Building the European Road Safety Observatory. SafetyNet. Deliverable D3.7a Road safety performance indicators: country comparisons

Deliverable D3.7a:

Road Safety Performance Indicators Country Comparisons

Please refer to this report as follows:

Vis, M.A. and Van Gent, A.L. (Eds.) (2007) *Road Safety Performance Indicators: Country Comparisons.* Deliverable D3.7a of the EU FP6 project SafetyNet.

Contract No: TREN-04-FP6TR-S12.395465/506723
Acronym: SafetyNet
Title: Building the European Road Safety Observatory

Integrated Project, Thematic Priority 6.2 "Sustainable Surface Transport"

Project Co-ordinator:
Professor Pete Thomas
Vehicle Safety Research Centre
Ergonomics and Safety Research Institute
Loughborough University
Holywell Building
Holywell Way
Loughborough
LE11 3UZ

Organisation name of lead contractor for this deliverable:
SWOV

Editors:
Martijn A. Vis and Alex van Gent (SWOV)

Report Author(s): Kerstin Auerbach-Hafen (**BASt**); François Riguelle (**IBSR**); Vojtech Eksler (**CDV**); Mouloud Haddak (**INRETS**); Péter Holló (**KTI**); Elisabete Arsenio, João Cardoso, Sandra Vieira Gomes (**LNEC**); Eleonora Papadimitriou (**NTUA**); Maarten Amelink, Charles Goldenbeld, René Mathijssen, Robert Louwerse, Peter Morsink, Chris Schoon, Alex van Gent, Sjoerd Houwing, Martijn Vis (**SWOV**); Victoria Gitelman, Shalom Hakkert (**TECHNION**); Terje Assum (**TØI**); Marianne Page, Lucy Rackliff (**VSRC**)

Due Date of Deliverable: 31/12/2006 **Submission Date: 31/12/2006**

Project Start Date: 1st May 2004 **Duration: 4 years**

Project co-funded by the European Commission within the Sixth Framework Programme (2002 -2006)		
Dissemination Level		
PU	**Public**	

Project co-financed by the European Commission, Directorate-General Transport and Energy

Executive Summary

This report compares the safety performance of 27 European countries – the25 EU member states, Norway and Switzerland. The comparison is done for seven road safety related areas: alcohol and drugs, speeds, protective systems, daytime running lights, vehicles (passive safety), roads, and trauma management, on basis of the theory presented in Hakkert, Gitelman and Vis[1] (2007), using the data obtained from the collaborating countries (see Vis and Van Gent[2] (2007). When indicator values are available but not comparable due to e.g. lack of data quality, this is explained.

In general, comparing the countries' performances is difficult. The main reasons are the lack of data, suspicious quality of the data, or the incomparability of the (seemingly similar) data due to different circumstances of measurement. As an example of the latter, one might think of speed measurements for different road types in different countries, or on similar road types with completely different characteristics.

In a number of cases, the choice for a specific performance indicator depends on the availability of data. This has, for example, been the case for the indicator for alcohol usage; while the optimal indicator would concern the usage rate of alcohol in the general driver population, the unavailability of data in a number of the (larger) country, has led to a more indirect indictor. Details about the development of the safety performance indicators can be found in Hakkert, Gitelman and Vis (2007).

In spite of all considerations and limitations, we are able to present a great number of comparisons in this report, or to present the figures that can form the basis for future comparisons. Reliable comparisons are made for the areas daytime running lights, protective systems, vehicles (passive safety), and trauma management. Only limited comparisons are made for the areas speeds and roads. Due to great differences in data quality between the different countries, comparisons in the area alcohol and drugs is not possible. The results for that area are presented for information only and will form the basis for future study.

[1] Hakkert, A.S., Gitelman, V., and Vis, M.A. (Eds.) (2007) *Safety Performance Indicators: Theory*. Deliverable D3.6 of the EU FP6 project SafetyNet.

[2] Vis, M.A., and Van Gent, A.L. (Eds.) (2007) *Safety Performance Indicators: Country Profiles*. Deliverable D3.7b of the EU FP6 project SafetyNet.

Contents

1 Introduction

This document presents the comparison of the road safety performance of 27 European countries – the 25 EU member states, Norway and Switzerland. The performance of these countries is based on their score on so-called 'safety performance indicators' in seven road-safety related areas: alcohol and drugs, speed, protective systems, daytime running lights, vehicles (passive safety), roads, and trauma management. We developed road safety performance indicators for each of these areas in Hakkert, Gitelman and Vis (2007).

Safety performance indicators are seen as any measurement that is causally related to crashes or injuries and is used in addition to the figures of accidents or injuries, in order to indicate safety performance or understand the process that leads to accidents (ETSC, 2001). They also provide the link between the casualties from road accidents and the measures to reduce them (ETSC, 2006).

Safety performance indicators help illustrate how well road safety programs are doing in meeting their objectives or achieving the desired outcomes. They are a means of monitoring, assessing and evaluating the processes and operations of road safety systems concerning their potential to solve the problems they are up against. They use qualitative and quantitative information to help to determine a program's success in achieving its objectives. They could be used to track progress and could provide a basis to evaluate and improve performance.

SafetyNet's Road Safety Performance project team has worked closely together with national representatives of the 27 countries to obtain as much of the data relevant for calculating the indicator values. A complete overview of all underlying data obtained for the 27 countries can be found in Vis and Van Gent (2007).The current report presents the indicator values as far as they were found suitable for comparison with other countries' indicator values. In many cases, we found that essential data were missing or that the quality of the data was too poor to use for country comparisons. For example, this was the case for the areas related to alcohol and drugs use and to roads. Yet, even in these cases, we have often presented the indicator values, but explicitly stated the extent to which we found the comparisons valid.

Chapter 2 first gives a brief instruction into the background of safety performance indicators, explaining their role in road safety management and the way to develop appropriate and feasible indicators. Next, it presents an overview of the indicators used for the country comparisons in this report.

The next chapter (chapter 3) gives an overview of the data available to the SafetyNet Road Safety Performance Indicators team. The overview shows, per indicator area and per country, whether any data were obtained from the national representative (or from another source) and whether the data obtained was suitable for calculating the indicator values.

Chapters 4 to 10 present the results for each indicator area consecutively. For each area, the developed safety performance indicator is briefly presented, and it is explained to what extent the available data allows a comparison of the countries' performances. After this, the country comparisons are presented in terms of graphs and tables. For some indicator areas, some of the underlying data and methods are detailed in the appendices to this report.

Finally, in chapter 11 we present our overall conclusions.

Acknowledgement

The authors would like to thank the National Experts of the 27 cooperating countries (25 member states, Norway and Switzerland) for providing the data and for giving feedback on concept versions of this report.

2 Development of Safety Performance Indicators in SafetyNet

VIS[A], M.A.

[A]SWOV

This chapter gives a brief overview of the theory behind road safety performance indicators (SPIs) and the way they were developed for the different road safety related areas, alcohol and drugs, speed, protective systems, daytime running lights, vehicles (passive safety), roads, and trauma management. The full theory behind the indicators developed can be found in Hakkert, Gitelman and Vis (2007).

2.1 Definition of safety performance indicators (SPIs)

The following definition of safety performance indicators can be given:

Safety performance indicators are the measures (indicators), reflecting those operational conditions of the road traffic system, which influence the system's safety performance.

The purpose of safety performance indicators is

- to reflect the current safety conditions of a road traffic system (i.e. they are considered not necessarily in the context of a specific safety measure, but in the context of specific safety problems or safety gaps);
- to measure the influence of various safety interventions, but not the stage or level of application of particular measures,
- to compare between different road traffic systems (e.g. countries, regions, etc).

2.2 The role of SPIs in safety management

Safety performance indicators are seen as any measurement that is causally related to crashes or injuries and is used in addition to the figures of accidents or injuries, in order to indicate safety performance or understand the process that leads to accidents (ETSC, 2001). They also provide the link between the casualties from road accidents and the measures to reduce them (ETSC, 2006a).

Safety performance indicators can give a more complete picture of the level of road safety and can point to the emergence of developing problems at an early stage, before these problems show up in the form of accidents (ETSC, 2001; Luukkanen, 2003). Because of this, safety performance indicators help illustrate how well road safety programs are doing in meeting their objectives or achieving the desired outcomes. They are a means of monitoring, assessing and evaluating the processes and operations of road safety systems concerning their potential to solve the problems they are up against. They use qualitative and quantitative information to help to determine a program's success in achieving its objectives. They could be used to track progress and could provide a basis to evaluate and improve performance.

In order to properly perform their function, SPIs need to be relevant to the program's desired outcomes and objectives, and to be quantifiable, verifiable and unbiased.

2.3 Selected areas for SPI development

Following the recommendations of the ETSC report "Transport Safety Performance Indicators" (2001), seven problem areas were selected for the SPIs' development in SafetyNet. They are:

- Alcohol and drug-use
- Speeds
- Protection systems
- Daytime running lights (DRL)
- Vehicles
- Roads
- Trauma management

Note that these seven domains are related to different levels of the road safety system. While "alcohol" and "speeds" address "road safety problems" (or unsafe system conditions), "protection systems" and "DRL" reflect countermeasures which are intended to prevent accidents ("DRL") or to lower accident consequences ("protective systems"). The domains "roads" and "vehicles" are related to a wide area of road safety interventions, whereas "alcohol" or "speeds" are related to the area of human behaviour as cause of accidents. The domain "rescue services" (trauma management) presents an additional category of road safety issues.

2.4 Optimal indicators where possible, indirect indicators where necessary

Under normal circumstances the optimal indicator for an issue would be a direct indicator. Often this is not realizable, e.g. due to a lack of appropriate data. In that case indirect variables which describe the problem can be used as indirect indicators. If this is also not possible, the problem can be divided into several sub-problems and the indicator can be established for each of those. In this case the initial problem is not completely covered any more.

Constructing composite indicators is possible, but difficult, because any weighting process is value-laden and perhaps no longer neutral. General methodology on constructing composite indicators is described in a handbook published by OECD (2005).

In a number of cases, the SafetyNet road safety performance indicator team found that the available data do not allow for the optimal performance indicator to be used, so that a more indirect indicator had to be proposed and used. This was, for example, the case for the alcohol and drugs issue, where the optimal indicator would be related to the use of these substances in the general traffic population. Some of the larger countries in the EU, however, have laws prohibiting the appropriate measurement of the necessary data. This makes the optimal performance indicator undesirable.

2.5 General overview of SPIs developed and used for comparisons

The following table gives an overview of the safety performance indicators developed by the SafetyNet team, and which were used for the country comparisons in this report.

Indicator area	Developed indicator
Alcohol and drugs	**SPI-alcohol** • The percentage of fatalities resulting from accidents involving at least one *driver* impaired by alcohol **SPI-drug** • The percentage of fatalities resulting from accidents involving at least one *driver* impaired by drugs other than alcohol
Speeds	• The average speed either during daytime or during the night • The percentage of speed limit offenders.
Protective systems	**Daytime wearing rates of seat belts** • A – Front seats – passenger cars + vans under 3.5 tons • B – Rear seats – passenger cars + vans under 3.5 tons • C – Children under 12 years old - restraint systems use in passenger cars • D – Front seats – heavy good vehicles (HGV) + coaches above 3.5 tons • E – Passenger seats - coaches **Daytime wearing rates of safety helmets** • F – Cyclists • G – Moped riders • H – Motorcyclists
Daytime running lights	• The total usage rate of daytime running lights • The usage rate of daytime running lights per road type (4 types) • The usage rate of daytime running lights per vehicle type (4 types)
Vehicles (passive safety)	• The crashworthiness and vehicle age of the passenger car fleet • The vehicle fleet composition
Roads	**Network design** • Intersection types • Intersection density **Road design** • EuroRAP Road Protection Scores (RPS) • Share of roads with a wide median or median barrier • Share of roads with a wide obstacle-free zone or roadside barrier

Indicator area	Developed indicator (continued)
Trauma management	**Availability of Emergency Medical Services (EMS) stations** • The number of EMS stations per 10,000 citizens • Availability and composition of EMS medical staff • percentage of physicians and paramedics out of the total number of EMS staff • The number of EMS staff per 10,000 citizens • Availability and composition of EMS transportation units • Percentage of Basic Life Support Units (BLSU), Mobile Intensive Care Units (MICU) and helicopters/planes out of the total number of EMS transportation units • The number of EMS transportation units per 10,000 citizens • The number of EMS transportation units per 100 km of total road length **Characteristics of the EMS response time** • The demand for EMS response time (min) • Percentage of EMS responses meeting the demand • average response time of EMS (min) • Availability of trauma beds in permanent medical facilities • Percentage of beds in trauma centres and trauma departments of hospitals out of the total trauma care beds • The total number of trauma care beds per 10,000 citizens Furthermore, a **combined indicator** was developed to measure a country's overall performance for trauma management.

Table 2.1 Overview of the developed safety performance indicators per indicator area.

3 Data availability overview

VAN GENT[A], A.

[A]SWOV

In this chapter an overview is presented on the availability to the SafetyNet safety performance indicators team of data for each country for each of the seven indicator areas studied. In general, most countries provided a great deal of the data needed to calculate the safety performance indicators. For most indicator areas it is possible to make comparisons between several countries, based on the data provided.

The first section in this chapter shows whether the available data are sufficient to calculate the safety performance indicators ('usability'). In the second section the quality of the data is briefly discussed.

3.1 Data usability and country profile presence

On average, usable data for the calculation of safety performance indicators is available for two thirds of the countries. Most of these data were obtained via the National Experts, who filled in the questionnaires. For some indicator areas, the SafetyNet team has gathered missing or additional data via other channels, like the SUNflower+6 and the SARTRE projects.

Table 3.1 gives an overview of the data availability and usability. For each country and for each indicator area the table indicates whether or not data are available and whether these data are suitable to calculate SPIs.

Country Name	Country code	Alcohol and drugs	Speed	Protective systems	DRL	Vehicle	Roads	Trauma managment
Belgium	BE	+	+	+	-	+	+	+
Czech Republic	CZ	+	+	+	+	+	+	+
Denmark	DK	+	+	+	-	+	+	+
Germany	DE	+	-	+	-	+	~	+
Estonia	EE	+	+	+	+	+	+	+
Greece	EL	+	-	-	-	+	+	+
Spain	ES	+	~	+	-	+	+	-
France	FR	+	+	+	+	-	-	-
Ireland	IE	-	+	+	-	-	-	-
Italy	IT	+	-	+	-	~	-	-
Cyprus	CY	+	~	-	-	+	+	+
Latvia	LV	+	~	+	-	+	~	+
Lithuania	LT	+	-	-	-	-	-	-
Luxembourg	LU	-	-	+	-	-	-	-
Hungary	HU	+	+	+	+	+	+	+
Malta	MT	-	-	+	-	+	~	+
The Netherlands	NL	+	+	+	+	+	+	+
Austria	AT	+	+	+	+	+	~	+
Poland	PL	+	+	+	-	~	~	-
Portugal	PT	-	+	+	-	~	+	~
Slovenia	SI	-	-	~	-	-	-	-
Slovakia	SK	+	-	-	-	-	-	+
Finland	FI	+	+	+	+	-	-	-
Sweden	SE	+	~	+	-	+	+	+
United Kingdom	UK	+	+	+	-	+	-	+
Norway	NO	+	+	+	-	+	+	+
Switzerland	CH	+	+	+	+	~	-	-

+	[green] = data available, and can be used for the calculation of performance indicators
~	[yellow] = data available, but not suitable for the calculation of performance indicators
-	[red] = no data available

Table 3.1. Overview data availability and presence of country profiles.

Fortunately, each country did provide data for at least one of the areas. From the table it can be seen that the Czech Republic, Estonia, Hungary and The Netherlands have delivered data that is suitable to calculate safety performance indicators for all indicator areas. Many other countries could provide data for almost all indicator areas. Unfortunately there is also a small group of countries that could provide only a very small part of the data. Ireland, Italy, Lithuania, Luxembourg, Slovakia and Slovenia provided data for only one or two indicator areas. The great part of red cells in the column of DRL are notable. This is partly due to the fact that in a part of these countries (Denmark, Latvia, Norway, Sweden) the DRL usage rate is assumed to be already so high, that these countries do not find it interesting to determine the exact DRL usage rate. Furthermore there are countries in which the usage of DRL is not an issue, through which data on DRL usage rates are not collected. Taken into account that Denmark, Latvia, Norway, Sweden have such a high DRL usage rate that it is not interesting to measure the exact usage rate, these countries have provided data for all SPI areas. Most of these data are suitable for the calculation of SPIs.

3.2 Data quality

A general issue is that the quality of the provided data is often unknown. It is clear that this affects the validity of the country comparisons. The received data were checked for basic omissions, like missing values. Nevertheless, a more thorough checking of the data quality will have to be done in the future.

4 Alcohol and drugs

Assum[A], T., Holló[B], P., Houwing[C], S., Mathijssen[C], R.

[A]TØI, [B]KTI, [C]SWOV

4.1 Indicators used

The safety performance indicators used for alcohol and drugs, respectively, are:

- **SPI-alcohol:** The percentage of fatalities resulting from accidents involving at least one ***driver*** impaired by alcohol
- **SPI-drugs:** The percentage of fatalities resulting from accidents involving at least one ***driver*** impaired by drugs other than alcohol.

4.2 Are comparisons possible?

To make realistic comparisons between countries, the statistics must be defined and collected in the same way in the countries to be compared. In the case of the SPIs above there are several differences between the countries which have provided data.

Most countries provide data for drivers above the legal alcohol limit. As seen from the tables below this limit varies from 0.0 to 0.9 g/l blood alcohol concentration (BAC). The difference in legal limit may have two opposite effects. On the one hand the higher the limit, the lower the percentage of drivers who should be above this limit. On the other hand, if low legal limits have deterrent effects, there may be relatively less drivers above the legal limit in countries with low legal limits.

Another important issue is the percentage of drivers involved in fatal accidents who are actually tested for alcohol and/or drugs. In France in 2005 the BAC level is known for the drivers in 4287 fatal accidents, whereas the total number of fatal accidents is 4857. In the example provided by the UK, however, about 41% of the fatal crashes have unknown driver BAC. If the police ask for blood samples only when there is a suspicion of a driver influenced by alcohol, the percentage of drivers above the legal limit will be higher among those tested than among those not tested. The question may then be asked whether the fatal accidents with alcohol-positive drivers should be related to the number of fatal accidents with drivers tested or to the total number of fatal accidents.

Some countries include all fatal accidents where drivers under the influence have been involved, whereas others include only fatal accidents *caused* by drivers under the influence. The concept of cause is difficult in road accidents. Consequently, including only accidents caused by drivers under the influence may reduce the value of the indicator

Especially for small countries the number of fatalities is small and is subject to random variation. To reduce the effects of random variation the safety performance indicators should preferably be computed based on data for several years, rather than for one year.

Germany and Lithuania include fatalities from accidents involving drivers as well as bicycle riders and pedestrians under the influence of alcohol. Thus the values of the indicator for these two countries are likely to be higher than they would have been if only drivers under the influence were included.

When comparing countries, the data should preferably be from the same year. However, this has not been possible in the case of fatal accidents with drivers under the influence of alcohol and drugs. Sixteen countries have been able to produce data for 2005, whereas the remaining six countries for which data were available have data from 2001 to 2004. On the one hand the prevalence of impaired drivers in a national population of drivers could be expected to be rather stable from one year to the next, and thus the number of fatal accidents involving impaired drivers could also be expected to be rather stable over a few years, except for the random variation mentioned above. On the other hand one of the main objects of safety performance indicators is to show improvement or deterioration in safety over time, especially if some countries are making efforts to reduce unsafe conditions such as drinking and driving.

Only six countries have provided data for drugs other than alcohol, and even some of these countries state that these figures are unreliable because very few drivers are tested for drugs. Data for drugs – or psychoactive substances other than alcohol – is a much more complex issue than alcohol. The number of drugs is large, and some drugs may be used in some countries but not in others. Drugs vary from medical drugs in prescribed doses, to medical drugs in abuse doses and to illicit drugs in varying doses. Drugs may be combined with each other or with alcohol. In some countries the police will only ask for drug testing if the alcohol breath test is negative, but still reason to suspect the presence of psychoactive substances. Only a few countries have legal limits for some drugs. Most countries having provided data for drugs, describe neither which drugs nor the limits that were used when considering a person under the influence.

