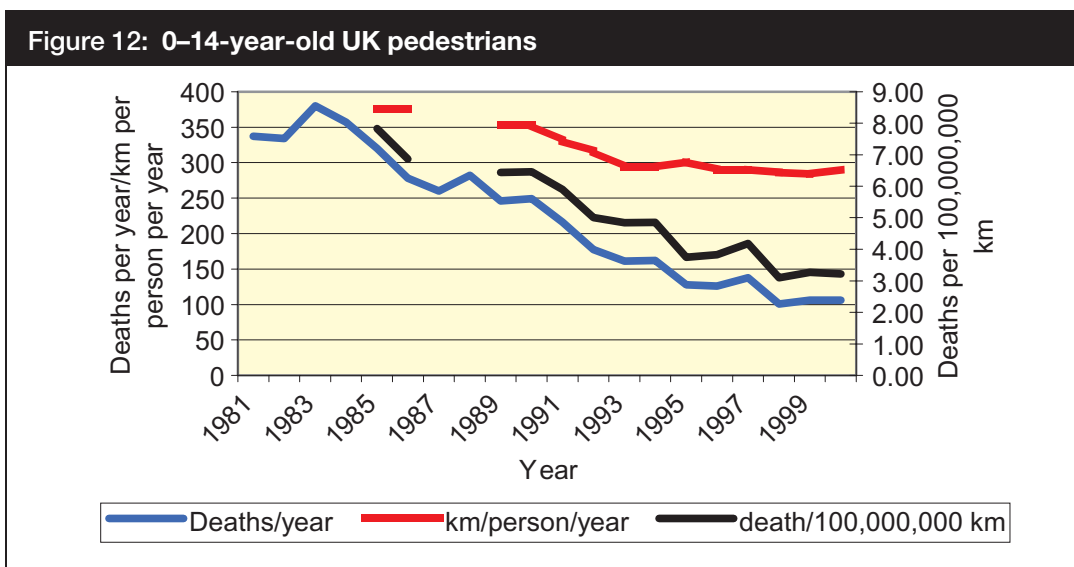


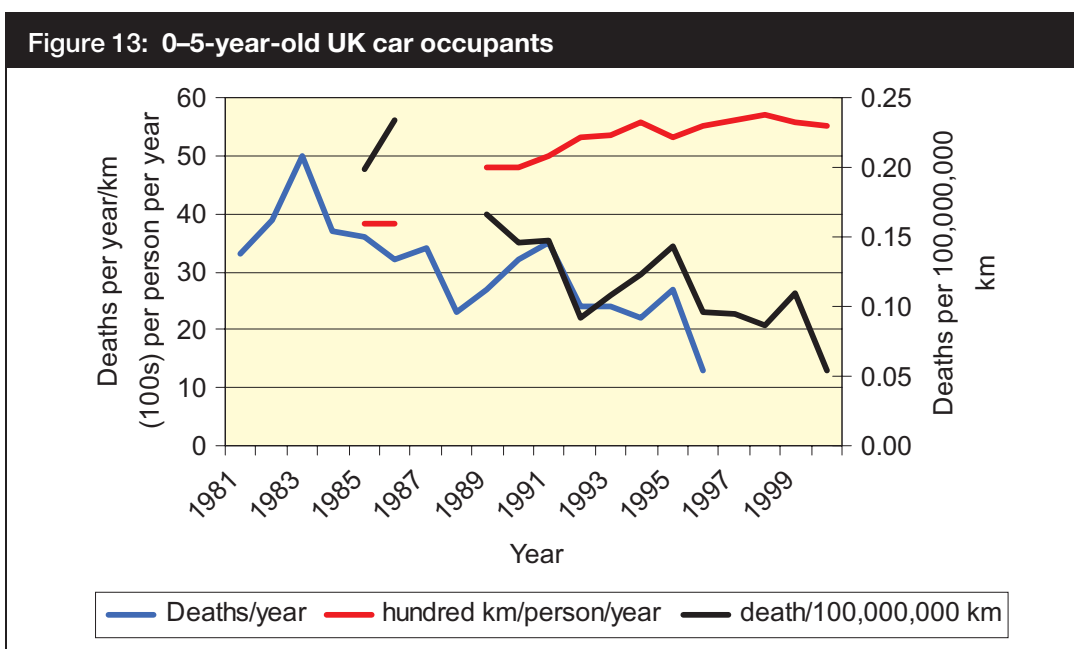
Figure 11: 10-14-year-old UK pedestrians