The above-mentioned factors causing differences may not be the only ones. Anyhow, they are too many to make simple transformations or corrections to improve comparability. Thus, the results shown below should be considered more as an example of possible results rather than as results showing actual and true differences between the countries. The differences between the countries are likely to reflect differences in data collection procedures and other methodological aspects more than differences in importance of alcohol and drugs as risk factors in road traffic in these countries.

Producing reliable and valid, and thus comparable safety performance indicators for alcohol and drugs for the 27 countries is likely to require considerable efforts in harmonizing definitions, data collection and data analysis methods. The most important aspect is likely to be the number of drivers involved in fatal accidents, *who are actually tested* for alcohol and/or drugs. Each country should report the number of *tested and untested* drivers involved in fatal accidents in addition to the total number of fatalities and the number of fatalities resulting from accidents with at least one driver impaired by alcohol or drugs.

4.3 Country comparisons

This section presents country comparisons for the alcohol and the drugs performance indicator, respectively. Results are only shown for those countries that have provided usable data. The following countries have supplied no data that could be used for computing the safety performance indicators for alcohol and drugs: Ireland, Luxembourg, Malta, Portugal, and Slovenia.

4.3.1 Alcohol

Twenty-three of the 27 countries provided data that could be used to calculate the safety performance indicator for alcohol.

Since the blood alcohol concentration (BAC) limit is an essential variable for the interpretation of the alcohol performance indicator, the countries are grouped according to BAC limit. Note that the measurement year can differ by country as discussed above.

Country	Year	SPI-alcohol (%)	BAC limit (g/l)
Czech rep.	2004	4.8	0.0
Hungary	2005	8.7	0.0
Slovakia	2005	12.9	0.0

Table 4.1 Comparison of the alcohol safety performance indicator for countries with a BAC limit of 0.0 g/l.

The Czech Republic has a low performance indicator value for alcohol, in spite of its legal BAC limit of 0.0 g/l, and in spite of the fact that the Czech Republic has the second highest per capita alcohol consumption in Europe (WHO 2004). The question may be asked whether this low indicator reflects the real situation or if there is a methodological explanation to it. The Czech national experts have confirmed that *all* motor vehicle drivers involved in fatal accidents are tested for alcohol. Thus, unless there are other methodological explanations, it seems that the Czech Republic has achieved a situation of practical segregation of drinking and driving for which most other countries aim.

Country	Year	SPI-alcohol (%)	BAC limit (g/l)	Comment
Estonia	2005	23.5	0.2	
Poland	2005	9.8	0.2	
Sweden	2005	25.0	0.2	Estimated on the basis of autopsies of killed drivers.
Norway	2001-2002	(22.2)	0.2	Killed drivers impaired by alcohol in % of all killed drivers rather than fatalities in accidents involving drivers impaired by alcohol. As alcohol-impaired drivers are over-represented in single-vehicle accidents, the figure for Norway is likely to be higher than the indicator for alcohol.

Table 4.2 Comparison of the alcohol safety performance indicator for countries with a BAC limit of 0.2 g/l.

Country	Year	SPI-alcohol (%)	BAC limit (g/l)	Comment
Belgium	2002	8.2	0.5	Only an estimated 20% of drivers involved in fatal accidents are tested. If this estimation is taken into account, the indicator will be 40.7%.
Denmark	2005	16.0	0.5	
Greece	2004	9.4	0.5	
Spain	2005	(29.5)	0.5	Killed drivers impaired by alcohol in % of all killed drivers rather than fatalities in accidents involving drivers impaired by alcohol. As alcohol-impaired drivers are over-represented in single-vehicle accidents, the figure for Spain is likely to be higher than the indicator for alcohol.
France	2005	28.8	0.5	Calculated as % of fatal accidents with tested drivers. Likely to give higher value than if calculated as % of all fatal accidents.
Hungary	2005	8.4	0.5	Legal limit 0.0, but data also provided for BAC>0.5.
Latvia	2005	21.7	0.5	
The Netherlands	2005	8.3	0.5	
Austria	2005	5.9	0.5	
Portugal	2005	(27.8)	0.5	Killed drivers impaired by alcohol in % of all killed drivers rather than fatalities in accidents involving drivers impaired by alcohol. As alcohol-impaired drivers are over-represented in single-vehicle accidents, the figure for Portugal is likely to be higher than the indicator for alcohol.
Finland	2005	23.4	0.5	
Switzerland	2005	19.3	0.5	

Table 4.3 Comparison of the alcohol safety performance indicator for countries with a BAC limit of 0.5 g/l.

Also for Austria the indicator value is so low that the question may be asked whether it conveys the real situation or whether it is due to methodological factors.

Four of the remaining countries all use a different BAC limit, and one country, Italy, has not provided information about its legal limit. Because of this difference, their calculated performance indicators are considered incomparable. Calculated values for the performance indicator for those countries are presented in the following table.

Country	Year	SPI-alcohol (%)	BAC limit (g/l)	Comment
Germany	2004	12.1	0.3	0.3 g/l is BAC limit of accident involved drivers
Italy	2004	(72.2)	0.5	Extreme value. Request for confirmation submitted, but no reply received.
Cyprus	2005	22.5	0.9	Limit changed to 0.5 in 2006
Lithuania	2005	14.8	0.4	
UK	2004	17.0	0.8	Estimated by Department of Transport, UK

Table 4.4 Calculated of the alcohol safety performance indicator for countries with BAC limits other than 0.0, 0.2 or 0.5 g/l.

The value for the indicator for alcohol varies from 4.8% in the Czech republic to 28.8% in France, disregarding the figures for Spain and Italy, which in the case of Spain is a slightly different statistic and in the case of Italy is likely to be an error. However, the French result is likely to be an overestimation as it is computed on the basis of the fatalities for which the BAC level of the drivers was known. For Belgium the value of the indicator is 8.2%, but it is estimated that only some 20% of drivers involved in fatal accidents are tested for alcohol. If this fact is taken into consideration, the indicator value for Belgium may be higher. This example shows that extreme care should be taken in comparing the alcohol performance indicator values for the European countries at this stage.

4.3.2 Drugs

Only few countries could provide data that could be used to calculate the value of the performance indicator for drugs. The following table provides an overview of this indicator for those countries.

Country	Year	SPI-drug (%)
Belgium	2002	0.9
Czech rep.	2004	0.1
Cyprus	2005	2.9
Finland	2005	1.8
Norway*	2001-2002	(30.1)
Switzerland	2005	7.6

*Table 4.5 Comparison of the drugs safety performance indicator. (*The figure for Norway is the number of killed drivers impaired by drugs as percentage of all killed drivers, which is likely to yield an overestimation of the indicator value. See also the comment to the Norway data in Table 4.2.)*

As described in section 4.2 only one of the countries providing data for drugs (Switzerland) describes which drugs or which limits used, and only for illegal drugs. Consequently, the figures in Table 4.5 should be considered as an example of the drug safety performance indicator rather than comparable figures.

5 Speed

RIGUELLE[A], F.

[A]IBSR

5.1 Indicators used

The safety performance indicators used for speed are:

- The average speed either during daytime or during the night;
- The percentage of speed limit offenders.

5.2 Are comparisons possible?

The possibility of international comparisons for speeding performance is very limited at the moment. The problem is not the availability of speed data throughout Europe; most countries make large-scale speed surveys and even compute the proposed safety performance indicators. The average speed and the percentage of offenders are the more frequently reported indicators. The huge variability in the way countries conduct their survey, however, prohibits wide-scale comparison. Main issues are:

Representativeness of measuring locations

Only 8 out of the 18 European countries which have data and for which we have information use a sampling procedure to select their measuring locations. The others prefer to choose them on high traffic or high accident rate axes only. They are sometimes even not interested in a national estimate and concentrate on individual road analysis. Furthermore, in some countries (e.g., Germany, The Netherlands), it is not a national organism which is responsible for speed monitoring. That leads to different types of speed surveys in different parts of the country, producing data that are impossible to aggregate at the national level. Unfortunately, we do not have estimates of the influence of the choice of the measuring location on the value of the safety performance indicators.

Traffic conditions

The traffic conditions under which the measurements are considered as valid also vary across countries. Ireland and Austria select perfectly free-flowing vehicles only. The United Kingdom only leaves out obvious congestion periods. Others countries lay in between (Belgium and the Czech Republic) or do not give information. Since traffic conditions have a significant impact on the speeds at which drivers operate their vehicles, one should only compare speed measurements that were carried out in similar non-congested traffic conditions. This is not strictly possible at the moment due to the differences in methodologies between countries.

Comparability of roads

Road classifications and speed limits vary between countries. The information on this is generally well-reported along with survey results but issues of comparability are still raised. It is not possible to define a simple transformation rule that would allow comparing similar roads with different speed limits in a perfect way. It is also impossible to find one corresponding road in each country for each SafetyNet road category. Nevertheless, three road types can be found almost anywhere: motorways (AAA), single carriageways A-level road (A) and urban single carriageway distributor roads (D).

Even roads of the same type and of the same speed limit are designed differently across Europe. The influence of that can be minimised if strict criteria are applied to select measuring locations. There is a broad acceptance of the idea that speed measurement should be done on straight roads and far from anything that may slow speed. However, the effort made to apply these criteria may vary, especially for urban roads where it is very hard to meet all the criteria. The information on the 'freedom' taken by surveyors in relation to their 'ideal' criteria is never available in the survey reports.

Period of measurement

The length of time of measurements varies from a few hours to a whole year depending on the country. When speed is measured for a few hours, this is mostly done during the day. Distinction between day and night measurements is usually available for longer studies but other time distinctions (weekday/weekend, time of the year) are more uncommon.

Vehicle types

Speed indicators are not published everywhere for the same types of vehicles. Due to the different shares in traffic of the different types of vehicles between countries, it is better to compare indicators for one vehicle type only (e.g. cars). Unfortunately, indicators aggregated over all vehicles types are sometimes the only available indicators.

Accuracy of data

There are many sources of uncertainties in speed data: accuracy of the device, representativeness of the sample of locations, size of the sample, handling of data, etc. It is thus virtually impossible to calculate the margin of error on the finally calculated safety performance indicators. In comparisons it will be impossible to determine with certitude whether any two values are significantly different or not.

5.3 Country comparisons for motorways

Despite all these restrictions, we propose a comparison of speeds on motorways. On this type of road, the issue of road comparability is minimised (but speed limits still differ). Intuitively, it seems also easier for countries to produce a representative sample of their motorway network comparing to other road types.

Figure 5.1 and Figure 5.2 illustrate the comparisons. Values for daytime only, night time only and whole days are reported in the same graphs. It must also be noted that no standardisation was carried out concerning different speed limits across countries. The different speeds limits are indicated by different colours (note the speed limit change in Ireland between 2003 and 2005. The comparison is limited to 2005 because annual indicators for 2006 data are not yet available except in Czech Republic.

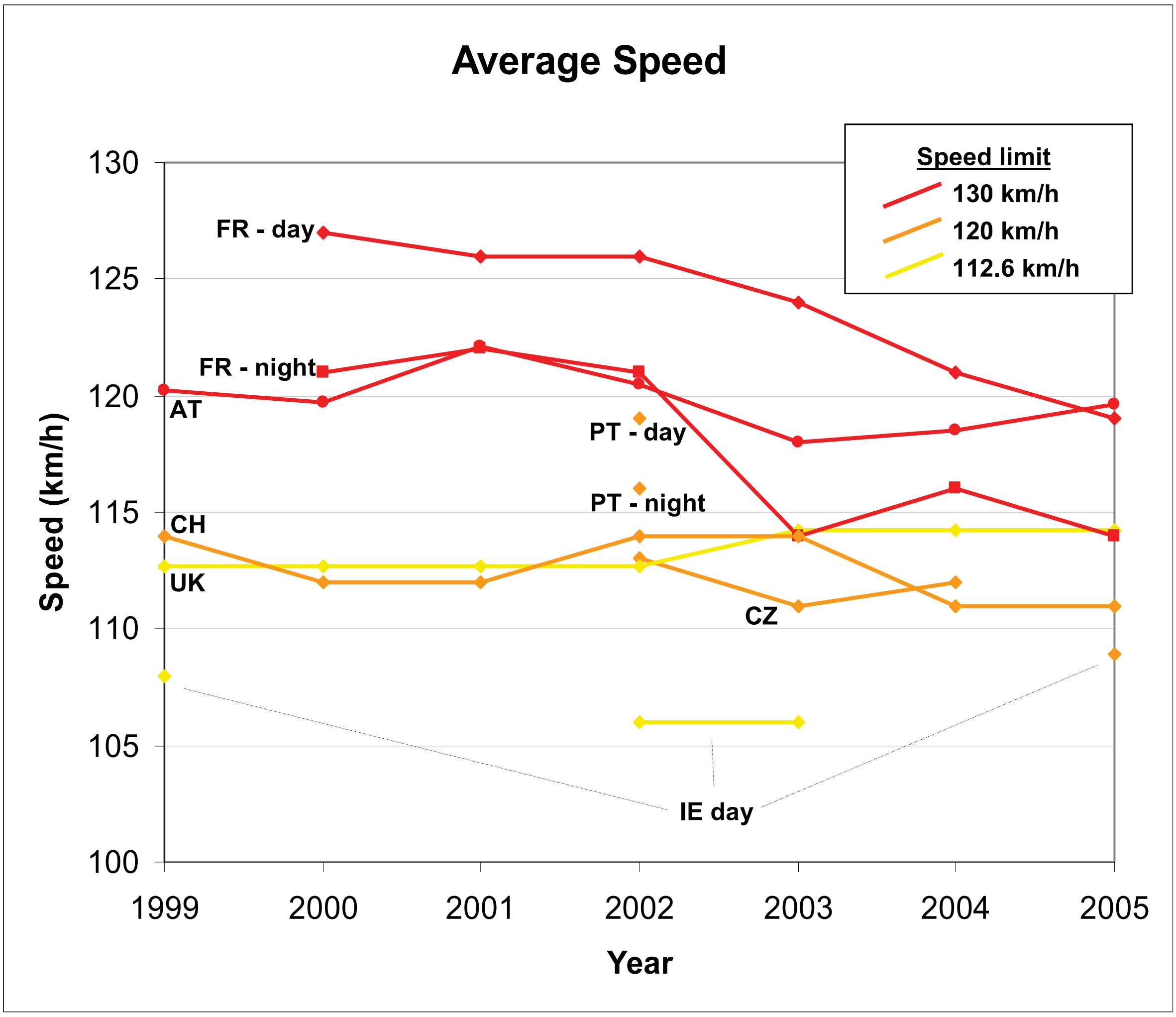

Figure 5.1 Comparison of average speeds of cars on motorways between six countries (* all traffic together for Czech Republic and Switzerland).*

For most of the differences in methodologies between countries, we have a qualitative idea of the influence it should cause on measured speeds. For example, the fact that Ireland measures strictly free-flowing vehicles will cause the measured speeds to increase; motorways with higher speed limits will have higher speeds. We will not comment differences that are following our expectations because we cannot estimate whether the observed differences are only caused by differences in methodologies or not. On the other hand, if differences are contradictory compared to our expectations, it is more relevant because it means that additional factors, such as the behaviour of drivers related to speed, may differ between the countries.

The figure shows that average speeds are relatively low in Ireland compared to the other countries. Until 2004, the Irish speed limit is comparable to that in the UK and higher than on French 110 km/h roads but Irish speeds are significantly lower. In 2005, despite the raise of the speed limit in Ireland to 120 km/h, the average speed remained lower than on UK motorways and is the same as on French 110 km/h motorways. The inverse results would have been expected, because the UK and France only leave out obvious congestion conditions from their data but do not select perfectly free-flowing vehicles, such as it is done in Ireland. Despite higher speed limits than in the UK, average speeds in Switzerland and Czech Republic are slightly lower in the last years. But it should be noted that all vehicles types are included in the indicators for these two countries, which likely have the consequence of lowering the average speed comparing to a “car-only” situation.

We may also look at the trends. First note that speed can vary much over the years. This may be due to actual changes in speed but also to variability generated by the methodologies. Whatever the cause, it implies that comparisons should not be based on one single year of measurement but better on a time series of data. It also shows the interest for countries to implement regular speed measurements instead of episodic surveys.

We saw that speeds decrease on French motorways, contrarily to Austria, UK and Ireland. The strong emphasis made by French authorities on enforcement is surely the main cause of this observation.

In summary, the only things we can mention with the comparisons are that the speeds on Irish motorways are low and that it is in France that the most progress is currently made. It would be very hazardous to try to derive more conclusions from the current data. In general, current speed data are more accurate to compare trends than absolute values because internal country methodologies usually remain consistent in time. On the other hand, nothing can be stated with enough certitude at the moment about absolute values due to the difference in the methodologies used across counties.

On a side note, French and Portuguese data also allow studying the difference in speeds between daytime and night. Unexpectedly, speeds at night are lower than daytime speeds in Portugal and on French 130 km/h motorways. We may consider that the observed differences between day and night speeds in France are significant because they remain over time and at the scale of one country, the methodologies for day and night measures are the same. This finding reemphasises the idea that day and night speeds should be considered separately and should not be combined into one safety performance indicator.

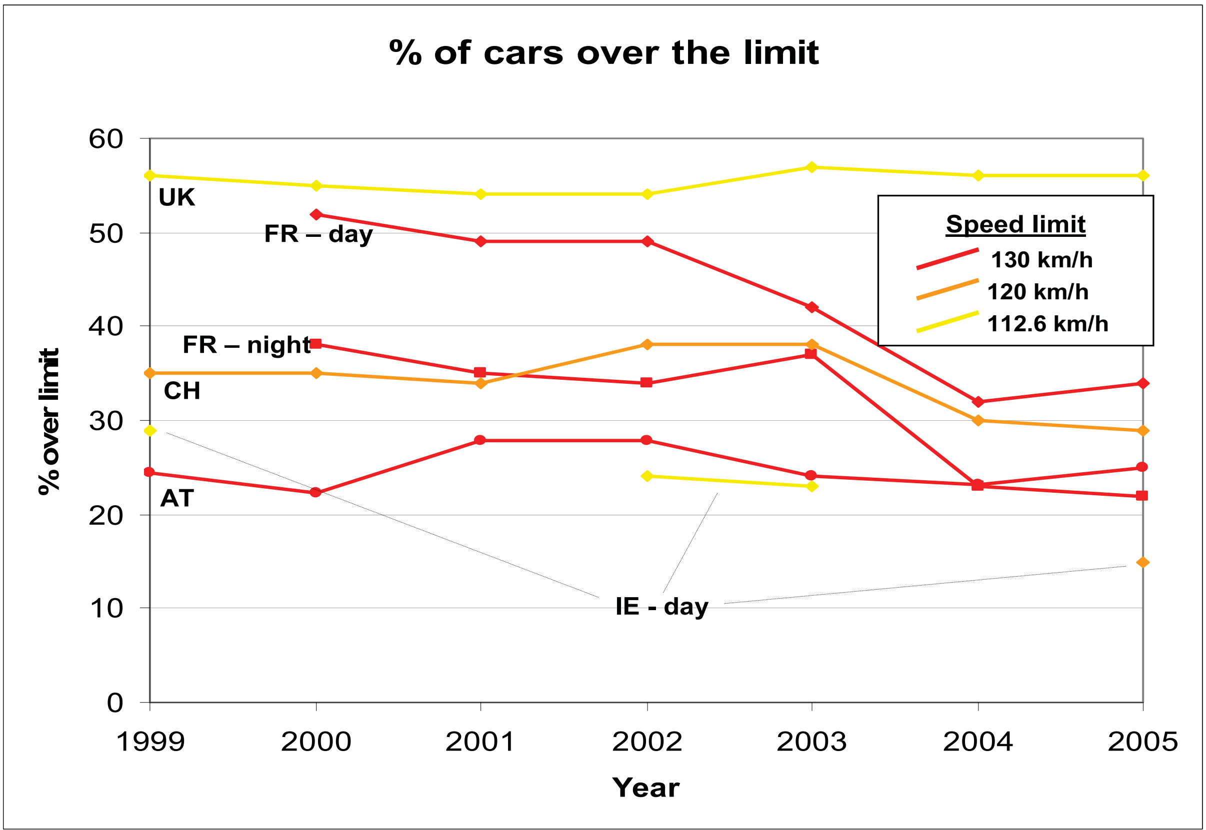

Figure 5.2 Comparison of the percentage of cars over the limit on motorways in five counties (* all traffic together for Switzerland).*

Concerning the percentage of offenders, we observe that its value is higher on roads with lower speed limits. Still, Ireland is an exception. The percentage tends to decrease on French motorways in the last three years. This is also the case in Ireland.