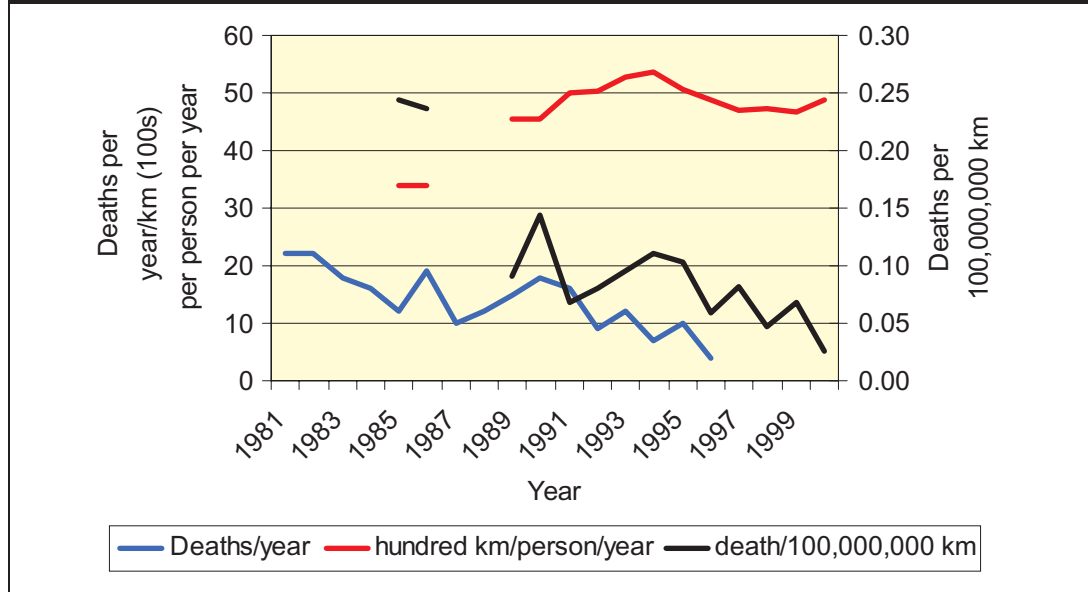


### 2.6.2. Child car occupants

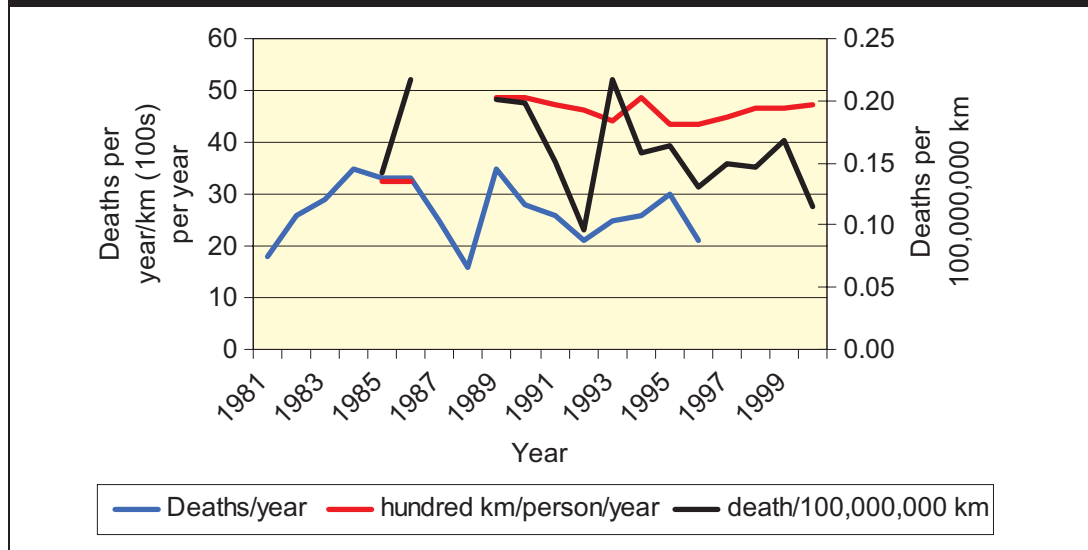
Trends are shown for child car occupant fatalities, child car occupant kilometres travelled and child fatality rates per unit of exposure. These trends are shown for 0–5, 6–9 and 10–14 year groups and all ages between 0–14 (Figures 13–16). The trends show that for all age groups the number of fatalities per population and unit of exposure are decreasing, suggesting that car occupancy has become safer. Over time there has been a particularly significant increase in travel by car among the younger age groups, which is an area of concern.

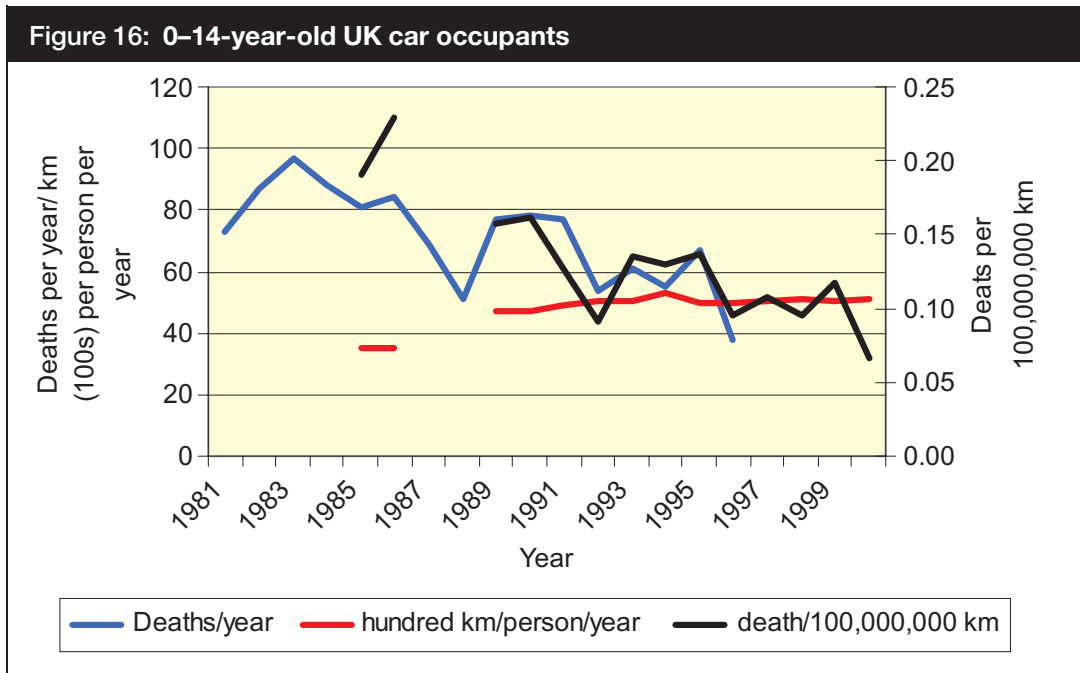


**Figure 14: 6–9-year-old UK car occupants**



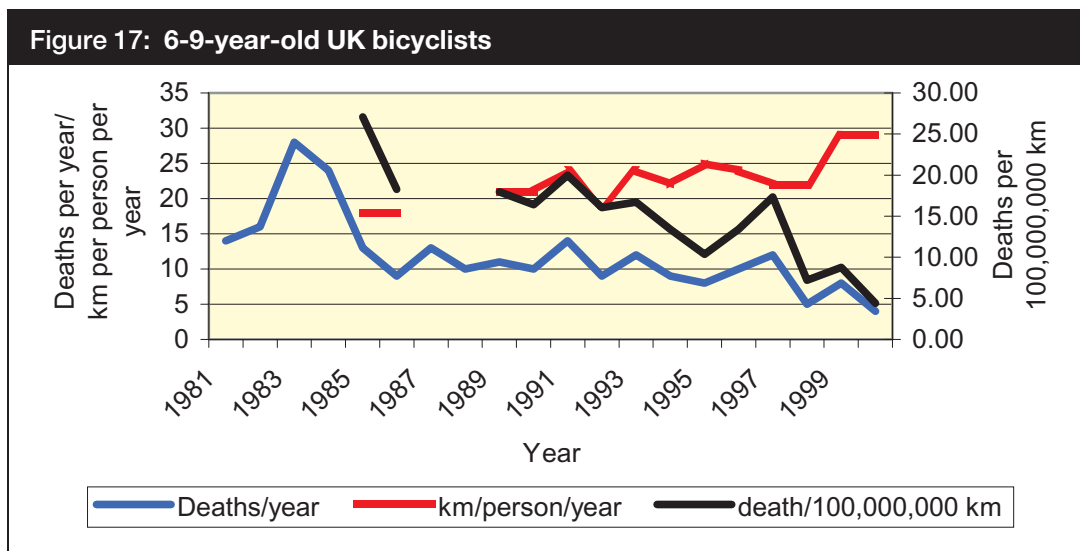
**Figure 15: 10–14-year-old UK car occupants**

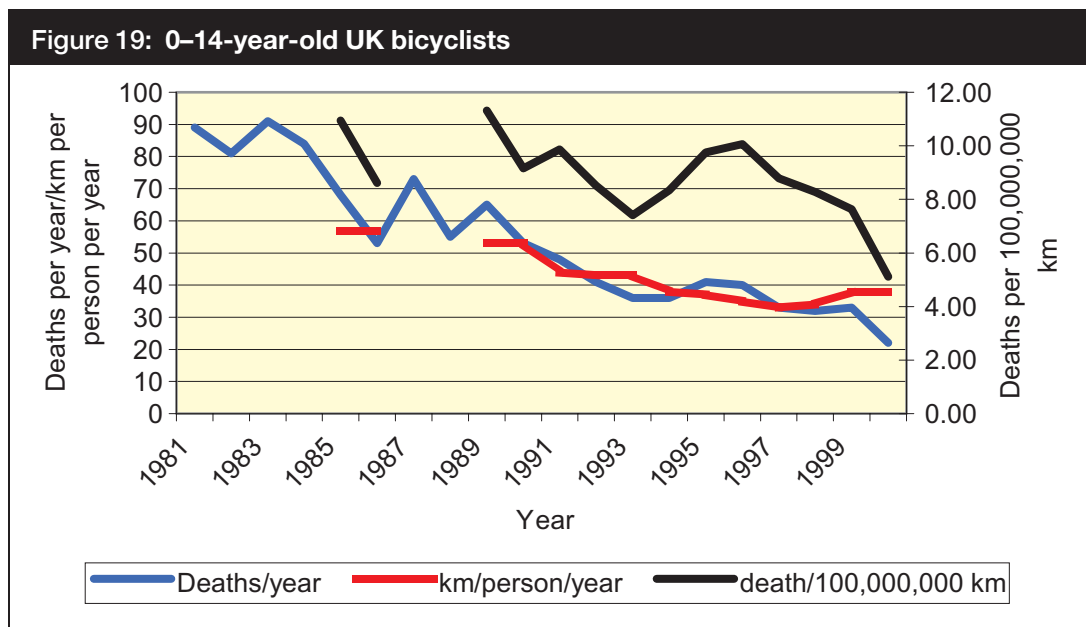
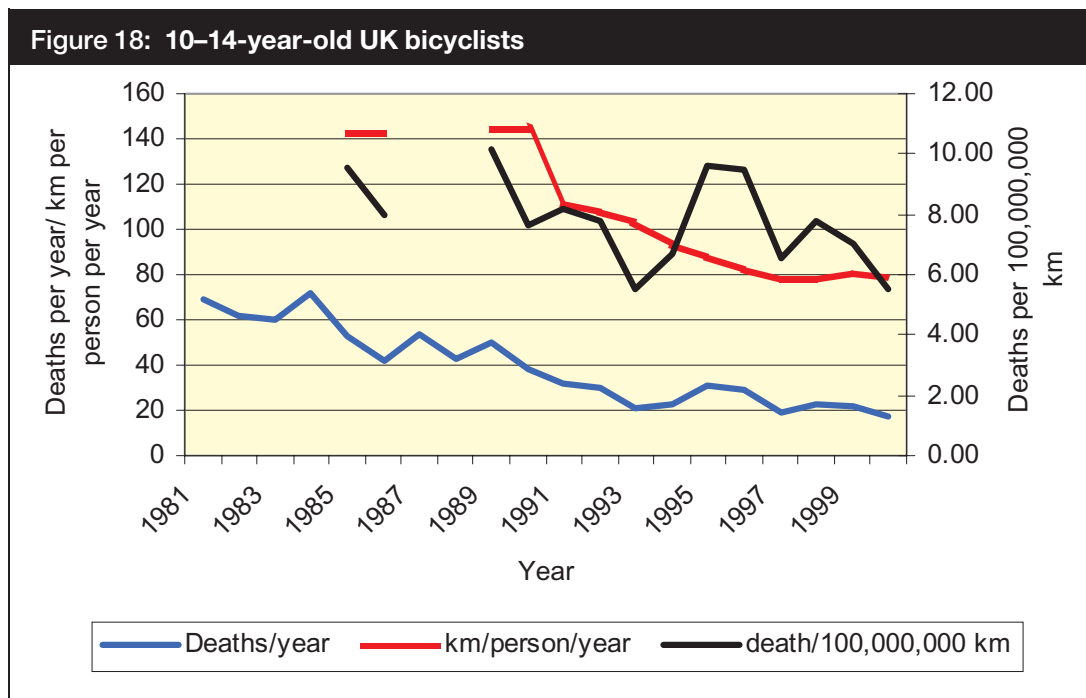




### 2.6.3. Child bicyclists

Trends are shown for child bicyclist fatalities, child bicyclist kilometres travelled and child fatality rates per unit of exposure. These trends are shown for 6–9, 10–14 and all ages between 0–14 (Figures 17–19). The numbers of children between 0–5 are very small and therefore difficult to interpret. The trends show that for all age groups the number of fatalities per population and unit of exposure are decreasing, suggesting that bicycling has become safer. Generally there has been a downward trend in the amount of bicycling although there is some signs that this trend is reversing, with there being an increase in the amount of bicycling among the 6–9-year-old age group.





**2.6.4. Important issues in measuring exposure**

Using exposure-based fatality indices is clearly important in making international comparisons and is also likely to be important in understanding national differences between the safety of different modes used by different population groups. The survey identified a number of issues with regard to the best ways to measure travel information for both national and international comparisons about child traffic safety.

## 1) What age group to survey

Given the current UN position, which defines children as being all those aged up to 18, coupled with the substantial accident problems as children become even more independent and also start to drive, a strong case can be made for specifically gathering data about people aged 15 to 18 that can be analysed separately from other ‘adult’ travel data. There are also many differences between the 0–15 age group and separate age groups need to be disaggregated to reflect differences according to the level of adult accompaniment and changes in exposure patterns because of the transition between infant, primary or middle school and secondary schools.