6 Protective systems

EKSLER[A], V.

[A]CDV

6.1 Indicators used

The safety performance indicators used for protective systems are:

Daytime wearing rates of seat belts

- A – Front seats – passenger cars + vans under 3.5 tons
- B – Rear seats – passenger cars + vans under 3.5 tons
- C – Children under 12 years old - restraint systems use in passenger cars
- D – Front seats – heavy good vehicles (HGV) + coaches above 3.5 tons
- E – Passenger seats - coaches

Daytime wearing rates of safety helmets

- F – Cyclists
- G – Moped riders
- H – Motorcyclists

6.2 Are comparisons possible?

A comparison can be performed on basis of the data available to the SafetyNet team. The use of at least one type of protective system in traffic has been assessed through independent roadside surveys in almost all countries, except Cyprus, Greece, Lithuania and Slovakia. In some particular cases, the values of indicators cannot be considered as valid and comparable as they do not fulfil defined conditions on accuracy. In these cases, the rough estimates of indicators are presented to give an impression of the magnitude of relevant road safety problem. All results presented concern the situation in 2005, unless stated otherwise. Data for 2006 will becomes available for many countries only in early 2007.

The following criteria were considered regarding the validity and comparability of the indicators produced by member states:

- Origin - roadside observational survey (independent)
- Fitness to indicator/sample definition (road user definition)
- Representativeness (observations on all road types, several locations for each)
- Time coverage - daytime during week days, no public holidays period
- Appropriate aggregation (by exposure) + transformation rules applied

6.3 Country comparisons

6.3.1 SPI-A: daytime wearing rates of seat belts in front seats of passenger cars and vans under 3.5 tons

The seat belt wearing rate in front seats (whether driver only, or also front passenger) is assessed in 20 of the 25 EU member states, in Norway and in Switzerland. The rates for France, Italy, Latvia, Malta, Poland and Portugal cannot be considered as valid and fully comparable, because they do not fulfil all above-mentioned criteria. (In particular, they are usually not representative for the entire road network due to a limited number of observation sites on one/two road types only.) However, they still provide a rough estimate of indicator value.

For many countries, only disaggregated values for driver and front seat passenger are available. Where an aggregated value was not available, we made use of a weighting coefficient of 0,35 for front seat passenger and 0,65 for the driver to get the value of the desired indicator (unless stated otherwise). (By the way, in countries with the most sophisticated survey design such as Germany, France, Sweden, or UK, the wearing rates for driver and for front seat passenger vary by max.1-2 %-points.) Similarly, if the rate was available for the driver only, it has been considered as corresponding to the indicator SPI-A.

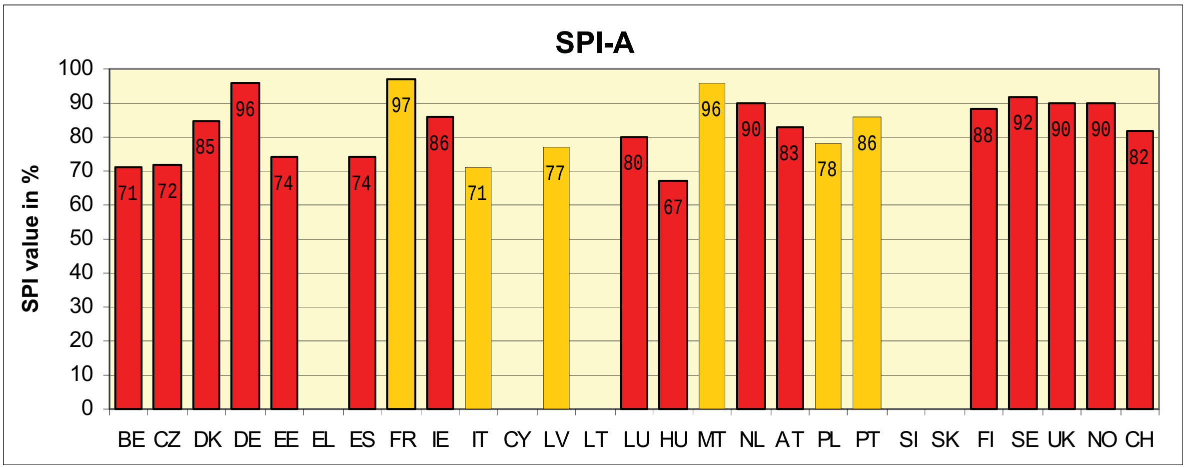

Figure 6.1 2005 Daytime seat belt wearing rate on front seats of passenger cars and vans under 3.5 tons (SPI-A). Remarks: LU: 2003; LV,MT: 2006; DK,DE,EE,IT,FR,PT,LU,CH: only driver wearing rates considered; FR: vans not included; IT,LV,MT,PL,PT does not fit to defined requirements.

Only Germany, France and Malta register wearing rates above 95%, while the rates under 75% are registered in Belgium, Czech Republic, Estonia, Spain, Hungary and Poland. The rates in Slovakia, Lithuania and Greece, where the surveys have not been performed yet are presumably even lower, as foreshadowed by available data on the indirect indicator (rates by accident fatalities).

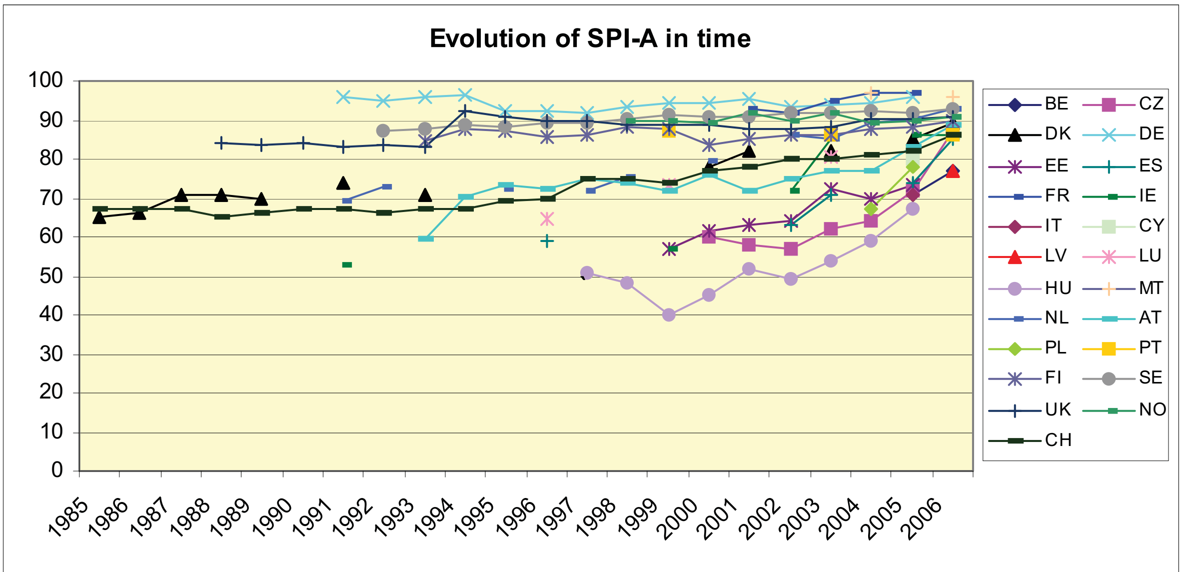

Figure 6.2 Time series of daytime seat belt wearing rate on front seats of passenger cars and vans under 3.5 tons (SPI-A).

From the time-series data, the evaluation of countries' seat belt wearing rates in time can be done, however an attention must be paid, since the national methodologies were often subject to changes over the years. The concept of conversion rates originally proposed by the NHTSA is used here. The conversion rate is the rate of decrease of non-use of protective systems from one year to other. The countries with already high wearing rates are not penalized by this evaluation. The user/nonuser categorization is a bit simplistic, since most of vehicle occupants are part-time users. However the use/non-use categorization is helpful for thinking about conversion rates. Here we can evaluate the improvement in seat belt wearing (SPI-A indicator) realized between 2000 and 2005. This was highest in The Netherlands (CR=55%), Hungary (CR=40%), Norway (CR=38%) and Czech Republic (CR=30%). That is, the countries “converted” 55%, 40%, 38%, and 34%, respectively, of its population that was not using belts in front seats in 2000 to using belts in 2005.

We can further estimate the overall wearing rates in 25 EU member states using known and estimated indicator values and weighting them by the exposure of country population in road traffic (EUROSTAT). This is determined as 86% in 2005. (See Appendix A.)

6.3.2 SPI-B: daytime wearing rates of seat belts in rear seats of passenger cars and vans under 3.5 tons

The seat belt wearing by passengers in rear seats of passenger cars and vans is assessed in 16 EU member states, in Norway and in Switzerland. Rates for the Czech Republic, Latvia and Malta cannot be considered as valid and fully comparable, but still provide a rough estimation of CRS use in road traffic.

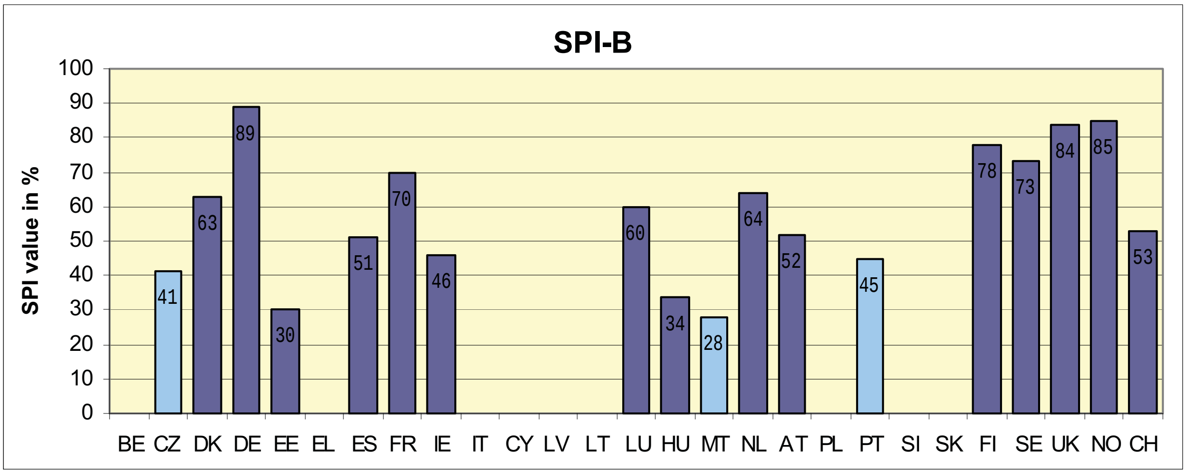

Figure 6.3 2005 Daytime seat belt wearing rate on rear seats of passenger cars and vans under 3.5 tons by persons above 12 years old (SPI-B). Remarks: LU: 2003, CZ, LV, MT: 2006; DK>16 years old, AT, IE>18 years old.

For all countries, the rates are substantially lower in comparison with the wearing rates on front seats (SPI-A) and in general are higher in those countries with higher rates for front seats and lower in those countries with lower rates for front seats. More precisely, there is a large positive correlation between the values of indicators SPI-A and SPI-B. (For 16 data pairs, the Pearson's product-moment correlation coefficient is equal to 0.65, p-value=0.0066.)

Improvement done between 2000 and 2005 was highest in Netherlands (CR=47%), Germany (CR=39%) and Switzerland (CR=31%). That is, the countries “converted” 47%, 39%, and 31%, respectively, of its population that was not wearing seat belts in rear seats in 2000 to using belts in 2005.

We can further estimate the overall wearing rate in EU25 member states using weights for traffic performance (EUROSTAT). This is determined as 63% in 2005. (See Appendix A.)

6.3.3 SPI-C: daytime usage rate of restraint systems in passenger cars by children under 12 year old

The rate of child restraint systems use is regularly assessed in 9 of the 25 EU member states, in Norway and in Switzerland.

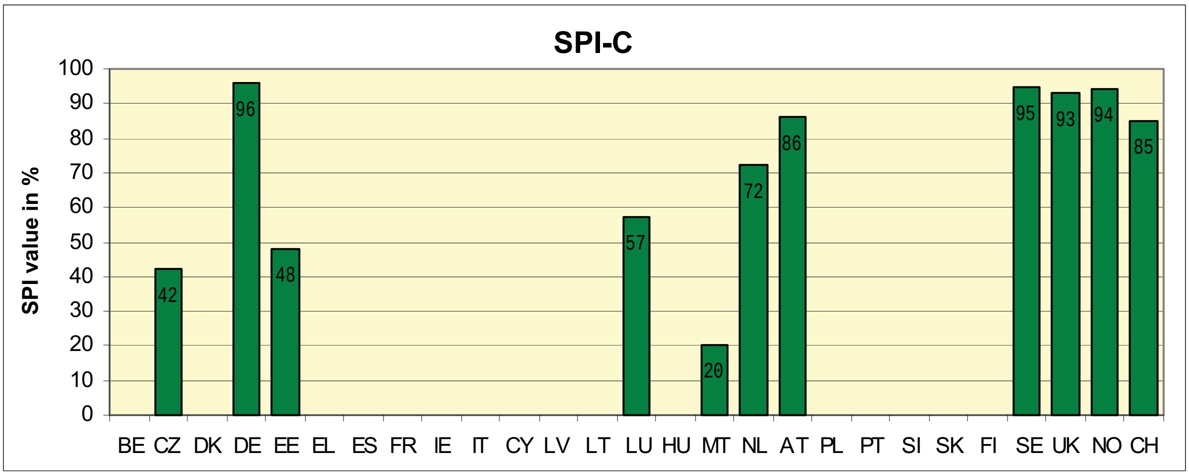

Figure 6.4 2005 Daytime usage of child restraints by children under 12 years old (SPI-C). Remarks:, MT: 2004; AT under 150 cm, NL: under 135 cm.

Figure 6.4 shows the child restraint usage rate for the 11 countries for which data are available. Note that the rates correspond to the use of the system and not to the correct use. This should be taken into account, as the misuse of child restraint systems is an important issue. There is a great variety in survey methods (including the nature, sampling, etc.) possibly causing difficulties in a correct interpretation of presented data. Moreover, in some countries, the proposed definition for the indicator, encompassing all children under 12 years old travelling in passenger car, do not strictly fit to the national methodologies, or to the legislation.

6.3.4 SPI-D: wearing rates of seat belts in front seats of HGV and coaches above 3.5 tons

The proposed indicator is addressed in only two countries at the moment – in Germany and in Sweden. The most recent rates are 51% for Germany in 2005 and 36% for Sweden in 2004. Interestingly, significant differences have been found in Germany between locally registered vehicles and vehicles registered abroad in 2005 (39 and 53%, respectively).

6.3.5 SPI-E: wearing rates of seat belts in passenger seats of coaches

The proposed indicator has not been assessed in any country until now.

6.3.6 SPI-F, SPI-G, and SPI-H: wearing rates of safety helmets by cyclists, moped riders and motorcyclists, respectively

Helmet wearing rates by cyclists have been assessed in 3 EU countries, in Norway and in Switzerland. The value is rather low in Germany (10%) and somewhat higher (around 30%) in Finland, Sweden, Norway and Switzerland. Helmet wearing rates by moped riders are known for 3 EU countries, in Norway and Switzerland, with values ranging from 60 to 100%. Helmet wearing by motorcyclists is not evaluated in some countries where the rate is considered to be 100% (e.g. Germany, Finland). It is high in all countries where the figures are available, with the exception of Spain, where it reaches 84%.

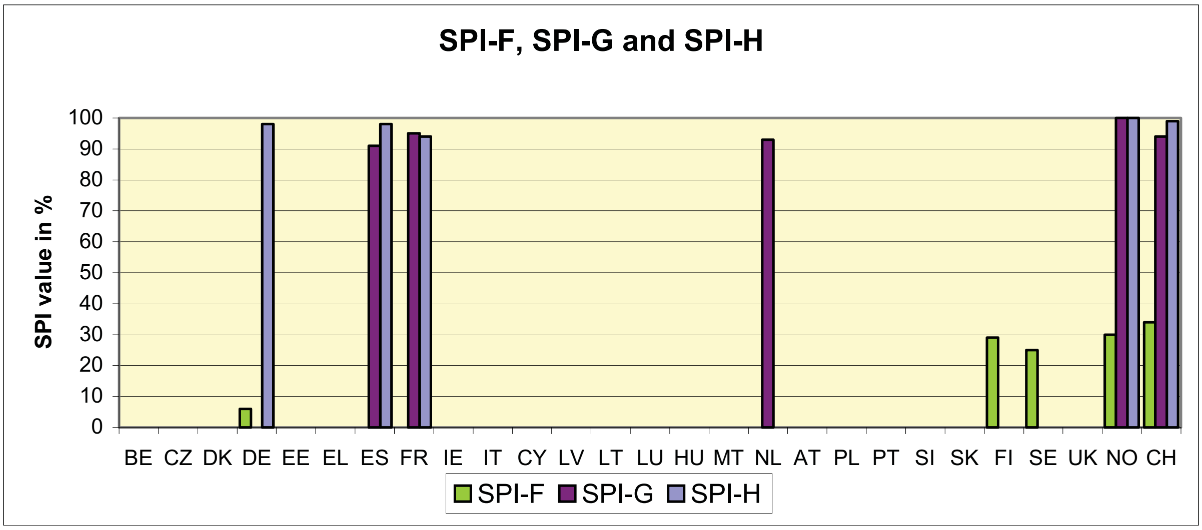

Figure 6.5 2005 Daytime usage rates of safety helmets by two-wheelers (SPI-F: cyclists; SPI-G: moped riders; SPI-H: motorcyclists).

In general, when assessing helmet use, both riders and their passengers are observed on motorized two-wheelers. Presented estimates can be biased by the use of a limited number of observation sites, and observed individuals.

6.4 Considerations

The **presence of seat belts** reaches almost 100% in passenger cars, but it is assessed (by means of a questionnaire) in just one country (in Sweden). Seat belt penetration is 99,5% for front seats (98% for rear seats) of registered passenger cars and 50% of registered heavy goods vehicles. The latter percentage foreshadows the problem of low penetration of seat belts in heavy good vehicles in the EU.

The knowledge on the **presence of airbags** in vehicles in member states is limited and has been recently assessed by means of a questionnaire in one country only – The Netherlands. This country reported that 73%, 67%, 29%, and 17% of passenger cars are equipped by driver front, passenger front, side impact front seat and side impact rear seat airbags, respectively. Data available from the national vehicle registers cannot provide sufficiently accurate estimates, since some vehicles are not re-equipped by airbags after sustaining a crash, what is particularly a case of Central and Eastern European countries.

Further comments:

- Using aggregation rules, it has been possible to figure out comparable and reliable values of the proposed indicators, since there are few countries using same sampling, observation and data proceeding methods. (see Country profiles)
- In some countries the indicators do not fit defined requirements, but can be considered as a rough estimates.
- Adjusting national methods to fit the proposed methodology seems to be a feasible task, which will not restrain countries from continuing to calculate figures in the same manner as before (in order to keep time-series data).
- For most countries, valuable time-series data are available and presented in their country profiles.
- Data for calculating the values of indirect indicators (protective systems use in accidents) are often missing and seem unreliable (e.g. due to a high proportion of unknown cases). They have a high value for policy-making, as they are necessary for a reliable estimation of lives saved by protective systems and of their lives save potential.

7 Daytime running lights

HOLLÓ[A], P., AMELINK[B], M., GITELMAN[C], V., SCHOON[B], C.
[A]KTI, [B]SWOV, [C]TECHNION

7.1 Indicators used

The safety performance indicators used for daytime running lights are:

- The total usage rate of daytime running lights;
- The usage rate of daytime running lights per road type (4 road types);
- The usage rate of daytime running lights per vehicle type (4 vehicle types).

7.2 Are comparisons possible?

Eight countries were able to deliver data on usage rates of daytime running lights (DRL) per road type. These rates can be compared, but several aspects should be borne in mind. When comparing countries, some differences can be partially explained by differences in the country's characteristics. For DRL, the most important characteristic is the DRL legislation. There are differences in whether or not DRL is obligatory, recommended or neither of the two. Furthermore there are differences in vehicle type, road type and time of year for which the regulations are valid. Other relevant country characteristics concerning DRL are the latitude of the country; the closer to the equator, the smaller are the effects of DRL, through which the usage rate could be lower. Subsequently the automatic switch-on of lights in vehicles is a relevant factor. Besides, it must be noted that the data for the different countries pertain to different years.