## 2) How to measure travel and what breakdowns to use

Currently the unit of exposure most countries focus on is distance. It can be argued that the ‘number of trips’ provides a better measure because many children’s journeys are short, and because of this the use of distance measurements do not help to differentiate sufficiently between differing travel patterns. Clearly, using trip numbers as opposed to distance also has a very significant impact on assessing the *relative safety* of different modes – for example, for comparing the safety of car travel with walking or bicycling. An argument can be made that ‘trip numbers’ is the better measure to use when comparing modes, since initiatives aimed at changing travel choices are concerned primarily with trips (not distance) and they may well result in a longer car trip being substituted for a shorter walk trip, such that the valid assessment of risk relates primarily to the number of trips by each mode.

The use of ‘travel time’ is recommended because children’s exposure may partly depend on the amount of time they spend out in the road environment when playing or hanging out during their journey, since many will not make a simple, direct trip. Many road safety experts would argue that children face the greatest risk when they are playing in the road environment rather than travelling somewhere, and that such risks are currently poorly considered in road safety initiatives. Consequently, focusing on travel times may help to highlight this issue.

A case can also be made that interviewees are more likely to be able to give correct measurements for the numbers of trips or travel times, as opposed to travel distances.

Ideally, exposure information should also distinguish between the types of roads that children use and cross, since this is known to have a significant influence on risk, as highlighted in a recent report comparing the road safety experience of the UK, France and the Netherlands (Bly *et al.* 1999).

However, given the prevalence of the distance measurement by many countries, our recommendation would be that all countries collect information on travel distances as their primary measure, but that it is clearly valuable to have information about

trip numbers and travel times as well. It is perhaps interesting that in our analysis, the use of trip numbers as opposed to trip distances did not significantly affect the picture that emerged in terms of 'good' and 'less good' performing countries *for each mode*, although given the small sample of countries with data, it cannot be claimed with any degree of confidence that the two can always be used interchangeably. As highlighted previously, the use of trip distances can also be misleading when comparing the relative safety of *different* modes.

### 3) Defining the detail of travel information

There are differences in the ways in which countries record journeys—in terms of what counts as a journey and in terms of where journeys are made. For example, surveys conducted in Great Britain used to discount all journeys of less than one mile. This clearly does not make sense given the current interest in travel by sustainable modes—particularly walking and bicycling—and it is important that journeys of all lengths are included. The GB surveys currently exclude all journeys that are not made on the public high road, whereas we believe that such journeys are included in surveys carried out by Switzerland. It would be useful if countries could be clearer about what they include and exclude, and, if a common international standard cannot be reached, to ensure that data about non-standard categories of travel can be analysed separately.

### 4) Sample size

Statistically, it is not possible to define the ideal sample size for a travel survey since this is dependent on the degree of variation within the sampled population. The guiding principle is usually to sample between 1000 to 1500. In our survey, it seems that national studies of children usually involve between 500–1500 children per age band (i.e. 0–5, 6–9 and/or 10–14), making total samples for 0–14-year-olds typically between 1500 and 4500 children. Another strategy to increase sample size is to pool data across a few years. This is done in the GB travel survey. As highlighted previously, if there are some modes which are of policy interest but usage is very low, the sample size will need to be big enough to get useful information about this mode. For example, in the USA, a sample size of 42,000 households was not considered large enough to provide meaningful information about bicycling.

A major consideration in sampling is the extent of local variations, which may impact significantly on casualty levels. For example, in areas that have a high deprivation score there will be fewer cars and higher levels of walking, often in more dangerous environments. Similarly, in rural areas there is likely to be higher car use because of the lack of public transport services. All injury prevention is ultimately implemented at a local level and should take into account local travel patterns. It could be argued that local authorities need to understand the travel behaviour of their communities in order to develop policy and practice to meet both modal shift challenges and casualty reduction targets.



### 3. NATIONAL SOCIO-ECONOMIC AND DEMOGRAPHIC INDICATORS AND CHILDREN'S TRAFFIC SAFETY IN THE UK

Part of the explanation of the relatively poor performance of the UK for vulnerable road users compared to other OECD countries may lie in the national socio-economic and geo-demographic profile of the UK. In the UK there is a strong relationship between social class and child pedestrian fatality rate, with children in the lowest socio-economic group being five times more likely to be killed as a pedestrian compared to their counterparts in the highest group. Much of this variation between child traffic fatality rate and social class has been explained in terms of the different types of environments in which children live, social factors such as family size and structure, and exposure factors such as access to a car and the level of street recreation (Christie 1995a,b). In order to look at the national socio-economic and geo-demographic profile of the UK compared to other OECD countries, the following national development indicators were used.

#### 1) Economic indicators

Three measures of economic status were used:

- Gross Domestic Product (GDP) per capita (exchange rate US dollar). Data was extracted from the website: <http://www.oecd.org/dataoecd/48/5/2371372.pdf>
- The child poverty index, which is the percentage of children living in households with income below 50% of the national median. Data was extracted from the UNICEF website: <http://www.unicef-icdc.org/>. It should be noted that this is a measure of relative not absolute poverty.
- The Gini coefficient,<sup>5</sup> which is a measure of income distribution within a country. A higher value of Gini coefficient represents lower equality of income distribution. Data was extracted from the United Nations website: <http://hdr.undp.org/reports/global/2001/en/>

These measures were used as indicators of wealth and inequalities.

5 The *Gini coefficient* was developed by the Italian statistician Corrado Gini (1884–1965). It is a measure of the income inequality in a society. The Gini coefficient is a number between 0 and 100, where 0 means perfect equality (everyone has the same income) and 100 means perfect inequality (one person has all the income, everyone else earns nothing).

## 2) Demographic indicators

- The percentage of population living in urban areas. Data was extracted from the World Development Indicators 2000 (World Bank).
- Population density per square kilometre. Data was extracted from the CIA World Factbook website: <http://www.cia.gov/>

These measures were used as indicators of the overall geographic distribution of the population within a country.

## 3) Social indicators

- The percentage of lone parent families. Data was extracted from the OECD website: <http://www.oecd.org/dataoecd/40/26/2492149.xls>

This measure was used as an indicator of social structure.

## 4) Exposure indicators

- Cars per capita. Data was extracted from the IRTAD website: <http://www.bast.de/htdocs/fachthemen/irtad/>

Table 1 opposite shows the UK position in the international league for each national development indicator

### 3.1. Geo-demographic profile

The UK population is highly urbanized, with 89% of the population living in urban areas (range Ireland 57% to Belgium 97%). The UK is the fourth most urbanised country (the same as the Netherlands) of the 24 OECD countries that provide national indicators. The UK is also the fifth most densely populated country out of the 26 OECD countries, with 244.1 people per km<sup>2</sup> (range Australia 2.5 to South Korea 490.7). In addition, the UK has extensive urban areas that were built before the motor age and is less equipped to meet its demands, which, it has been argued, may contribute to the comparatively poor performance of the UK for child pedestrian safety (Lynam and Harland 1992).