Only one country provided data on DRL usage rates per vehicle type: Switzerland. None of the countries provided the total DRL usage rate, as only Switzerland has data on the DRL usage rates per vehicle type. Therefore the comparison of countries is not possible for the SPIs 'Total usage rate' and 'Usage DRL rates per vehicle type'. Furthermore, it is likely that some countries have calculated the usage rate at DRL roads inappropriately. Most countries have calculated this by taking the average of the DRL rates at the road types at which DRL is obligatory. However, this should be weighted by traffic density.

7.3 Country comparisons

For the eight countries that provided data on the DRL rate per road type, the data can be compared (Table 7.1). The DRL usage rate is the percentage of the motorized vehicles that have switched on their lights during daytime. These rates can be determined per vehicle type and per road type. Note that reporting years are different for the different countries. An extreme case is formed by The Netherlands, for which the most recent DRL rates date from 1993. It is assumed that the 97% DRL usage rate in Finland on roads outside urban areas is valid on both motorways and rural roads.

Country	Year	Motorways	Rural roads	Urban roads	DRL roads
Austria	2006	94	90	87	91
Czech Republic	2004	100	77	86	88
Estonia	2004	99	100	99	99
Finland	2002	97	97	95	-
France	2004	35	24	-	30
Hungary	2005	95	84	5	-
Switzerland	2004	51	48	46	48
The Netherlands	1993	25	19	14	-

Table 7.1 Daytime running lights usage rates on different road types for 8 countries.

In Austria (since 2006), Czech Republic (since 2004), Estonia and Finland, DRL is obligatory for all vehicle types, on all road types, and all year long, in Hungary only outside urban areas. DRL is recommended in France and in the Netherlands. DRL is (highly) recommended by law in Switzerland for all motor vehicle types, all year, on all road types. There are plans to make DRL obligatory in the future. But until now, DRL is not obligatory.

Several countries, Norway, Denmark, Sweden, Estonia and Latvia have a DRL law for all vehicle types, during all year and on all roads for a long time. Besides, almost all vehicles are equipped with automatic switch-on lights. In most of these countries the DRL usage rate is said to be close to 100%. Due to this, the countries feel it is not necessary to survey the DRL rate. These countries, therefore, do not have recent DRL usage rate data, except for Estonia.

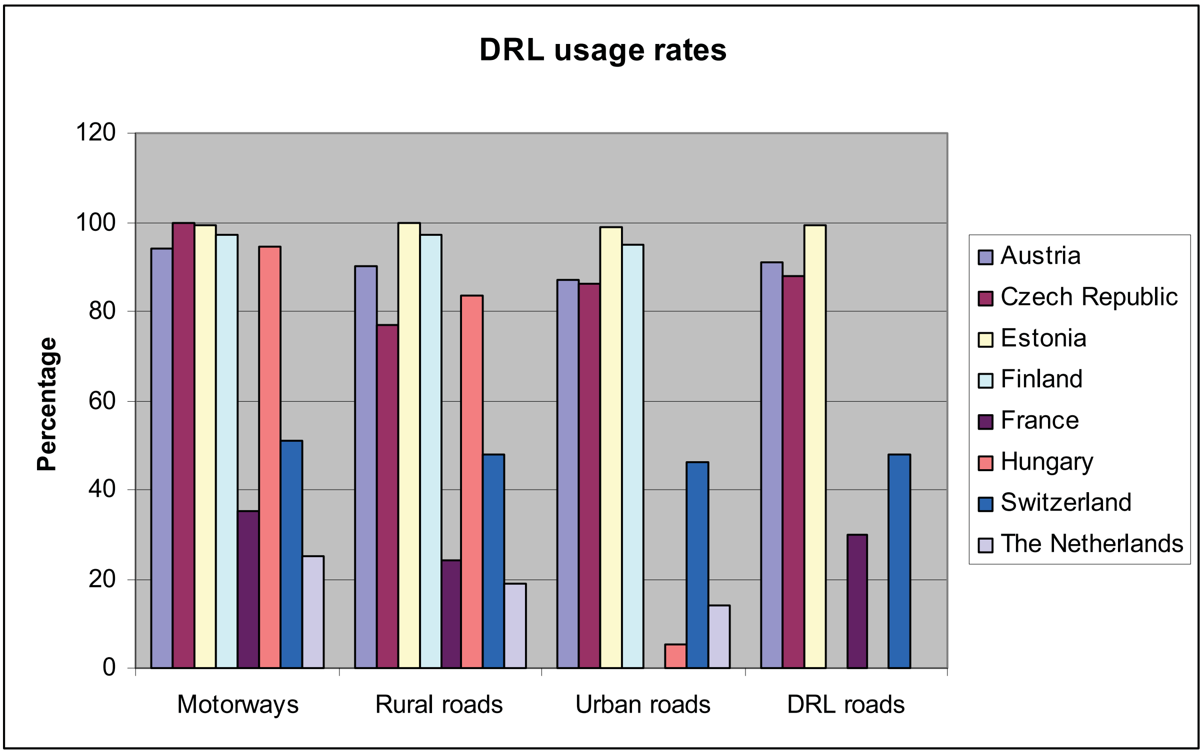

Figure 7.1 Daytime running lights usage rates on different road types for 6 countries.

Figure 7.1 shows the DRL usage rates in a bar chart. It is clearly visible that the DRL usage rates are highest in the countries and at the road types where DRL is obligatory. In Hungary, for example, DRL usage is high on roads outside urban areas. Inside urban areas it is not compulsory, the usage rate there is 5%. Switzerland has a high usage rate, considering that DRL is not compulsory. This could be explained by the recommendation by law in

Switzerland. Austria, Czech Republic, Estonia and Finland have high DRL values for all road types. The DRL rate at the road type 'DRL roads' consists of the DRL rates at the road types at which the usage of DRL is obligatory by law in a country.

8 Vehicles (passive safety)

RACKLIFF[A], L., HADDAK[B], M., PAGE[A], M., VIS[C], M.A.

[A]VSRC, [B]INRETS, [C]SWOV

8.1 Indicators used

The safety performance indicators used for vehicles (passive safety) concern:

- The crashworthiness and vehicle age of the passenger car fleet;
- The vehicle fleet composition.

8.2 Are comparisons possible?

The SafetyNet team received vehicle fleet data from 19 countries. However, there were variations in the level of detail and degree of accuracy between different countries. Common problems included; failure in some countries to remove all scrapped vehicles from the database; lack of detailed information about vehicle make and/or model in some countries; use of database from a year other than 2003, leading to compatibility problems.

Keeping the above considerations in mind, the countries can be compared, though, either on parts of their data or by complete comparisons. The following sections show these comparisons.

8.3 Country comparisons

8.3.1 Crashworthiness and vehicle age of the passenger car fleet

To explain the comparison of the countries' fleets using the combined crashworthiness-passenger car age safety performance indicator, first the different aspects of the countries' vehicle fleets are shown.

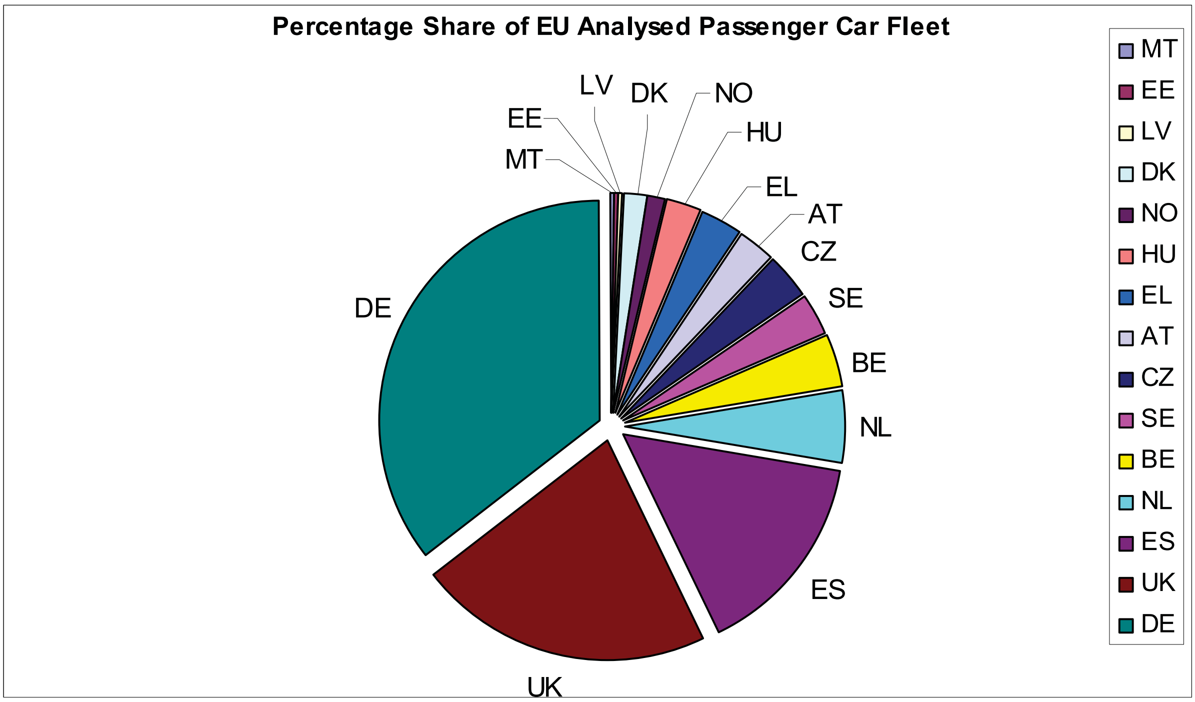

Figure 8.1 2003 Percentage share per country of total passenger car fleet of countries that responded.

The chart above shows per country the percentage share of the total fleet of countries that responded, registered in 2003. Of these, Germany and the UK have the biggest fleets, representing almost one third of the total vehicles in the EU. These countries have the biggest populations and a high level of car ownership.

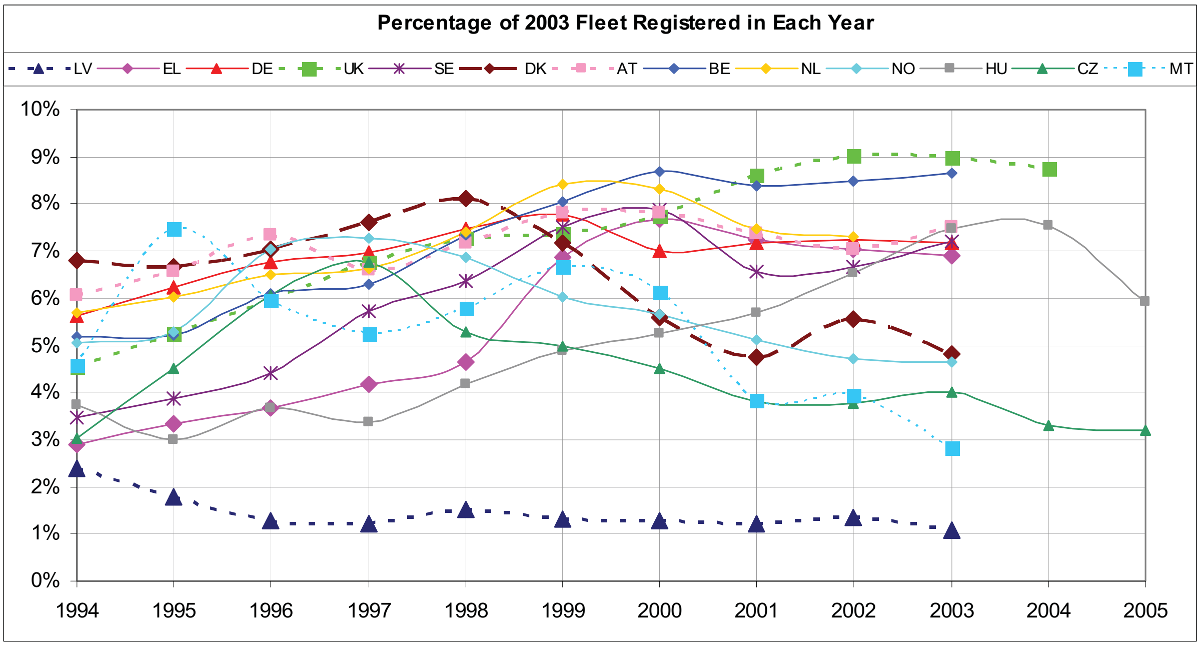

Figure 8.2 Percentage of cars within the 2003 fleets registered in different years.

The 2003 fleets consist of cars registered in different years. Figure 8.2 shows the percentage of the 2003 fleet that was registered in each year from 1994 onwards. Austria, Germany and the UK have the highest proportion of new vehicles, whilst the proportion of new vehicles in Latvia is consistently considerably lower than in the other countries. A sudden increase can be noted in the registration of new vehicles in Greece between 1998 and 2000. It is likely that this can be attributed to a tax incentive introduced to encourage the replacement of older vehicles. Conversely, there is a fall in the number of vehicles registered in Denmark between 1998 and 2001. It is likely this is also the result of fiscal changes relating to the duty on new cars, which made new car purchases less attractive to consumers.

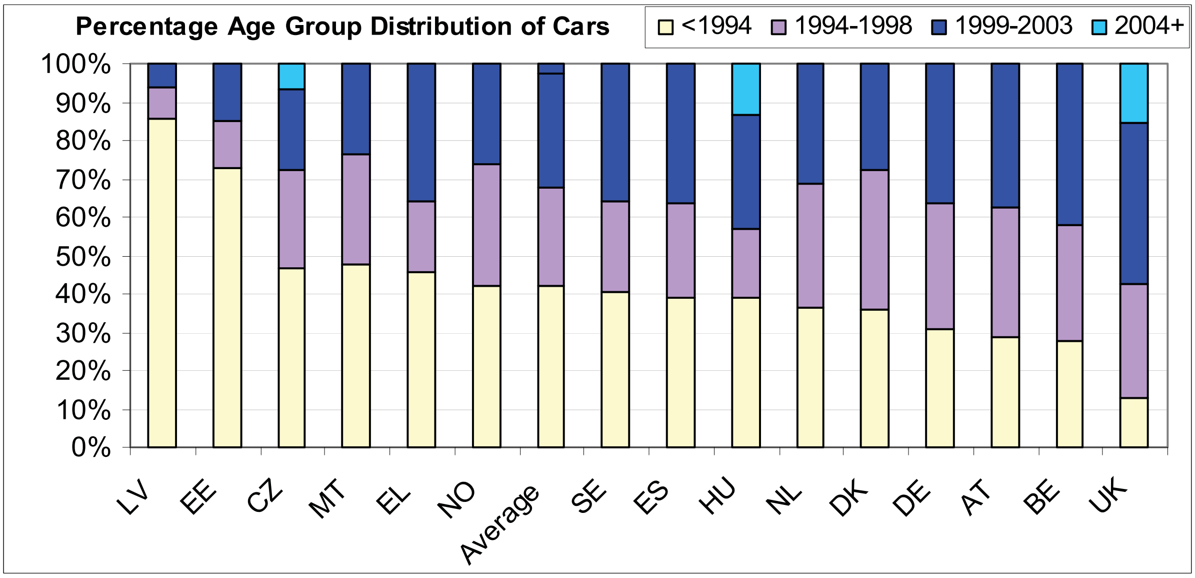

Figure 8.3 Passenger car age group distributions in the 2003 fleets.

The chart above shows the fleet distribution divided into three age groups. It demonstrates that some countries have a more even distribution between old and new cars, whereas in others the fleet is dominated by a greater proportion of old cars (Latvia) or by new cars (UK). This raises compatibility issues, as collisions between very old poorly equipped vehicles and newer, heavier vehicles with a high level of equipment will pose a significant risk for the occupants of the older vehicle. Interestingly Germany, which is generally perceived across Europe to have a new vehicle fleet actually has a very even distribution of vehicle age throughout the fleet.

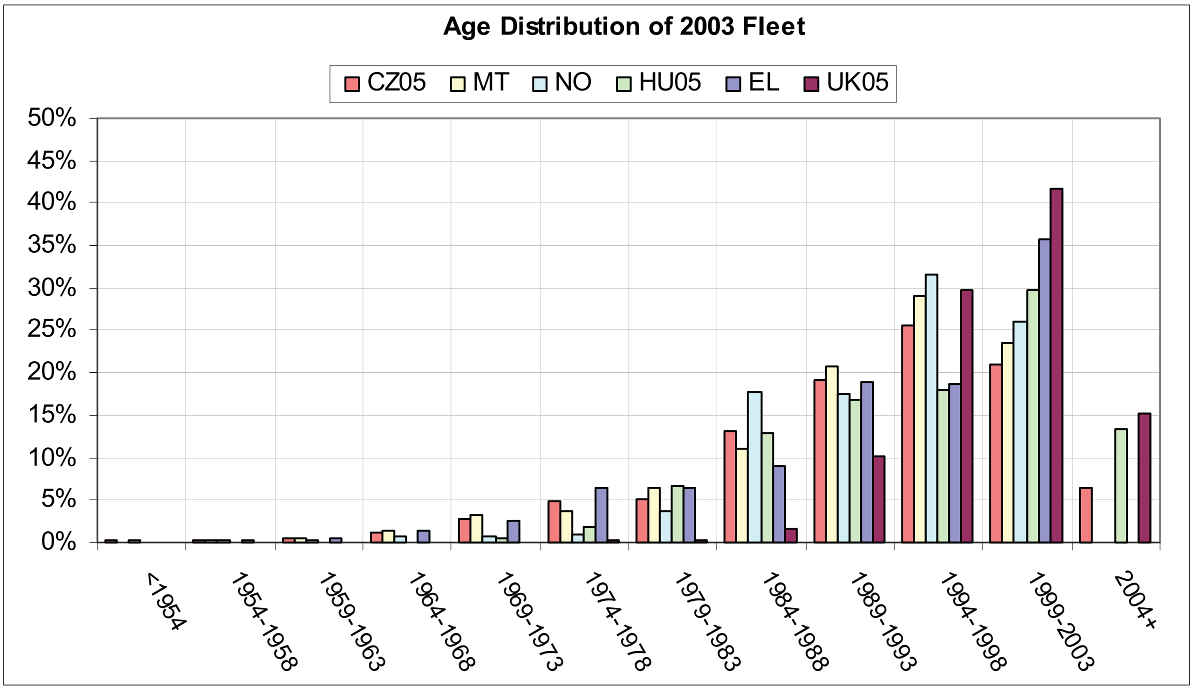

Figure 8.4 More detailed passenger car age group distribution for those countries that provided the information. (The addition '05' to the country identifiers indicate that the data for those countries is from 2005.)

Figure 8.4 shows a more detailed distribution of passenger car vehicle age for the countries which provided age data beyond 1994. It shows that some countries have quite high proportions of cars that are 15 and 20 years old. These vehicles pose a serious risk of compatibility issues if in collision with newer cars.

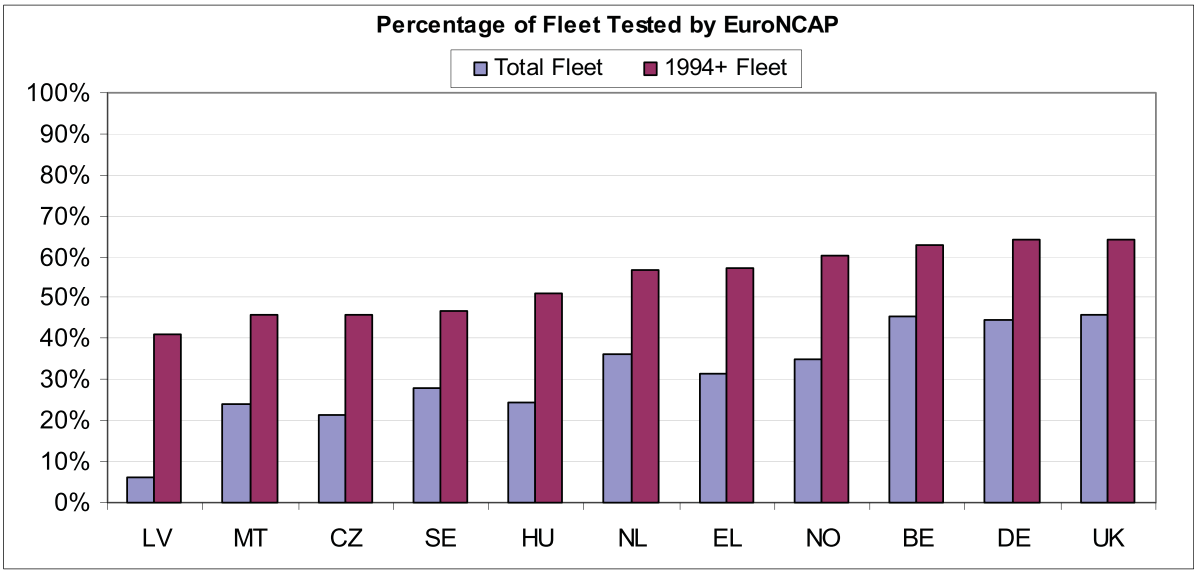

Figure 8.5 Percentage of the 2003 fleets that is tested by EuroNCAP.

The next step is to study the crashworthiness of the passenger cars within the countries' fleets. EuroNCAP analysis was possible on vehicles registered from 1994 onwards. This is because, whilst the tests were introduced in 1997, they cover vehicles manufactured prior to that date. Figure 8.5 shows the percentage of the fleet that can be analysed using EuroNCAP scores. In the case of Latvia, although EuroNCAP analysis was possible on fewer than 10% of the total fleet, it was in fact possible on over 40% of the vehicles registered since 1994. This compares favourably with the "best" of the other countries, where analysis was possible on 65% of the post-1994 fleet. It will be some time before any national fleet contains cars all tested by EuroNCAP; therefore certain assumptions have been made based on yearly averages, to give an overall score for each country.

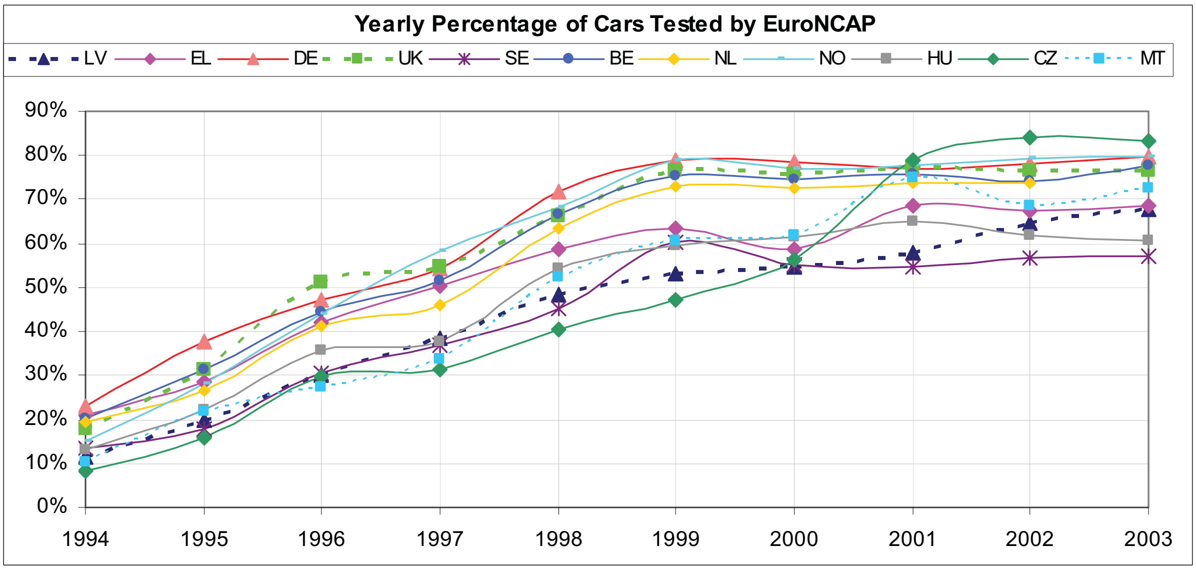

Figure 8.6 Percentage of cars within the 2003 fleets that are tested by EuroNCAP, per year of registration.

As in Figure 8.2, the passenger cars within the 2003 fleets can be studied per year of registration. Figure 8.6 shows a steady increase in the percentage of cars tested each year, followed in some countries by a levelling off. This may be because a saturation point is being reached, whereby the only vehicles within the fleet that are not tested are "specialist" cars and those with lower sales volumes. In Germany and the UK a consistently higher proportion of the fleet consists of cars is tested by EuroNCAP. In Greece there is a visible dip in the figure for cars registered in 2000. Closer analysis reveals that whilst the absolute number of cars registered in 2000 and EuroNCAP tested did rise, the overall number of new registrations that year rose more rapidly. This suggests that whilst people bought more new cars, they did not necessarily prioritise EuroNCAP tested cars. It could be that consumers in some countries place a higher emphasis on this kind of information when purchasing a new car.

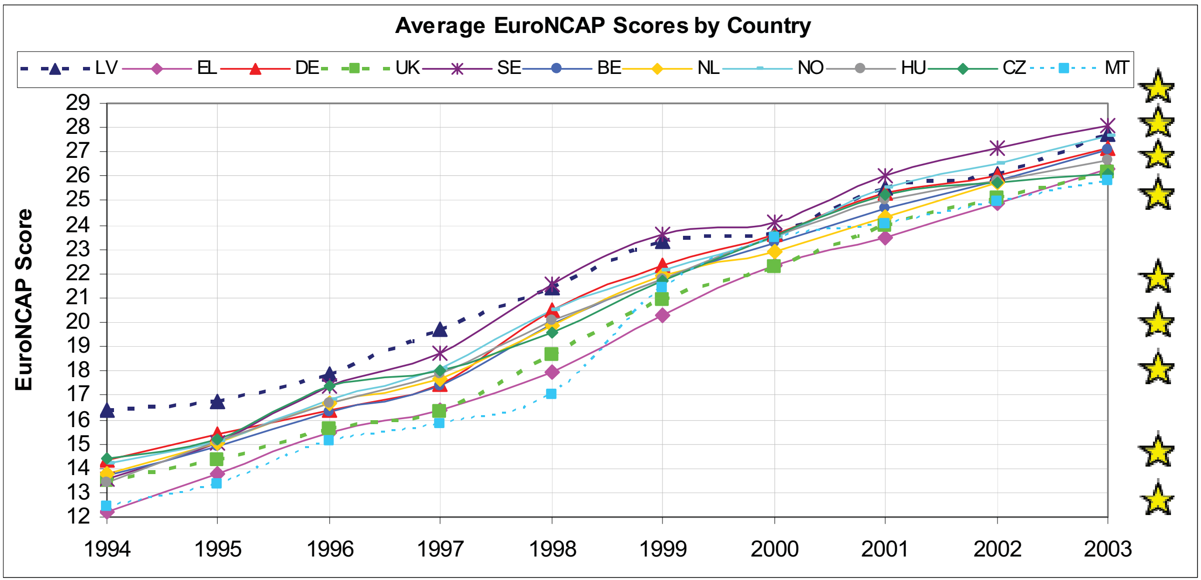

Figure 8.7 Average EuroNCAP scores of passenger cars within the 2003 fleets, per year of registration.

The above graph shows how the average score has risen for new cars registered in each successive year from 1994 onwards in each of the countries. The stars indicate how the scores of the national fleets correspond to the stars awarded by EuroNCAP, as discussed earlier. It is interesting to note that the countries are all following a very similar trend on this measure.

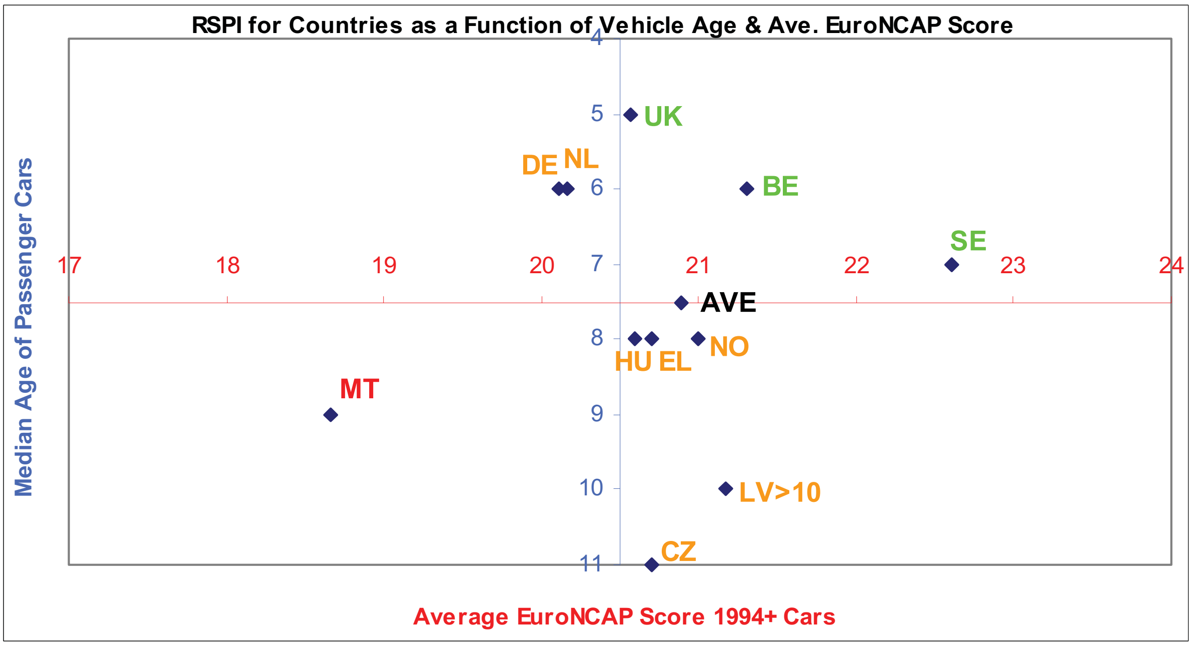

Figure 8.8 Safety performance of each country, based on median vehicle age and average EuroNCAP score. (AVE = average)

For each country a EuroNCAP score was attributed to eligible vehicles. An average figure was then calculated for each year and weighted by the number of vehicles present in the 2003 fleet from that year. An overall average EuroNCAP score is then awarded for each country and, together with the median age of passenger cars in the fleet, these two figures make up the safety performance indicator for each country. Figure 8.8 shows the countries' performance based on median vehicle age and average EuroNCAP score. Note that the horizontal scale represents the points range for a four star EuroNCAP rated car.

Best practice would appear to be a vehicle fleet which contains high EuroNCAP scores and a relatively new vehicle fleet (upper right area). The UK and Sweden are heading towards this area with different strengths; the UK has a lower median age for passenger cars, while Sweden has a high EuroNCAP score. Germany and The Netherlands have relatively new cars with slightly lower EuroNCAP scores, whereas Greece and Latvia have slightly, but not significantly higher EuroNCAP scores than Germany, The Netherlands and the UK, but an older passenger car fleet.

8.3.2 Vehicle fleet composition

The composition of the vehicle fleet should give an indication of the safety of a fleet since there are issues of vehicle-to-vehicle compatibility that have a well-recognised effect on occupant outcomes in crashes. For example, there may be greater numbers of car-to-truck/bus crashes in Member States that have a higher proportion of trucks/buses in the fleet. This will have implications for occupant injury outcomes in those countries..

In vehicle-to-vehicle collisions, the protection of all occupants in the subject and other vehicle should be considered. Compatibility means that passenger vehicles of disparate size provide an equal level of occupant protection in car-to-car collisions. Vehicle mass is one of the most significant factors affecting driver injury in car-to-car injury, and an incompatible vehicle induces high risk for the occupants in the other vehicle.

The heterogeneity and the diversity of a country’s fleet are key determining factors of their vehicles’ road safety performance. Vehicle categorisation and inventory of the different vehicle categories vary greatly from one country to another. For example mopeds and scooters with a capacity of less than 50ccs are not systematically registered in all countries and it is therefore difficult to include them in the study. A similar problem is encountered for buses, light good vehicles (LGVs) and heavy good vehicles (HGVs).

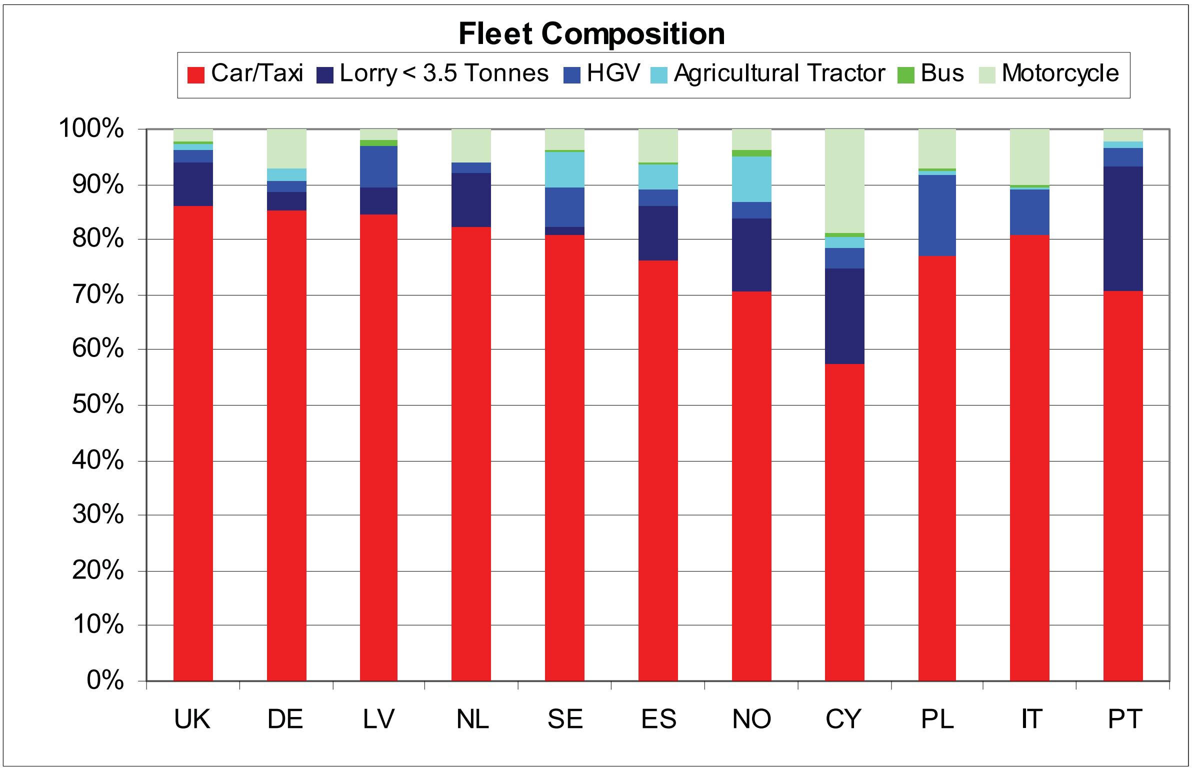

Figure 8.9 Safety performance of each country, based on fleet composition

Figure 8.9 shows the fleet composition for the countries able to be analysed. It shows the UK has the highest proportion of passenger cars and taxis, while countries such as Norway have a bigger proportion of other larger vehicles including HGVs and buses, which pose significant risks in terms of compatibility.

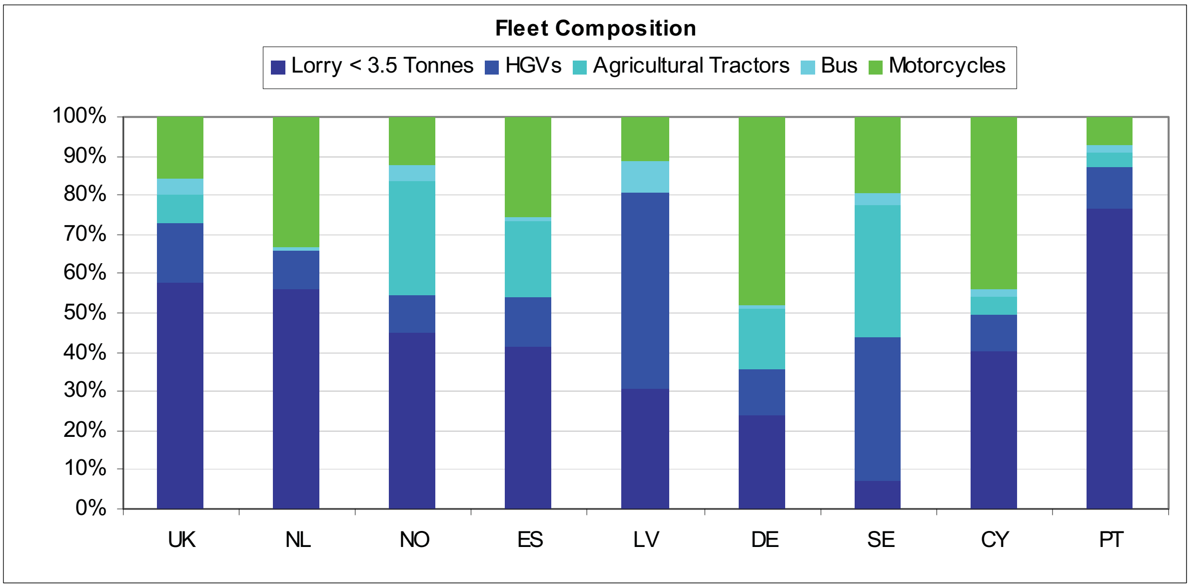

Figure 8.10 Share of vehicle types other than passenger cars in the country fleets.

Passenger cars make up a large part of the vehicle fleets, clouding the distribution of the other vehicle types. Figure 8.10 analyses more closely the vehicles besides cars in the country fleets. It can be seen that Latvia and Sweden have a high proportions of HGVs, while Germany has a large number of motorcycles, both contributing to compatibility risks.

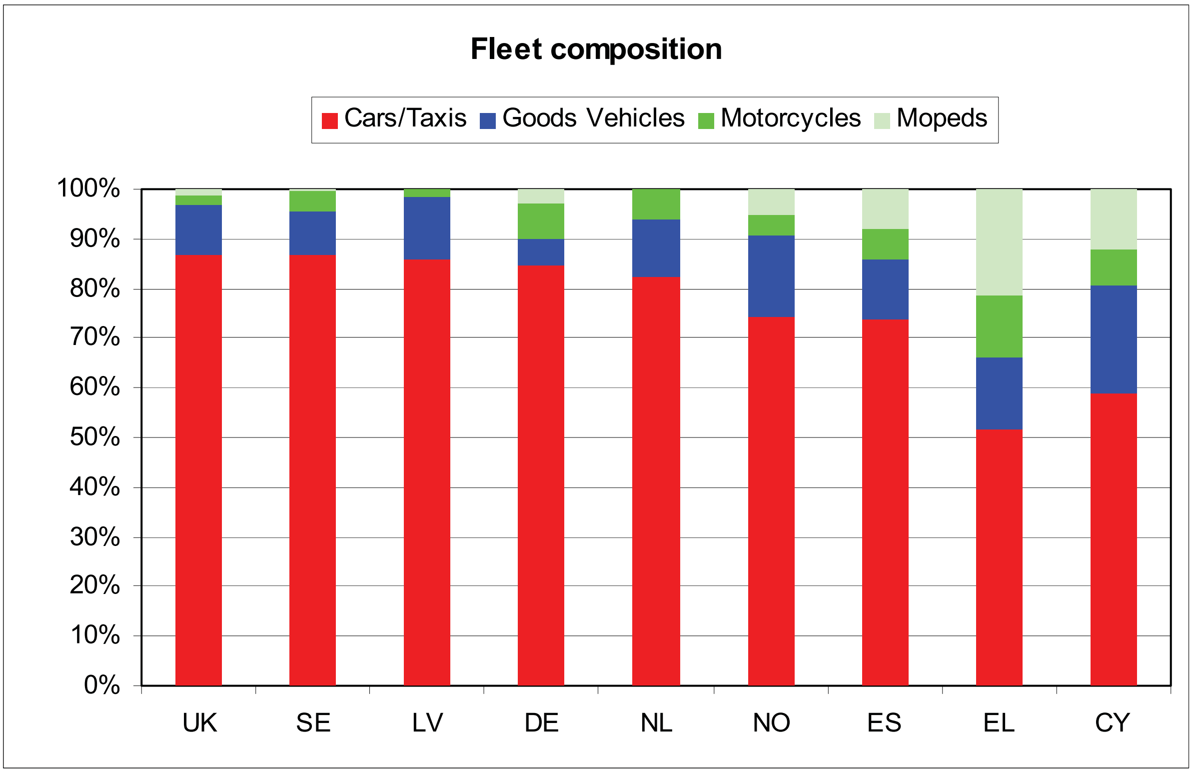

Figure 8.11 Share of vehicle types in the country fleets, focussing on the share of mopeds and motorcycles.