### 3.2. Social structure

The UK, together with Canada, has the highest percentage (11%) of children living in lone parent families (range Sweden 3% to Canada/UK 11%) out of the 21 OECD countries that provide this information. A lone parent family has been identified as a predictor of child pedestrian accident involvement (Christie 1995a,b). The burden of poverty is greatest among lone parents. A research report commissioned by the Joseph Rowntree Trust (Gregg *et al.* 1999) found that two-thirds of children living

Table 1: UK position in the international league for each national development indicator

Country	% urban population	Country	Cars per capita	Country	% lone parent families	Country	GDP per capita	Country	Population density	Country	% of children living in poverty	Country	Income inequality
Belgium	97	Portugal	0.84	Canada	11	Norway	36,500	South Korea	490.7	USA	22.4	Turkey	41.5
Iceland	92	USA	0.79	UK	11	USA	35,200	Netherlands	386.9	Italy	20.5	USA	40.8
Australia	91	New Zealand	0.68	Finland	9	Ireland	30,000	Belgium	336.8	UK	19.8	UK	36.1
Netherlands	89	Italy	0.66	Ireland	9	Switzerland	29,900	Japan	336.1	Turkey	19.7	Ireland	35.9
UK	89	Iceland	0.64	New Zealand	9	Iceland	29,300	UK	244.2	Ireland	16.8	Portugal	35.6
Germany	88	Switzerland	0.64	Norway	9	Denmark	29,200	Germany	233.2	Canada	15.5	Australia	35.2
New Zealand	86	Austria	0.63	South Korea	9	Netherlands	29,200	Italy	191.6	Poland	15.4	Switzerland	33.1
Denmark	85	Germany	0.63	USA	9	Canada	28,900	Switzerland	176.8	Australia	12.6	France	32.7
Sweden	83	Australia	0.62	Australia	8	Austria	28,200	Czech R	130.1	Spain	12.3	Netherlands	32.6
Canada	79	Japan	0.62	Austria	8	Belgium	27,700	Denmark	124.6	Japan	12.2	Spain	32.5
Japan	79	Spain	0.59	Portugal	8	Australia	27,400	Poland	123.5	Germany	10.7	Poland	31.6
Spain	78	Canada	0.58	Belgium	7	Finland	26,500	France	109.3	Hungary	10.3	South Korea	31.6
USA	77	France	0.58	France	7	Japan	26,400	Portugal	109.1	France	7.9	Canada	31.5
France	75	Norway	0.57	Italy	7	Germany	26,300	Hungary	108.3	Netherlands	7.7	Germany	30
Norway	75	Belgium	0.56	Denmark	6	UK	26,300	Austria	97.4	Czech R	5.9	Italy	27.3
Czech R	74	Sweden	0.53	Spain	6	France	26,200	Turkey	86.2	Denmark	5.1	Norway	25.8
Austria	67	Netherlands	0.50	Switzerland	6	Italy	26,200	Spain	79.4	Belgium	4.4	Finland	25.6
Italy	67	UK	0.49	Germany	5	Sweden	26,000	Ireland	55.3	Finland	4.3	Czech R	25.4
Switzerland	67	Finland	0.48	Japan	5	Spain	21,400	USA	29.1	Norway	3.9	Belgium	25
Turkey	66	Czech R	0.46	Netherlands	5	New Zealand	21,200	Sweden	19.7	Sweden	2.6	Sweden	25
Hungary	64	Denmark	0.45	Sweden	3	Portugal	17,600	Finland	15.4	Japan		Japan	24.9
Portugal	64	Ireland	0.44	South Korea		South Korea	15,900	New Zealand	14.5	Denmark		Denmark	24.7
Finland	59	Hungary	0.27	Czech R		Czech R	15,000	Norway	14	Hungary		Hungary	24.4
Ireland	59	Turkey	0.14	Hungary		Hungary	13,400	Canada	3.2	Austria		Austria	23.1
				Poland		Poland	9900	Iceland	2.7				
				Turkey		Turkey	5800	Australia	2.5				

with lone parents are poor, compared to a quarter of children living with two parents. The high accident involvement of children from lone parent families may be partially explained by the high correlation between being a lone parent and low socio-economic status.

### **3.3. Socio-economic profile**

The UK has the third highest (36.1) level of income inequality measured by the Gini coefficient (range Austria 23.1 to Turkey 41.5) among the 24 OECD countries that provide this information. The UK has the third highest (20%) level of children living in relative poverty (range Sweden 2.6 % to USA 22%) out of the 20 OECD countries that provide this information. In terms of GDP per capita, the UK is in the middle of the distribution (range Turkey 5800 to Norway 36,500) out of the 26 OECD countries.

### **3.4. Exposure**

In terms of the number of cars per capita, the UK is in the lower part of the distribution (0.49) (range Portugal 0.84 to Turkey 0.14). This indicates a lower level of car ownership, which may be correlated with socio-economic factors and differences in exposure.

### **3.5. Implications for policy**

At an international level, the survey found some moderately strong correlations between fatality rates and wealth and economic inequality. There was a negative correlation between the GDP and the child road traffic fatality rate, i.e. the higher the GDP the lower the fatality rate, and a positive correlation between income inequality and the child road traffic fatality rate, i.e. the higher the income inequality the higher the fatality rate. The UK has an average GDP and particularly high levels of income inequality. These factors may contribute to the safety performance of the UK for vulnerable road users, especially given the strong relationship between socio-economic inequalities and child pedestrian accidents. Research has shown that socio-economic factors play a key role in accidental injury and especially in child pedestrian accidents (Christie 1995; BMA 2001). Whilst childhood accidental fatalities, of which child pedestrians are the main cause, are declining for all socio-economic groups in the UK, the rate of decrease is slowest among the lowest socio-economic group (Powers and Roberts 1996). The lessons from this are well understood by the DfT, as reflected in its target to reduce the level of injury among children from disadvantaged backgrounds. The DfT has implemented a highly targeted approach to address the inequalities in child pedestrian traffic accidents with the Pedestrian Skills Training Project in deprived areas and with the Dealing with Disadvantage Initiative (see [http://www.dft.gov.uk/pns/DisplayPN.cgi?pn\\_id=2002\\_0312](http://www.dft.gov.uk/pns/DisplayPN.cgi?pn_id=2002_0312)).