Mopeds are a growing contributor to vulnerable road users and many countries do not require them to be registered. Figure 8.11 shows the share of mopeds in the countries' vehicle fleets.

Since collisions between the very smallest and the very largest vehicles (powered two-wheelers and heavy goods vehicles, respectively) are the most problematic, proportions of these two vehicle types are compared. In countries with a high proportion of both, the chances of collision between these highly incompatible vehicles is more likely.

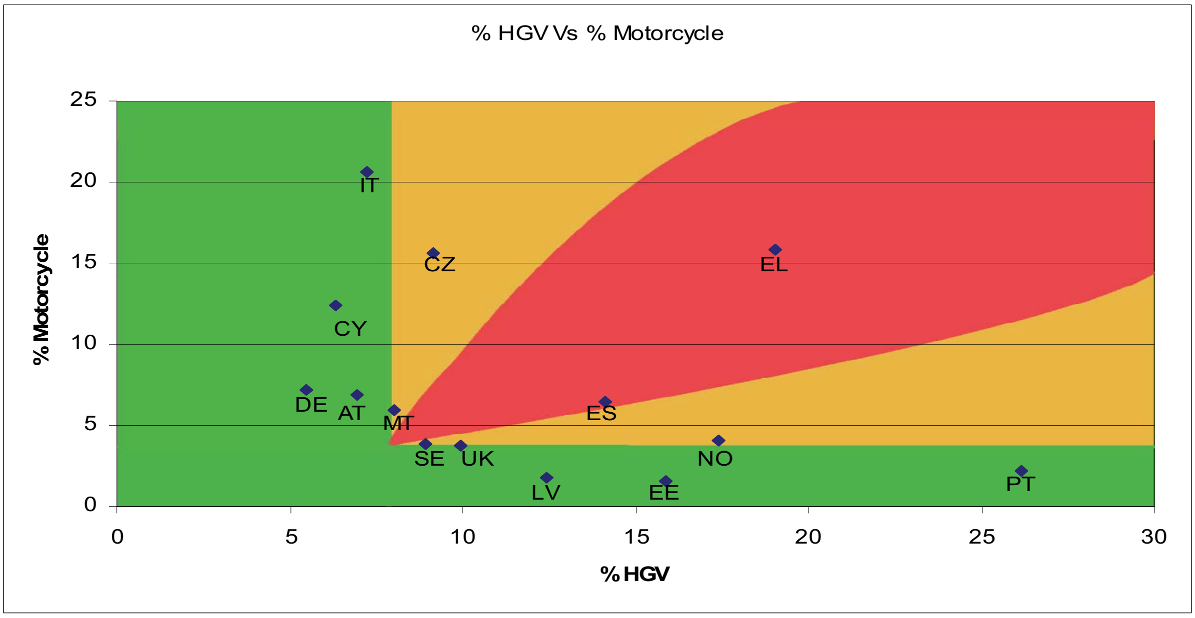

Figure 8.12 Safety performance based on proportions of HGVs/motorcycles.

Figure 8.12 shows the performance of the countries in terms of the proportions of HGVs and motorcycles. It can be seen that Greece performs least well, with high proportions of both vehicle types. There are large variations in the proportions of these vehicle types in the other countries, making it is very difficult to assess their performance using this method. For this reason, a “relative gravity” was calculated for each fleet. This uses the vehicle fleet data to calculate the gravity of the possibility of collisions between incompatible vehicles (namely cars, HGVs and motorcycles). In this instance, countries which score the highest values have the highest degree of incompatibility within the fleet.

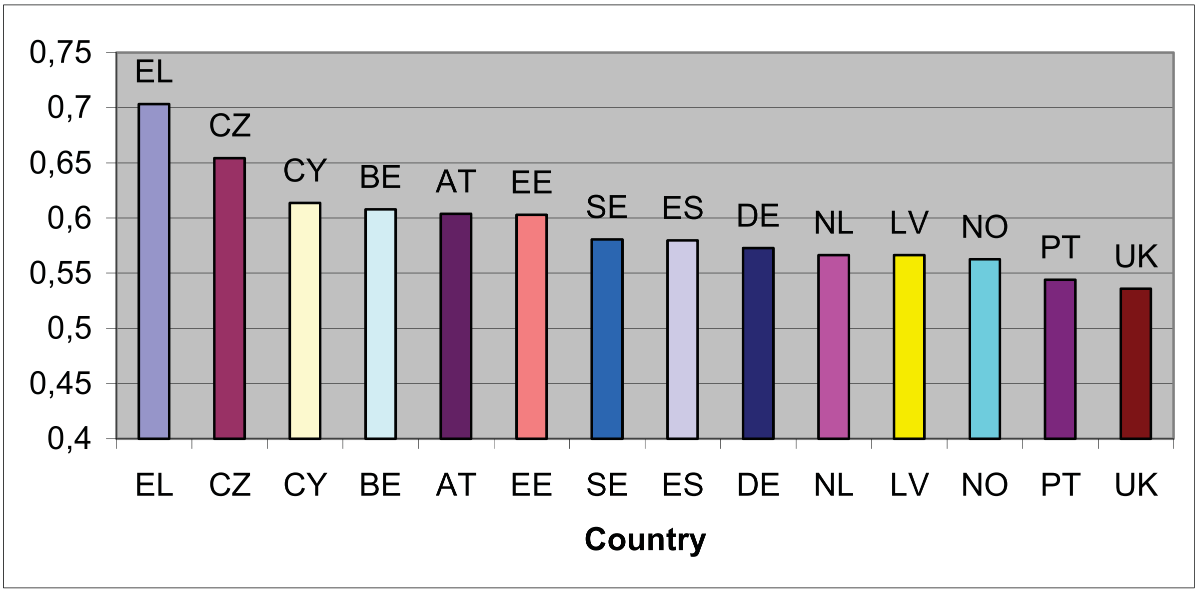

Figure 8.13 Safety performance based on relative gravity.

Figure 8.13 shows the results for the relative gravity measure of incompatibility. Again, Greece is the country with the highest degree of incompatibility. However, using this measure the UK, Portugal and Norway can be identified as the countries which perform best. This is an unsurprising result in some respects; all three countries lie on the edge of Europe, with Norway currently not a member of the EU. Movement of freight by road may not be as significant to the economies of these countries as it is in the central European countries. Because the measure used depends on the difference in mass between the vehicles, collisions between two vehicles of the same type (such as motorcycle/motorcycle accidents) are treated as being less serious than collisions between vehicles with very different mass (HGV/motorcycle accident). This is not necessarily an accurate reflection of crash outcomes, since the lack of protection a motorcycle offers, the rider means that he or she is vulnerable even in collisions with another motorcycle. A measure of gravity which took account of this would make the performance of countries with higher numbers of motorcycles relatively worse compared to countries with fewer motorcycles.

9 Roads

MORSINK[A], P., ARSENIO[B] E., CARDOSO[B], J., EKSLER[C], V., GITELMAN[D], V., HAKKERT[D], S., LOUWERSE[A], R., PAPADIMETRIOU[E], E., STRIEGLER[C], R., VAN GENT[A], A., VIEIRA GOMES[B], S.

[A]SWOV, [B]LNEC, [C]CDV, [D]TECHNION, [E]NTUA

9.1 Indicators used

The safety performance indicators presented in this document for roads concern:

Network design

- Intersection types
- Intersection density

Road design

- EuroRAP Road Protection Scores (RPS)
- Share of roads with a wide median or median barrier
- Share of roads with a wide obstacle-free zone or roadside barrier

9.2 Are comparisons possible?

The comparisons presented in this document are based on data delivered by the National Experts via the questionnaire. Only the data of the Netherlands are obtained via other channels than the National Expert. This chapter is not meant to exactly show the performance of each country, or the scores relative to each other. It rather illustrates an overview of the data obtained until November 2006. To be able to make a trustworthy comparison, data from the various countries should be collected in a predetermined, uniform manner.

The safety performance indicators for 'Roads' are divided into two categories: network design performance indicators and road design performance indicators. In the Theory document, the definitions of the road design performance indicators have been modified compared to the definitions in the State of the Art document. As there was no time to collect the data needed for the calculation of these new safety performance indicators, the results of the indicators constructed in the 'State of the Art' document are presented in this document. These results are based on the data obtained via the questionnaires.

EuroRAP

The modified indicators are based on the European Road Assessment Programme (EuroRAP) data. In order to be able to calculate these new indicator values, it is important that the Road Protection Scores (RPS) of the roads of the participating countries in SafetyNet will be available as soon as possible. At this moment the RPS scores of a part of the Netherlands are available (Zuid-Holland). Other countries, like Spain, the UK and Sweden, have calculated RPS scores for a part of their network. These data have not been received yet. Austria, Finland, Germany, Ireland and Switzerland all have planned to calculate the RPS scores between 2005 and 2007. Belgium, the Czech Republic, Slovakia and Slovenia have planned a pilot for EuroRAP, part of this pilot program might be the calculation of RPS scores (EuroRAP, 2005[3]).

[3] EuroRAP (2005). Safer roads save lives : from Arctic to Mediterranean : first Pan-European progress report.

9.3 Reliability and representativeness

It should be borne in mind that the comparison is based on the data submitted through the questionnaires by the countries. The data were checked for basic errors. However, the SafetyNet team was not able to check neither the correctness of the data, nor whether the submitted data of the roads is representative for the roads in the whole country. The data that are received usually contains data gathered through specific studies on a sample part of the national road network. It is not known to which extent these sample parts are representative for the entire roads network. The figures presented in this section are not meant to describe the exact performance of the roads in a country, but are to show the results of the data submitted via the questionnaire. The results are presented in graphs showing the results of roads with comparable traffic functions (same connection type) of several countries.

9.4 Country comparisons

9.4.1 Network design safety performance indicators

The road network is described in terms of the type of connection between different types of urban areas. The following urban area types are used:

- type 0: very big city (over 1 million inhabitants);
- type 1: big city (between 200,000 and 1 million inhabitants);
- type 2: city with 100,000-200,000 inhabitants;
- type 3: city with 30,000-100,000 inhabitants;
- type 4: village with 10,000-30,000 inhabitants;
- type 5: village with less than 10.000 inhabitants.

These road types will vary between different countries, although some basic overlap will be present. The network function of a road in a country or region can then be displayed in a uniform way by specifying what urban centers the particular road connects. For example, a road of (0-1) connection type connects a very big city (type 0) with a big city (type 1). In the theory document only five urban area types are defined, type 0 and type 1 are put together in one type. Type 1 is defined as: big city (over 200.000 inhabitants) in the theory document. In this document, however, the results are presented according to the division in six urban area types.

Intersection types

As it can be seen in Figure 9.1, Hungary has a small share of grade separated intersections on the sample of highways of (0-1) connection type. More than 40% of the junctions are non-signalized. The rest of the intersections exist of signalized (25%) and grade separated (31%) intersections. Both samples from Greece and the Czech Republic have highways which only contain grade separated intersections, like expected for this connection type, just like Belgium, Denmark, The Netherlands and Portugal (Figure 9.2).

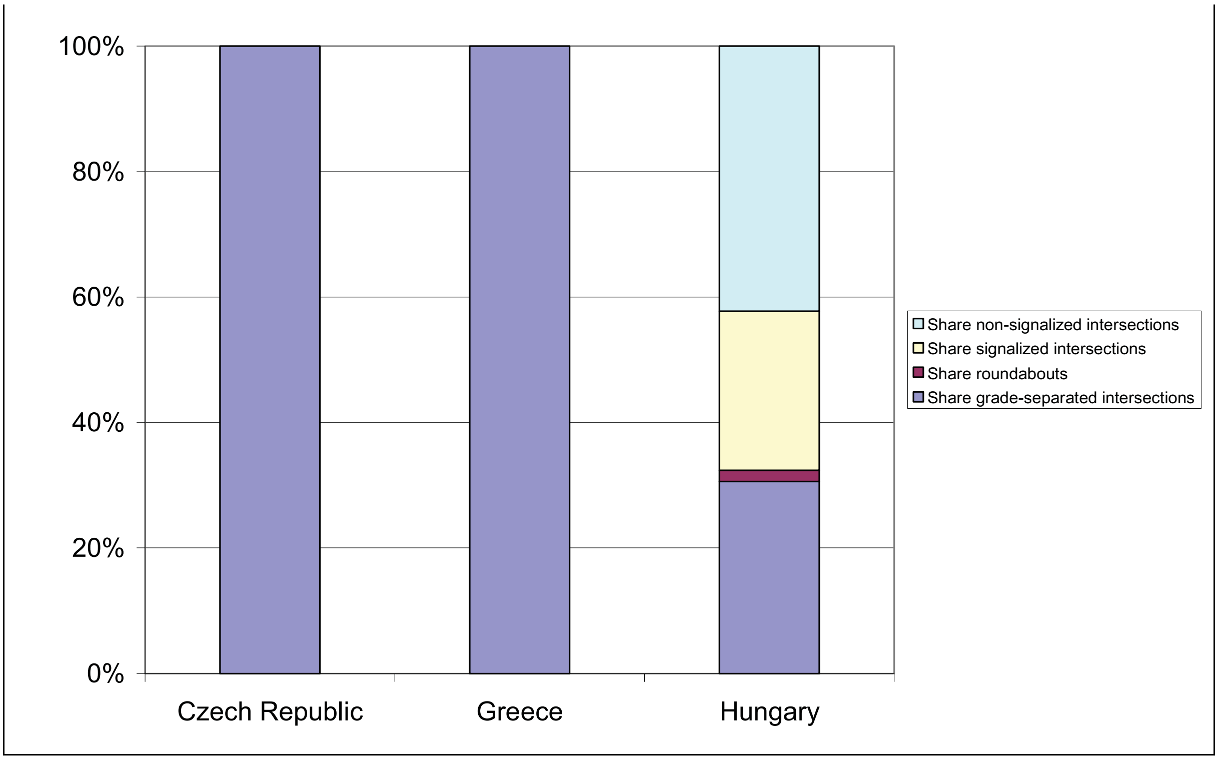

Figure 9.1 Share intersection types on a (0-1) connection (based on questionnaire).

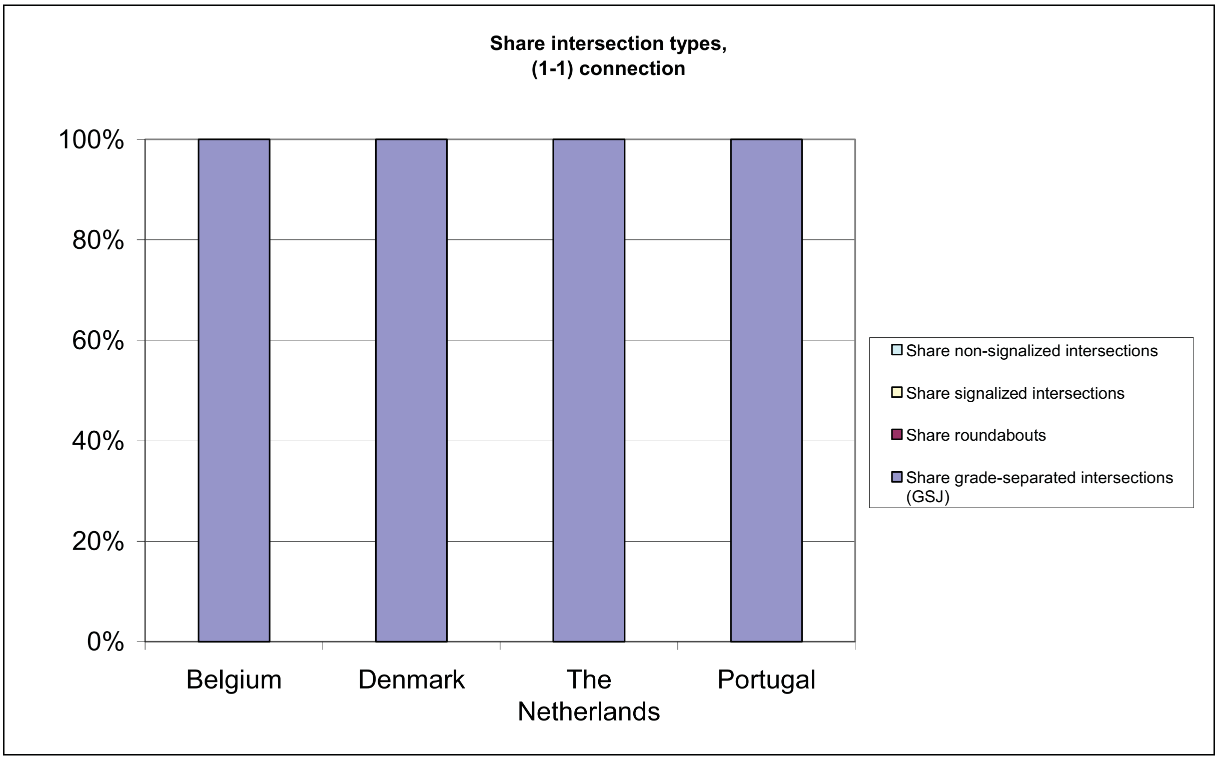

Figure 9.2. Share intersection types (1-1) connection (based on questionnaire).

On a lower connection type, which connects a major city of category 1 (1,000,000 – 200,000 inhabitants) with a city of category 3 (100.000 – 30.000 inhabitants), there is more variety in the intersection types. In the samples of Cyprus, the Czech Republic and Hungary, non-signalized intersections form a major part of the total. There are hardly any roundabouts on these connections, and on the Hungarian highways there are no grade-separated intersections on this connection type (Figure 9.3). The part of the (1-3) connection in Cyprus that is categorized as AAA only contains grade-separated intersections. The other intersection types are located at the part of the connection that is categorized as A-road. The samples from Belgium, Denmark, Sweden and Portugal only have grade-separated junctions on this connection type.

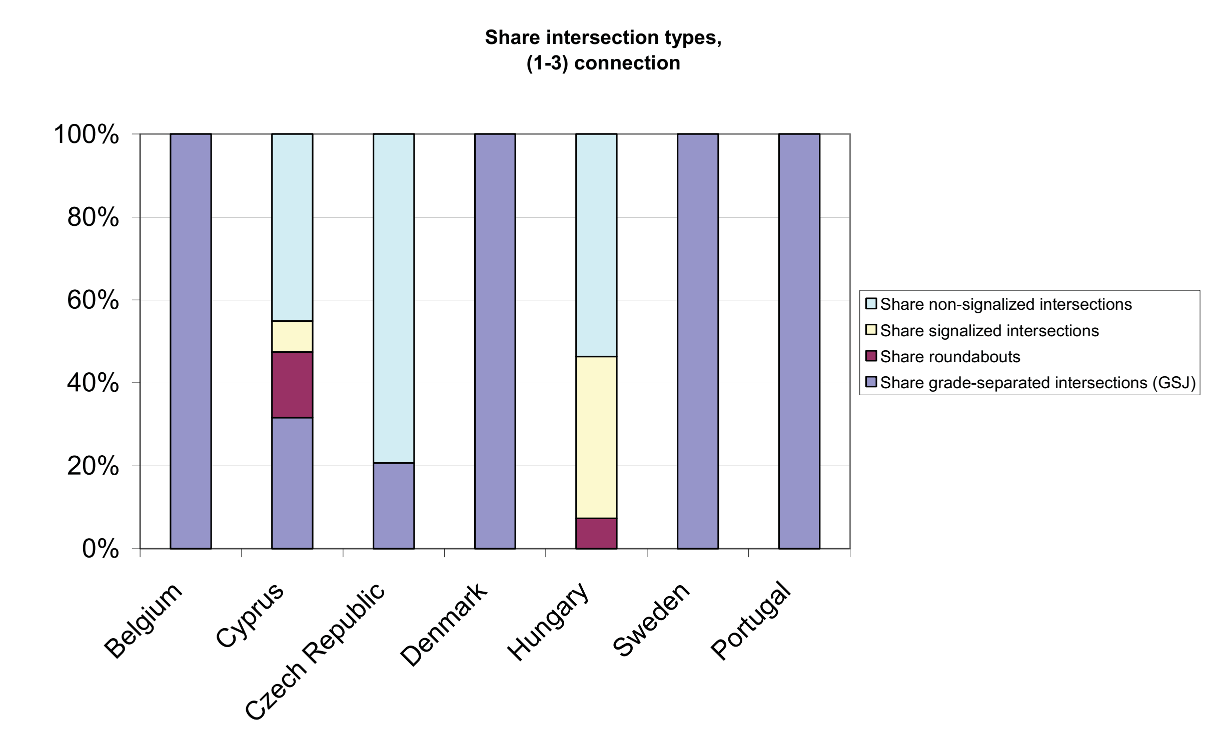

Figure 9.3. Share intersection types (1-3) connection (based on questionnaire).