It is important to have a targeted approach aimed particularly at socially deprived groups or children from certain ethnic minority groups because factors that influence their risk differ from those of the general population. In relation to socially deprived groups, additional factors include:

- lack of money (the ability to buy safety equipment);
- exposure to hazardous environments (e.g. facilities for safe play, the lack of gardens, heavy traffic densities and speed);
- the ability of parents/carers to supervise children (single parent families, parental maturity, depression and family illness); and
- children's attitudes and behaviour (e.g. risk taking) (Towner *et al.* 2003).

In relation to ethnicity, additional factors may include:

- exposure to a different environment (e.g. different travel patterns);
- access to information and services;
- barriers related to language; and
- the ability of parents/carers to supervise children (a lack of familiarity with traffic conditions for first generation immigrant families).

(Source: Thomson *et al.* 2001)

There is a strong relationship between ethnicity and low socio-economic status which compounds the risks for ethnic groups of low socio-economic status.

The relationship between socio-economic status, ethnicity and child road traffic casualties needs to be measured and monitored to ensure that inequality targets are met. Areas of disadvantage can be identified using indices of multiple deprivation, which are useful for monitoring the relationship between socio-economic status and pedestrian accidents, but currently there is no way of recording this information for individuals other than for fatalities through the registration of death by social class of the parent. For fatalities the DfT should be regularly reviewing the relationship between existing data on road traffic fatalities and social class via the Office for National Statistics on childhood accidental injury.

## 4. ROAD ENVIRONMENT

### 4.1. International good practice on road environment modification

There is a considerable body of evidence which shows that changing the road environment to reduce vehicle speed leads to significant casualty reductions (Mackie *et al.* 1988; Mackie *et al.* 1990; Webster and Mackie 1996; Stevenson *et al.* 1999; Grayling *et al.* 2002). Compared to the top performing countries, the UK survey response suggests a less comprehensive approach to the adoption of

- very low speed limits in local authority areas; and
- speed reduction measures outside schools.

Most of the top performers report that speed reduction measures and very low speed limits (30–40 kph) are adopted in *most* local authority areas and outside *many* schools. Such measures were reported in *many* local authority areas and only for *few* schools in the UK. Similarly, whilst the provision of outside play areas, such as parks or play grounds, in *most* residential areas was a shared characteristic among top performers, UK provision was less strongly reported for *many* areas.

The UK, like most of the top performing countries, has advisory environmental planning guidance for the safety, security and freedom of movement of children. Other countries are adopting innovative approaches to environmental planning that the UK may wish to consider. In Norway, for example, environmental standards require that children's play and activities are protected from the dangers of traffic, noise and pollution. Norway also has legislation that requires each local authority to appoint a senior member of staff who has specific responsibility for the design and implementation of area plans and buildings with children's interests in mind.

Even though the school journey only accounts for one-fifth to a quarter of all traffic accidents in most countries, the local environment around the school has become a focus of attention for many countries. Action outside schools may help to raise the profile of road safety and encourage more widespread positive attitudes to speed reduction, traffic calming measures and road safety training. Many countries are attempting to make the whole route from home to school safer for children when they are walking or bicycling. Such area-wide schemes, or whole route treatments, also benefit pedestrians and bicyclists, and not just children. In South Korea, for example, Road Traffic Law has designated the area of 300 m radius around schools as school zones. In these school zones, the police have the authority to enforce parking restrictions and speed limits of 30 kph. The Netherlands also takes a very strong approach to the environment outside schools, especially near primary schools. Many initiatives are taken to protect children, such as playing zones, 'kiss and ride' strips, coloured tiles indicating safe routes to school, flashing warning

lights when school starts or when school is over, road closures to prevent through traffic, etc. The Netherlands has introduced an approach called the ‘child ribbon’—a path through a green area for children connecting important destinations, like houses, schools, shops, which are safe and secure, and provided with play objects. It is not clear how widespread this approach is in the Netherlands and how it differs from the safe routes approach adopted in the UK. More information is needed to judge whether this is innovative practice that should be adopted in the UK or whether it implies that the safer route approach should be adopted more widely.

In the UK there are joint Government Department initiatives that aim to encourage safe and sustainable travel on the school journey. *Travelling to school: an action plan* was launched by the Department for Education and Skills (DfES) and the DfT in 2003. The action plan announced £50 million funding for school travel over the next two years; around £20 million a year will be distributed as a new capital grant for schools with a travel plan, whilst £7.5 million a year will fund school travel plan advisers to support schools in drawing up and implementing their travel plans (see [http://www.dft.gov.uk/stellent/groups/dft\\_localtrans/documents/page/dft\\_localtrans\\_024011.pdf](http://www.dft.gov.uk/stellent/groups/dft_localtrans/documents/page/dft_localtrans_024011.pdf)). Small grants of up to £10,000 will be allocated for infrastructure changes, such as 20 mph (30–40 kph) zones and the provision of expert advice. Although the UK Government appears to be adopting best practice, it is not clear how widespread these initiatives are and therefore it is unlikely to be the norm for all schools.

In the UK there are some radical environmental approaches to the development of residential areas, such as Home Zones which are currently being piloted, that may have an impact on road safety. Home Zones aim to create high-quality street environments to achieve a better balance between the needs of the local community and drivers. The key features of Home Zones are support from residents, very low speeds through the redesign of the street and traffic calming, seating and other street furniture, and new Home Zone gateway signs.

## 4.2. Implications for policy

These findings suggest the need to have more widespread introduction of 20 mph (30–40 kph) speed limits, a more targeted approach to the environment around the school and greater provision of safe play areas. In addition, there may need to be a review of environmental planning processes to encourage a child-based approach to ‘whole route safety’.

Many of these approaches to environmental modifications to improve road safety need to become more widespread. Although there is existing guidance about safety outside schools, such as the introduction of low speed limits and encouragement of the enforcement of speed limits near schools, there needs to be more widespread implementation of safety measures. Ideally, the norm should be that low speed limits



are introduced outside every school unless there are circumstances where this would not be appropriate.

In the UK there are barriers that may make environmental solutions difficult to implement. Cost is one such barrier. The top performing countries tend to be the more wealthy OECD countries. Resources and capacity are also required in order for this approach to be adopted. In the UK, staff shortages are widespread throughout the transport sector, including traffic and highway engineers, project managers, design engineers and transport planners (see <http://www.cfit.gov.uk/research/la2b/01.htm>). A strategy to address these skills shortages is being actively promoted by the Government. However, in view of these capacity shortfalls, consideration needs to be given to alternative strategies to road environment safety for children in the short term. The introduction of low speeds limits could be more widely implemented, there could be more enforcement of speed limits in residential areas and greater provision of safe places for children to play and hang out.