Intersection density

In general it appears that higher level connections (i.e., connecting larger cities) have a lower intersection density (Figure 9.4). Connections between (0-1) and (1-1) cities contain less intersections, in general. The high intersection density in The Netherlands is caused by the fact that The Netherlands is a very densely populated country. Besides, the data are of a region in the 'Randstad', the most densely populated area of the country. The samples from Portugal on the other hand has a very low intersection density. It should be noted that the sample is not representative for the whole country road network as the SPIs were calculated based on the data of main highways.

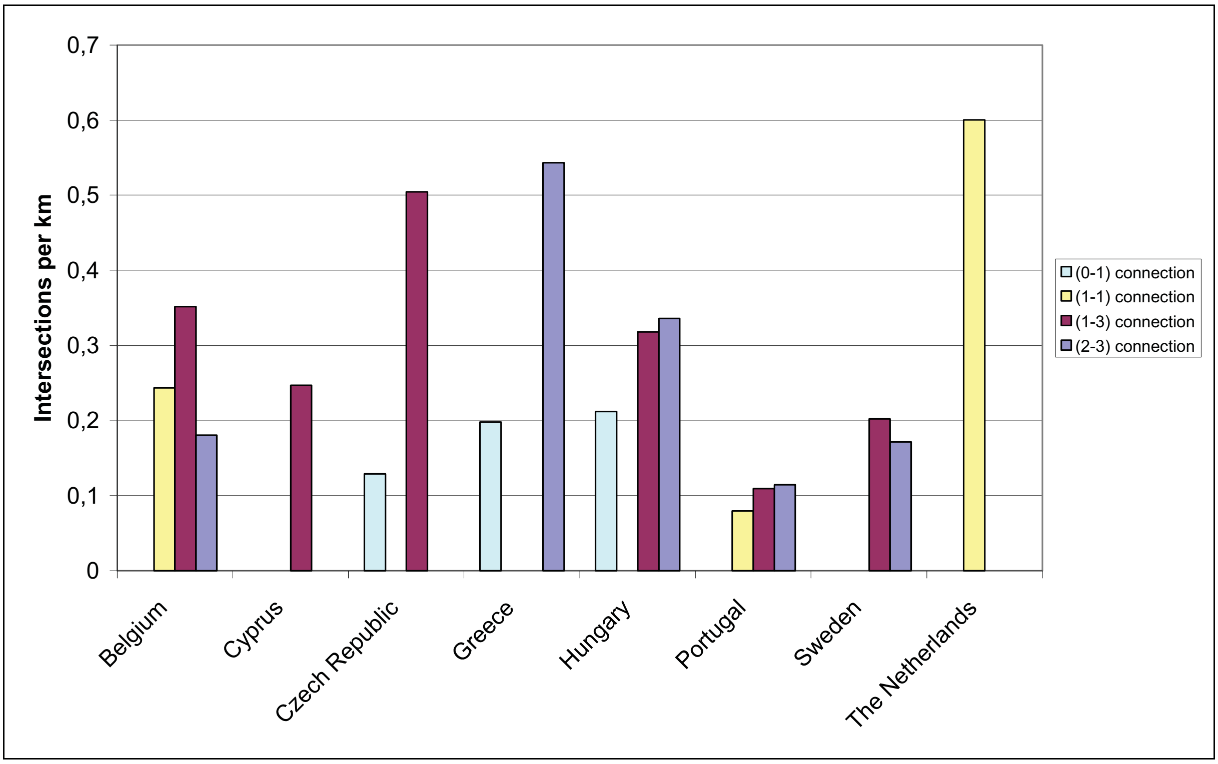

Figure 9.4. Intersection density, per connection type per country (based on questionnaire).

9.4.2 Road design characteristics

As stated above, it is not known to what extent the data received via the questionnaires is representative for the whole country. Probably most samples are not representative for their countries, as the samples consist of a few roads that are not randomly selected. The figures presented in this paragraph are not meant to describe the exact performance of the roads in a country, but are to show the results of the data obtained until November 2006. The results are presented in graphs showing the results of roads with comparable traffic functions (same connection types) of several countries.

EuroRAP

In the Theory document, the definitions of the road design safety performance indicators have been modified compared to the definitions in the State of the Art document. The modified performance indicators are based on EuroRAP data. In order to be able to calculate these new indicator values, it is important that the Road Protection Scores (RPS) of the roads of the participating countries in SafetyNet will be available as soon as possible. More information on the safety performance indicators and the data necessary to calculate them can be found in the Theory document. As there was no time to collect the data needed for the calculation of these new indicators, the results based on the data obtained via the questionnaires are presented in this document. These safety performance indicators are constructed in the 'State of the Art' document

Share of roads with a wide median or median barrier

The samples of Austria and the Czech Republic both have a score of 100% on this safety performance indicator, as expected on a (0-1) connection. Greece and Hungary have a score of 54% and 43% (Figure 9.5). The score of Norway on this safety performance indicator is noteworthy (Figure 9.6), 3% seems low for this connection type. The score of the other countries is 100%, as expected on connection types (0-1) and (1-1). In Figure 9.7, the score of Austria is notable. Although the road connects two cities of type 1 and type 3, almost 40% of this road does not have a wide median or median barrier. This also counts for Cyprus. This is caused by the fact that the sample of Cyprus contains two parallel roads of connection type (1-3). The new road is classified as AAA-road, the old road is classified as A-road and is maintained to give access to smaller villages. Also in the sample from Austria, the part of the connection that is classified as AAA-road has a wide median or median barrier over it's full length. The part of the connection without wide median or median barrier is located at the part of the connection that is categorized as A-road. Just like for higher connection types, The sample of Hungary has a relatively low share of roads with a wide median or median barrier. The sample of the Czech Republic has a low share of roads with a wide median or median barrier on connection type (1-3) as well.

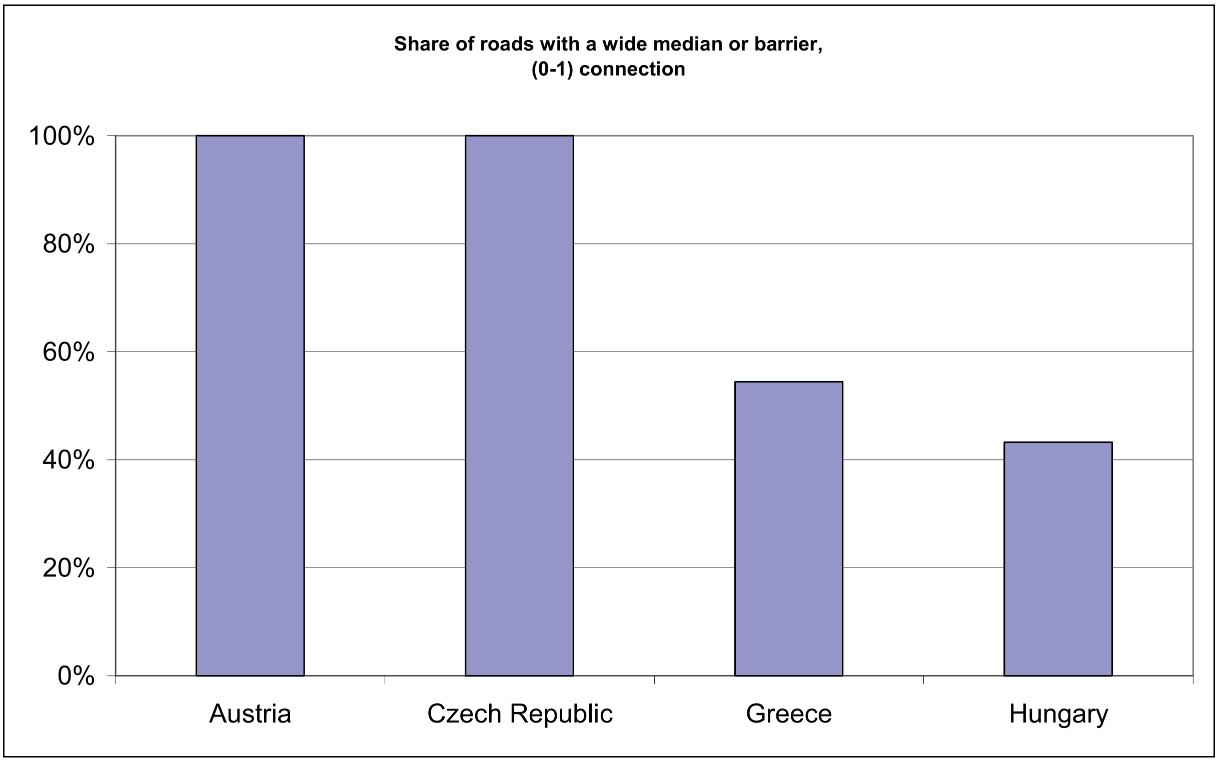

Figure 9.5. Share of roads with a wide median or median barrier (0-1 connection) (based on questionnaire).

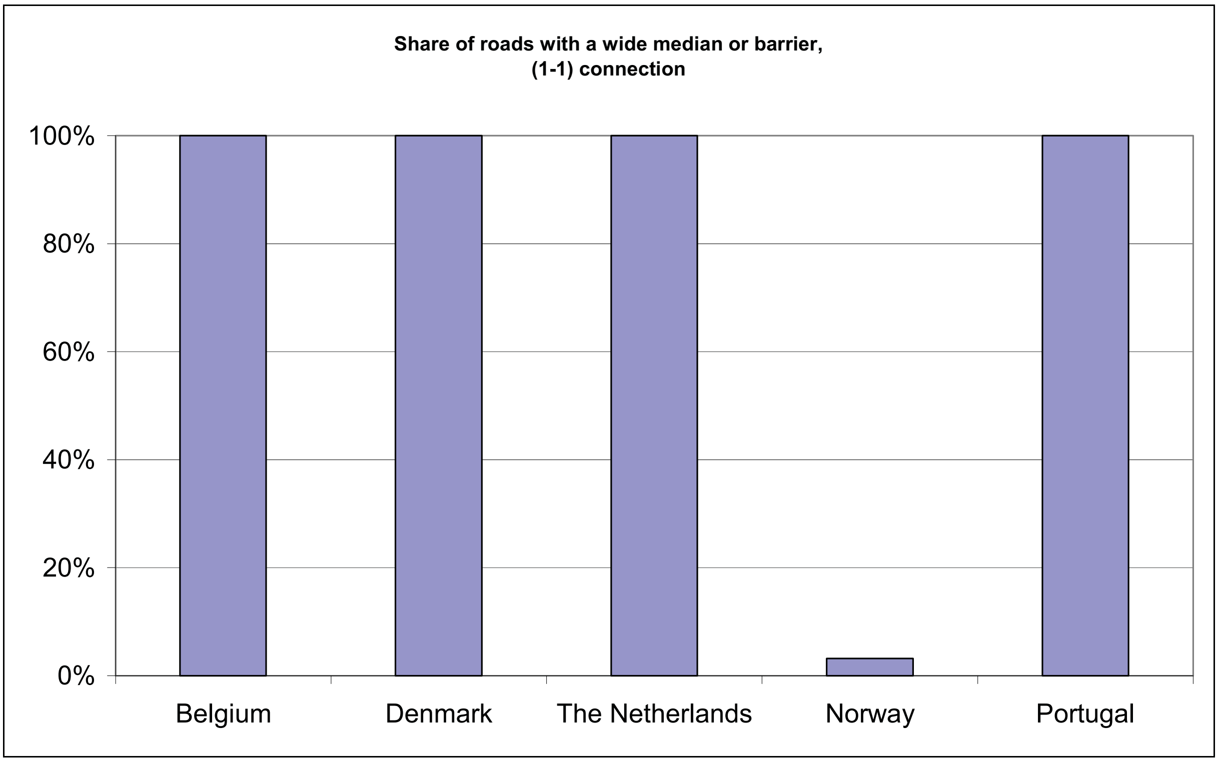

Figure 9.6. Share of roads with a wide median or median barrier (1-1 connection) (based on questionnaire).

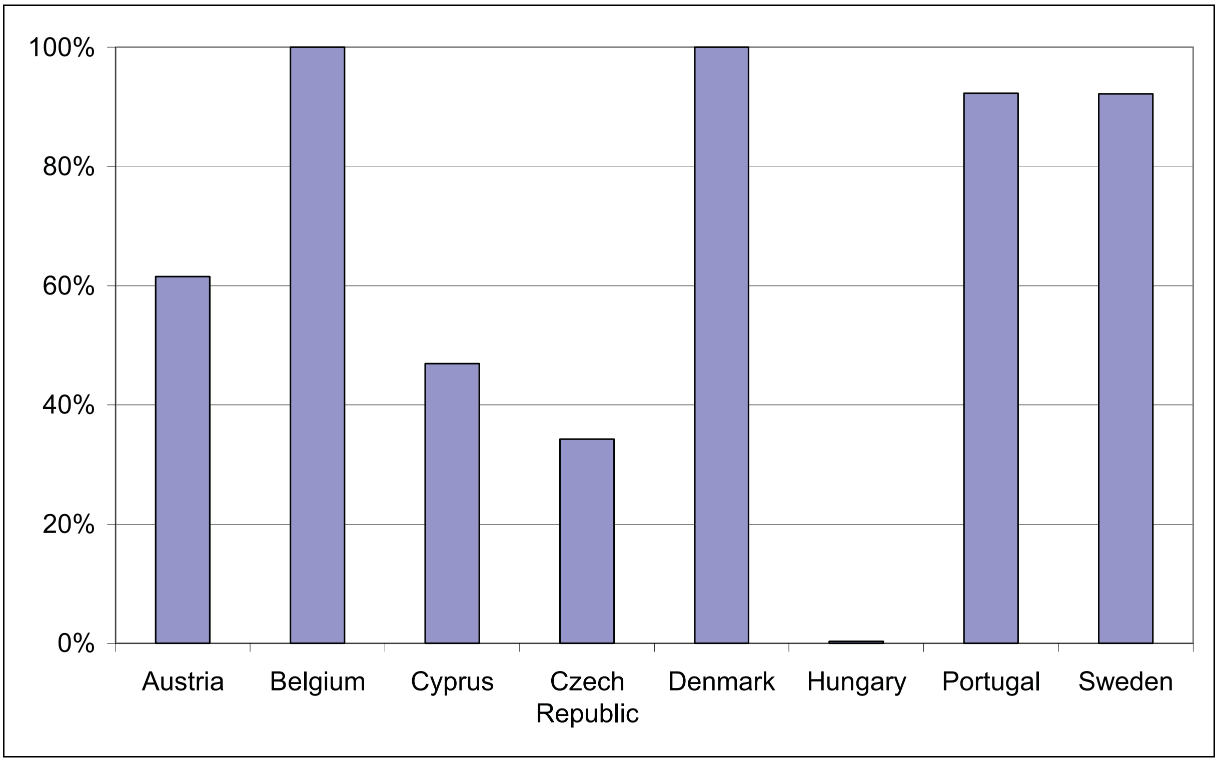

Figure 9.7. Share of roads with a wide median or median barrier (1-3 connection) (based on questionnaire).

Share of roads with a wide obstacle-free zone or roadside barrier

There is few data on this subject, not many countries filled in this part of the questionnaire. Though a value of 100% is expected for the (0-1) connections, Austria and Denmark score lower, with respectively 54% and 75% (Figure 9.8). Belgium and The Netherlands both score

100% for the (0-1) connections, just like expected (figure is not included). The samples of Belgium and the Czech Republic score relatively high on this safety performance indicator for the (1-3) and the (2-3) connections (Figure 9.9 and Figure 9.10). Greece scores low with no roads with a wide obstacle-free zone or road side barrier on the (2-3) connections in their sample (Figure 9.10).

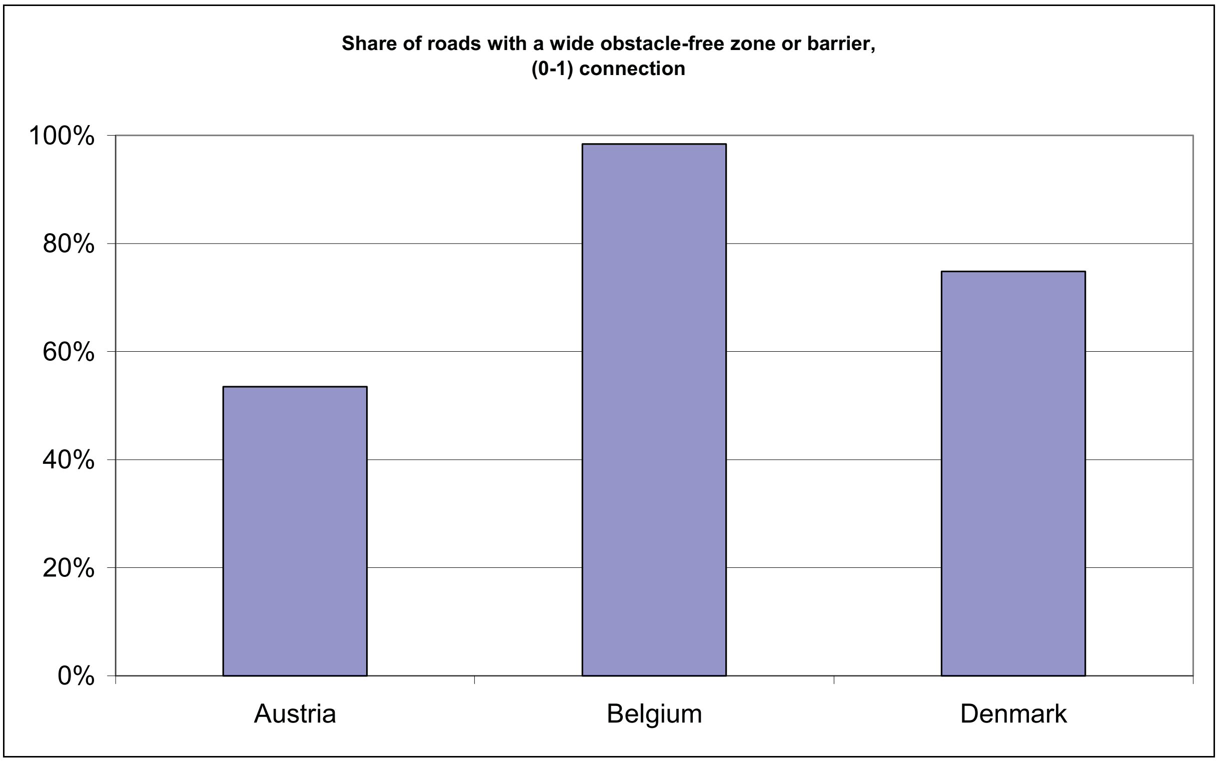

Figure 9.8. Share of roads with a wide obstacle-free zone or roadside barrier (0-1) connection (based on questionnaire).