## **5. EDUCATION, TRAINING AND PUBLICITY**

### **5.1. International good practice in road safety education, training and publicity**

Overall most countries have compulsory road safety education and other educational initiatives. The UK is in the minority in not having compulsory road safety education in schools. The international survey did not address the quantity or quality of these initiatives and in any case this would have been hard to judge as few educational initiatives had been evaluated in terms of casualty reduction or behaviour change.

Top performing countries share a number of approaches to safety, such as teaching pedestrian skills at the roadside, in playgrounds or traffic parks and providing materials and advice for parents. These initiatives are also supported by the UK. In some top performing countries (e.g. the Netherlands and Sweden) participant approaches are being utilised, where children are consulted about traffic safety or are encouraged to research and learn about traffic themselves. In Sweden the roads administration, SNRA, has financed a developing project in approximately 400 schools – for pupils in the age-group 6–12 years of age – called “research and learn” in the local environment with special emphasis on road safety. In Norway some schools allow children to go out and count the number of bicyclists wearing a helmet and car occupants using seat belts. As well as being part of the mathematics curriculum education etc., this might influence pupils’ thinking and attitudes.

Many countries, including the UK, also involve parents in road safety. For example, The Traffic Club has been developed to help parents teach their young children how to stay safe when they are out walking, playing or travelling. In Scotland, membership of the club is free to all 3-year-olds and the take-up rate is currently around 60% (i.e. 35,000 new members per year).

In most of the UK road safety education can and does appear as part of the curriculum, although it is not compulsory, and school inspectors can choose to recognise school travel work, but there is not always explicit inclusion of these issues on the curriculum and it is not always an official criterion on which inspectors will judge a school. In Northern Ireland students can study for a General Certificate of Secondary School Education in “Motor vehicle and road user studies” and inspectors are trained to cover this part of the curriculum. Making school travel and safety a more formal part of the educational process could be much more powerful than relying on voluntary uptake of interventions which is known to be difficult to encourage, especially among socially disadvantaged groups. There also other mechanisms to formalise road safety education as part of the educational process by building capacity at a professional level, for example, in some countries, such as

Norway and Australia, children's traffic safety is an integral part of initial teacher training.

Publicity also has a role to play in raising awareness. Conducting child pedestrian safety campaigns once a year or more was a shared characteristic of the top performing countries for child pedestrian safety. This approach is also adopted by the UK.

## 5.2. Implications for policy

Unlike most countries, the UK does not have compulsory road safety education in schools, although it does support education and training initiatives, such as Kerbcraft. One way to ensure that safety is established in an educational context is to ensure it features as part of the curriculum. Travel to school is increasingly becoming a focus for messages about sustainable development in the national curriculum. However, it may need to become a more explicit part of the curriculum. A possible lever for establishing safe travel to school by children is by making it part of the school inspection process. By developing a School Travel Plan, schools are sometimes able to enhance aspects of their school inspection reports if the inspectors choose to take account of school travel in connection with community links. However, there is nothing explicit required in the inspection process. Including road safety as part of initial teacher training could be one mechanism of ensuring that road safety receives greater attention among teachers.

Ensuring that issues such as safe and sustainable transport feature in the curriculum could be one mechanism of engendering a safety culture, especially if it encourages ownership of the problem through participant approaches. These approaches are favoured by the top performing countries for pedestrian safety, such as Sweden and the Netherlands. Schools have a clear role to play in encouraging safe behaviour, for example, it was interesting to note that many countries reported that their schools have policies on school bicycle helmets and it was these countries that were associated with high bicycle helmet wearing rates overall.

Evidence from the international survey suggests that publicity can make an important contribution to the holistic approach to children's traffic safety. Conducting national pedestrian road safety campaigns once a year or more was a shared characteristic of the top performing countries and distinguished them from other countries performing less well. The UK actively promotes road safety for all road users and this approach needs to continue. Perhaps more frequent publicity could be considered to help encourage cultural acceptance of road safety.

## 6. LEGISLATION

### 6.1. International good practice on legislative approaches to road safety

Most countries have legislation on seat belt wearing in cars. The UK and other countries that have achieved the lowest rates of child vehicle occupant injuries have all achieved high wearing rates of seat belts by children; indeed, this was a shared characteristic of top performers in the league table that distinguished them from those performing less well.

In relation to children travelling in public vehicles, the presence of legislation for seat belts on school buses was a shared characteristic of the top performers which distinguished them from countries doing less well. In the UK, children may travel to school on public service vehicles which are not often exclusively designed for the school journey and do not have to be fitted with seat belts. However, when being transported by coach or minibus, seat belts are provided.

The UK has achieved high levels of seat belt wearing on both the front (95%) and back of cars (92%) for children aged 0–13. However, the wearing rate for older children (10–13) travelling in the back is lower (83%) than younger children and this is clearly an area that needs to be addressed. The DfT's current "THINK!" campaign includes national television adverts aimed at increasing seat belt use by teenage drivers and passengers (see <http://www.thinkroadsafety.gov.uk/>).

Legislation is not necessarily the only effective mechanism to achieve behavioural change. An example of this is the high rates of bicycle helmet wearing achieved by Sweden and Norway without introducing legislation. Responses to the international survey showed that Sweden has achieved a rate of 80% for children aged under 15 and Norway has achieved 63% compared to the UK rate of 15% for children. How these rates were achieved in the absence of legislation needs to be understood. It may be due to a number of factors, including parental attitude, the number and style of education and publicity campaigns, or the relative homogeneity of these two countries in terms of wealth and income distribution compared to countries performing less well.

The presence of legislation that assumes driver responsibility in an accident involving a child pedestrian was a shared characteristic of the top performing countries and distinguished them from countries that performed less well in terms of pedestrian safety. The UK does not have this legislation and, at present, less than a third of countries have such legislation.

## 6.2. Implications for policy

More information is needed to understand the ways in which Scandinavian countries have achieved changes in behaviour leading to a better uptake of secondary safety behaviour and what lessons could be learned for the UK.

The impact and feasibility of introducing legislation on driver responsibility for pedestrian accidents should receive greater consideration in the UK.

Achieving compliance with legislation on seat belt use among older children needs further research. Interventions aimed at teenagers and secondary safety, such as the 'THINK!' campaign, need to be developed and sustained.

## 7. ROAD SAFETY POLICY

### 7.1. International good practice on road safety policy

In terms of policy, the UK shares much with the top performing countries by favouring a holistic approach. These countries have national implementation plans which consist of a wide range of measures, including low speed limits, speed reduction measures, promotion of secondary safety, and publicity aimed at both children and their parents and drivers. Some countries go further and extend their approach to introducing low fares on public transport in order to improve safety. In Denmark there is a major initiative to improve school safety which includes a package of measures, such as physical measures near schools and reduced bus fares. This is one of the few initiatives to implicate the role of concessionary fares on public transport in relation to safety.

Many countries use casualty reduction targets as a lever for action at a local level. In our survey over half the countries had a national plan to reduce road casualties but less than half of these set specific targets for casualty reduction.

Great Britain has set the following target for children:

- Total child deaths and serious injuries to halve from a baseline of 1994–98 by 2010.

In Northern Ireland the target is also to achieve a 50% reduction in the number of children killed or seriously injured on the roads but from a baseline of 1996–2000 by 2012.

Great Britain, in particular, is unique in identifying a target for those who live in disadvantaged communities. In 2002, the DfT stated that road safety strategy targets should tackle the significantly higher incidence of road traffic injury among disadvantaged communities.

There are also other types of targets that are used by different countries as a lever for action. Some countries have identified behaviour-related targets, for example the USA and Canada have targets to increase seat belt wearing, and in the USA some states have targets about bicycle helmet legislation. Also, exposure-based targets seem especially important given the UK has policy targets for increasing the amount of walking and bicycling by children and to make sure this is done safely. For the UK, exposure-based targets could be derived for children for different age, gender and road user groups. The UK has travel data and casualty data that are good enough to enable such targets to be derived.

Governments also have a role in advocating the importance of road safety and encouraging cultural attitudes towards road safety. Sweden, the top performer, has

adopted a Vision Zero policy. Sweden's long-term road safety goal is that there should be no fatalities or serious injuries in road traffic. This goal was approved by the Swedish Parliament in 1997 and is based on the 'Vision Zero' programme. Sweden is already among those countries with the lowest number of traffic fatalities in relation to its population.

The Government has an advocacy role to raise awareness of the importance of road safety and to encourage stakeholders to work together to develop solutions to road safety problems. There are some innovative approaches to advocacy adopted by some countries. In the Netherlands there is a Traffic Safety Label: a regional quality label for schools meeting fundamental safety-quality requirements. In addition, the Netherlands has an annual national street playing day, usually in May, when residents' organisations close down some residential streets for motorised traffic, and organise all kinds of social and play activities (for children and for adults). Many municipalities are involved in this activity. It is co-ordinated by the national traffic safety organisation 3VO (see <http://www.3vo.nl/>). There are also European-wide initiatives which aim to advocate car-free days in towns (see <http://europa.eu.int/comm/environment/carfreeday/charter.pdf>).

The Government can also have a role in actively engaging the community in trying to develop road safety solutions. In the Netherlands, the Government has initiated a working group of young people to act as advisers on traffic safety and mobility matters, and to work as ambassadors for other young people, in order to increase safety. In several municipalities, children are consulted on safety and they may come up with innovative solutions (especially when it comes to routes to school). Generally, the best solutions are given an award or applied in practice.

## 7.2. Implications for policy

The UK needs to continue to maintain a holistic approach to safety and continue to adopt both population and targeted approaches to road safety.

There is a range of targets in different countries. Most are based on a reduction of casualties by a given percentage by a set date, but there are other highly specific behaviour, based targets, such as increasing the amount of seat belt wearing. The DfT (England and Wales) is unique in setting an inequalities target, but it is imprecise owing to the lack of routinely collected socio-economic data for casualties other than fatalities. This underlines the need for a more comprehensive range of data to be collected. At present, the data is limited to small area statistics with associated indices of multiple deprivation or to the registration of deaths by social class, but this is not routinely examined in relation to child traffic accidents.

Given the importance of exposure in understanding risk, the UK could consider whether the expression of exposure-based indicators could be used to measure the dual Government objectives of increasing walking and cycling whilst at the same

time making these activities safer. The amount of bicycling and walking as part of local authority performance indicators could act as levers for them to increase the amount of walking and bicycling undertaken and to ensure that this is done safely.

There are some interesting advocacy approaches that may help raise the awareness of road safety among school children. In particular, the regional safety label for schools in the Netherlands is not dissimilar to the Healthy School Standard that can be achieved by schools in the UK (see <http://www.ohn.gov.uk/ohn/school/school.htm>). Consideration could be given to adopting this approach for road safety in the UK.

## 8. KEY LESSONS

- 1) In order to become more like the top performers, the UK needs to adopt a stronger and more widespread approach towards pedestrian and bicyclist infrastructure. The advantage of changing the environment is that, although the initial short-term cost is high, the results are longer term, sustainable and can be associated with significant casualty reductions. Modification of the environment is a costly process, and resources and capability are required in order for this approach to be adopted. The top performing countries tend to be the more wealthy OECD countries. Cost and capacity are major barriers to implementation in the UK. Policies to address lack of capacity to implement environmental modification must be sustained. There are also many examples of innovative approaches to environmental planning and of modification to improve safety, and these approaches could be considered for the UK. There is a greater need to implement low speed limits near schools, and identifying these areas as enforcement zones should be routine practice unless a case can be made why they should not be introduced.
- 2) The relatively poor performance of the UK for pedestrian safety may be related to socio-economic risk factors, and may be compounded by old urban development and high population density in these areas, and multi-agency approaches (engineering, education, training and publicity) are required to tackle these issues. The UK must continue both targeted and population approaches to interventions. The UK is unique in setting a target to reduce the accident rate among the most disadvantaged members of the community. The social gradient in child pedestrian fatalities needs to be routinely monitored. Data on this needs to be enhanced so that it is possible to assess whether inequality targets are being met.
- 3) Most countries show that secondary safety, such as wearing a seat belt or bicycle helmet, is lower among older children compared to younger children. More needs to be understood about achieving higher levels of secondary safety behaviour among older children.
- 4) Little is known about the impact of legislation on driver responsibility for pedestrian accidents. More information is needed about the impact of this law and consideration is then needed on the feasibility of introducing this legislation in the UK.
- 5) Encouraging safety practice through schools may help develop ownership of the problem and engender a safety aware culture. There could be more national support for promoting safe and sustainable travel to school by linking these themes with explicit and clear curriculum topics, and by making safe travel to school an aspect of the school inspection process.
- 6) Exposure-based indicators could be derived for children for different age, gender



and road user groups. Exposure-based targets seem especially important given the UK has policy targets for increasing the amount of walking and bicycling by children. The UK has travel data and casualty data which are good enough to enable such indicators to be derived.

- 7) Behaviour-related indicators could also be developed to increase the uptake of safety behaviour, such as wearing a seat belt or bicycle helmet. These behaviours are regularly monitored and data exists to provide baseline measures.
- 8) There are many examples of innovative advocacy and action research approaches involving children that could be readily transferred to the UK. More information about these approaches would be useful.

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