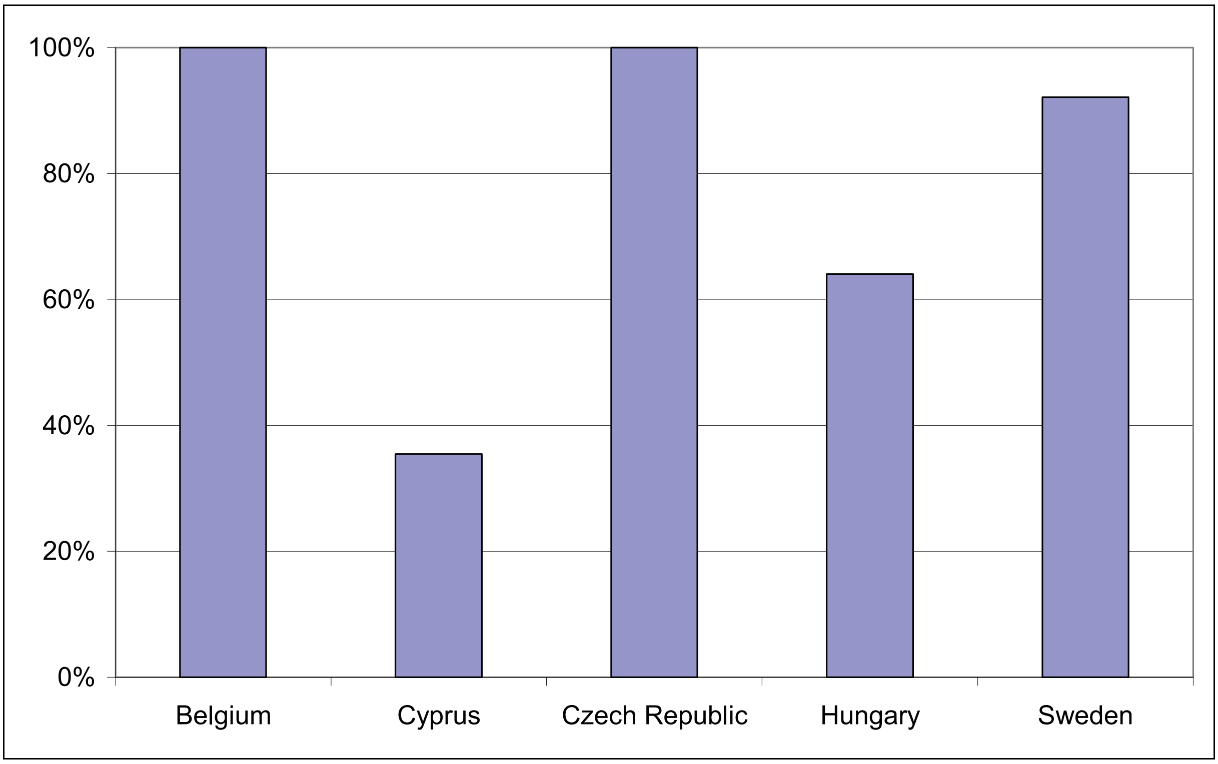

Figure 9.9. Share of roads with a wide obstacle-free zone or roadside barrier (1-3) connection (based on questionnaire).

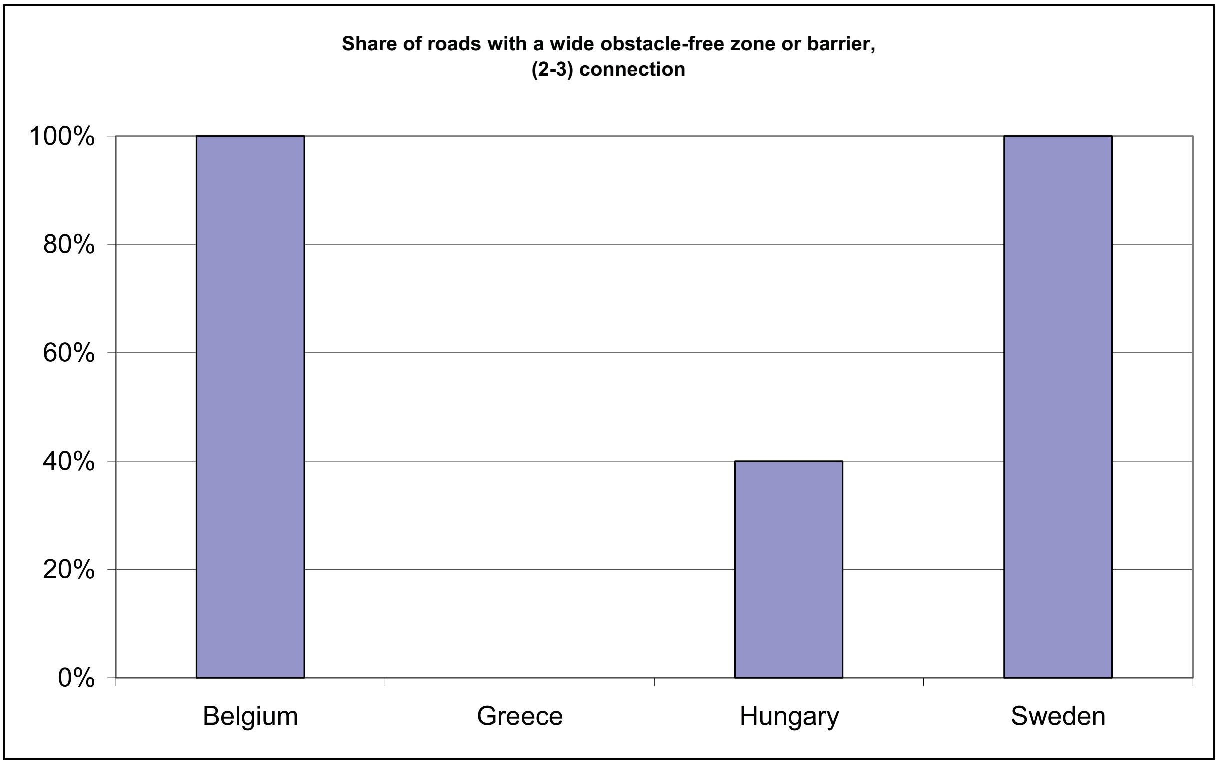

Figure 9.10. Share of roads with a wide obstacle-free zone or roadside barrier (2-3) connection (based on questionnaire)

10 Trauma management

GITELMAN[A], V., AUERBACH-HAFEN[B], K.
[A]TECHNION, [B]BASt

10.1 Indicators used

The safety performance indicators used for trauma management concern:

Availability of Emergency Medical Services (EMS) stations

- the number of EMS stations per 10,000 citizens

Availability and composition of EMS medical staff

- percentage of physicians and paramedics out of the total number of EMS staff
- the number of EMS staff per 10,000 citizens

Availability and composition of EMS transportation units

- percentage of Basic Life Support Units (BLSU), Mobile Intensive Care Units (MICU) and helicopters/planes out of the total number of EMS transportation units
- the number of EMS transportation units per 10,000 citizens
- the number of EMS transportation units per 100 km of total road length

Characteristics of the EMS response time

- the demand for EMS response time (min)
- percentage of EMS responses meeting the demand
- average response time of EMS (min)

Availability of trauma beds in permanent medical facilities

- percentage of beds in trauma centres and trauma departments of hospitals out of the total trauma care beds
- the total number of trauma care beds per 10,000 citizens

Furthermore, a **combined indicator** was developed to measure a country's overall performance for trauma management.

10.2 Are comparisons possible?

Based on the data obtained for 17 countries (BE, CZ, DK, DE, EE, EL, CY, LV, HU, MT, NL, AT, PT, SK, SE, UK, NO), figures and tables below show the estimated safety performance indicators for trauma management. The results enable to compare the trauma management systems in the countries.

10.3 Country comparisons

Figure 10.1 to Figure 10.3 show that Germany is characterized by a high density of the EMS stations per road lengths and a high number of the EMS staff per population. Austria scores high on the EMS stations and the EMS transportation units per population, while the United Kingdom has a high number of the EMS transportation units per population as well. Furthermore, Belgium, Latvia and Estonia show relatively high numbers of the EMS staff per population, while Austria and the United Kingdom have relatively high numbers of the EMS transportation units per road length.

High shares of specially equipped vehicles (BLSU, MICU, and helicopters/ planes) out of the total EMS transportation units were reported by the majority of countries, except for Estonia, The Netherlands, Slovakia and the United Kingdom. High shares of a highly-qualified EMS medical staff (physicians and paramedics) out of the total EMS medical staff were reported for Germany, Malta, Slovakia and the United Kingdom.

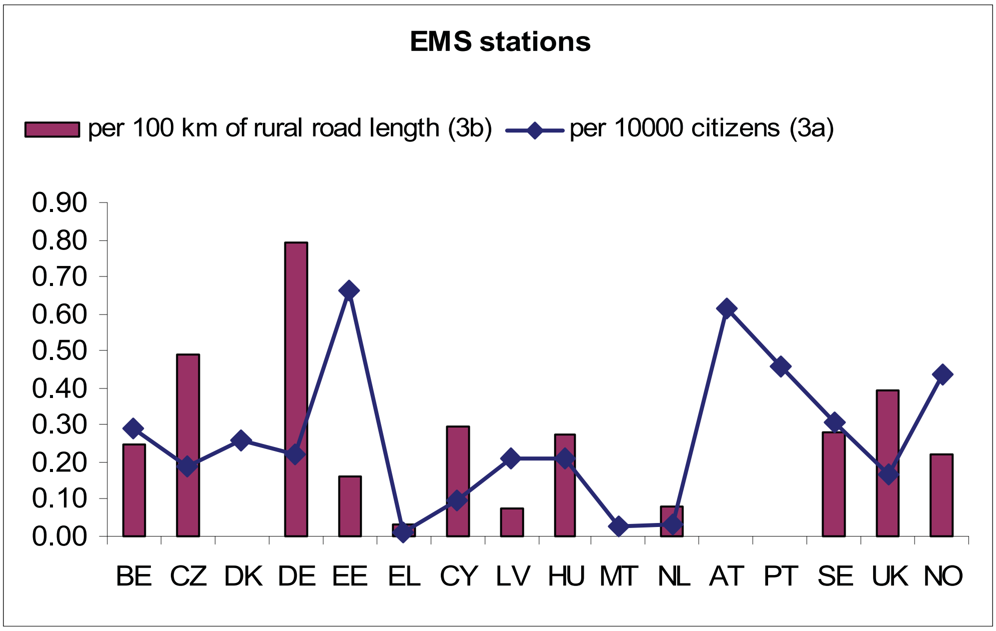

Figure 10.1 Number of EMS stations per 10,000 citizens and per 100 km of rural road length. (For underlying data refer to Appendix A.)

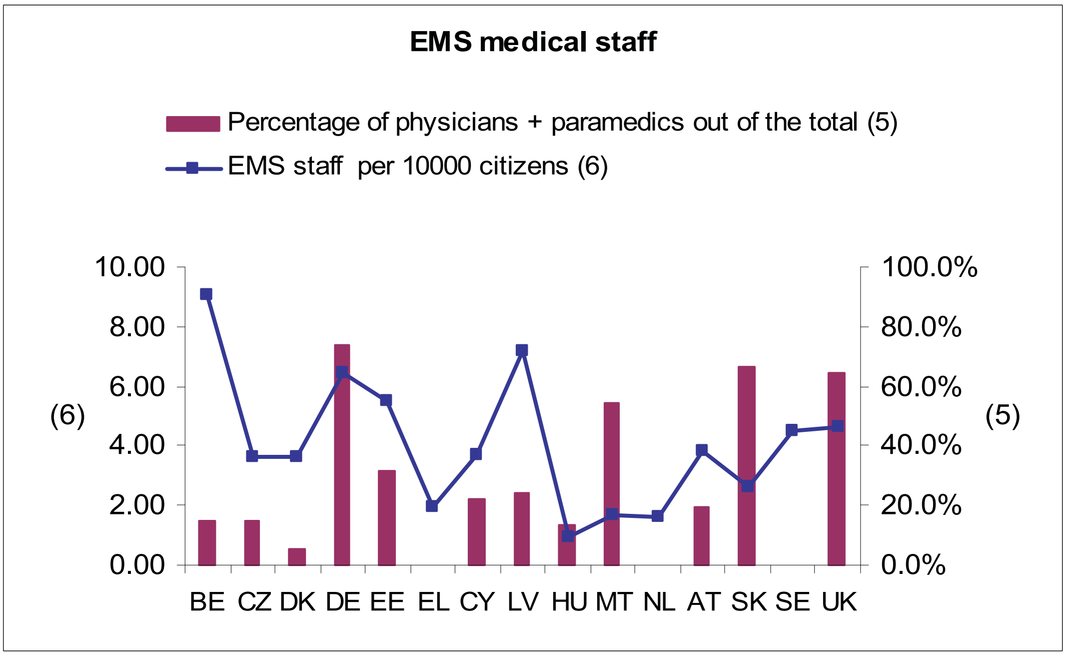

Figure 10.2. Number of EMS medical staff per 10,000 citizens and the percentage of physicians and paramedics out of the total EMS staff. (For underlying data refer to Appendix A.)

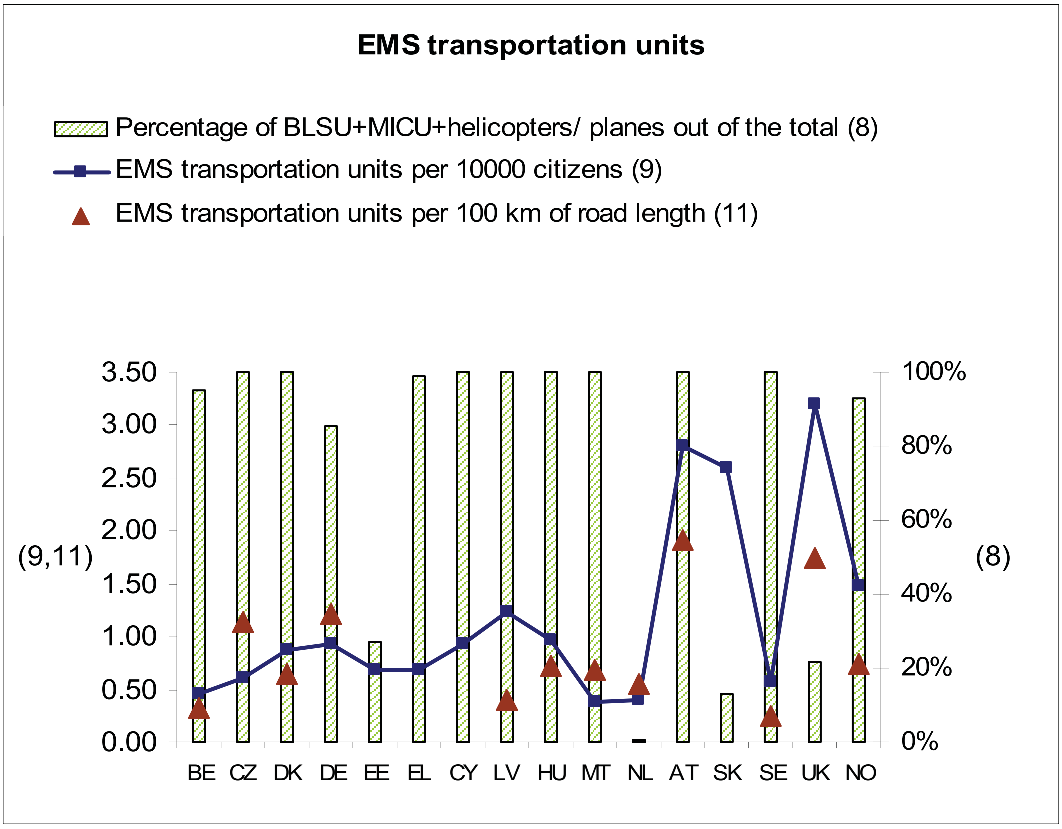

Figure 10.3. Number of EMS transportation units per 10,000 citizens and per 100 km of total public roads, and the percentage of highly-equipped EMS units out of the total. (For underlying data refer to Appendix A.)

Country	(19) The demand for response time (min)	(20) Percentage of EMS responses meeting the demand	(21) Average response time of EMS (min)
BE	15 min	100%*	6 min* - city
CZ	15 min	89.2%	7.83 min* - city
DK	5-10 min*	100%	8.0 min*
DE	15 min*	89.1%	7.8 min*
EE	30 min*	n/a	10.2 min
EL	n/a	n/a (no demand)	15 min
CY	n/a	n/a (no demand)	n/a
LV	25 min	88%	17 min
HU	15 min*	72%*	12-20 min*
MT	n/a	n/a (no demand)	15-30 min
NL	15 min*	n/a	n/a
AT	15 min*	95%	12 min
PT	n/a	n/a	n/a
SK	n/a	n/a	6-14 min
SE	10 min for 80%	n/a	10-30 min
UK	8 min for 75%*	100%*	n/a
NO	n/a*	app. 90%	n/a

Table 10.1 Characteristics of the EMS response times. (See comments in 'Country profiles'.)*

The countries have different demands for the EMS response time and also differ by estimation methods of this indicator. (To note, the values of the EMS response time were requested for rural areas where the problem of response time typically exists). Average values of the EMS response time and percentages of EMS responses meeting the demands were received from the countries (see Table 10.1). It can be seen from the table that the internationally accepted value of 15 min is prevailing in the demands, where the actual values of the EMS response time vary between the countries.

Country	Percentage of beds in trauma centres + trauma departments of hospitals (24a)	The total number of beds per 10,000 citizens (25)
BE	100%	0.34
CZ	100%	10.5
DE	24%	67.0
EL	0%	46.5
CY	0%	1.10
HU	n/a	3.34
MT	100%	0.41
AT	n/a	4.90

Table 10.2 Availability of trauma beds in permanent medical facilities.

Characteristics of permanent medical facilities – the numbers of trauma beds in different types of facilities, were not reported by the majority of countries. The available values of the rates of trauma beds per population range widely (see Table 10.2), which might stem from two reasons: on the one hand, from different interpretations of the term "trauma beds" in different countries, and on the other hand, from real differences in the availability of these beds among the countries.

No country keeps the same position according to all safety performance indicators. However, groups of countries with relatively high or low levels of most indicators can be recognized.

10.3.1 Combined performance indicator

As the trauma management system is characterized by a range of performance indicators, it is useful to have a combined indicator which could provide an overall characteristic of the system. A combined indicator was developed by means of ranking the values of separate safety performance indicators and weighting the results together (see *SPI Theory* report).

The combined trauma management safety performance indicator was estimated by three methods of ranking, termed "ranks A", "ranks A-1" and "ranks B":

Ranks A is a direct ranking of countries according to the values of each safety performance indicator, with equal weights for all indicators;

Ranks A-1 is similar to ranks A, with different weights for the indicators;

Ranks B ranks the countries using five groups of the performance level according to the values of each safety performance indicator.

By each ranking procedure, the country is attributed to one of five levels of the trauma management system's performance, which are "high", "relatively high", "medium", "relatively low" or "low". To note, three methods of ranking are applied in order to avoid the dependency of the results on the estimation method and to check the sensitivity of results. Summing up the results of different rankings, the final category for a country is defined.

The calculation results – countries' rates according to each ranking method are given in Appendix B, section B.2.

Country	Combined estimates of the level* of the trauma management systems' performance, according to			Final category
	Ranks A	Ranks A-1	Ranks B	
Belgium	M	RH	RH	**RH**
Czech Rep.	RH	RH	RH	**RH**
Denmark	M	M	M	**M**
Germany	H	H	H	**H**
Estonia	RH	RH	RH	**RH**
Greece	L	RL	RL	**RL**
Cyprus	RL	M	RL	**RL**
Latvia	RH	RH	RH	**RH**
Hungary	M	M	RL	**M**
Malta	RL	M	RL	**RL**
The Netherlands	L	L	L	**L**
Austria	H	RH	H	**H**
Slovakia	M	RL	M	**M**
Sweden	RL	RL	RL	**RL**
United Kingdom	RH	M	RH	**RH**
Norway	RH	RH	RH	**RH**

*Table 10.3 Combined estimates of the trauma management systems' performance in the countries considered. **H**: high, **RH**: relatively high, **M**: medium, **RL**: relatively low, **L**: low. Note that Portugal does not appear in the combined ranking due to a high number of missing values for the trauma management safety performance indicators.*

The combined indicators (ranks) of the trauma management systems' performance in the countries considered are presented in Table 10.3. It can be seen that:

- a consistently high level of the trauma management system's performance was found for Germany;
- summing up different rankings, a high level of the trauma management system's performance is attributable to Austria as well;
- a relatively high level of the trauma management system's performance can be stated for Belgium, Czech Republic, Estonia, Latvia, the United Kingdom and Norway;
- a medium level of the trauma management system's performance is attributable to Denmark, Hungary and Slovakia;
- countries such as Greece, Cyprus, Malta and Sweden, are characterised by a relatively low level of the trauma management systems' performance;
- surprisingly, a consistently low level of the trauma management system's performance was found for The Netherlands.

In can be seen from Table 10.3 that the results of different rankings are consistent for all the countries considered: applying different ranking methods, each country is attributed to the same or a neighbour category of the performance level. This means that based on the available data, we received an objective ranking of the levels of the trauma management systems' performance in the countries compared.

10.4 Considerations

The trauma management indicators estimated characterize the EMS treatment potential, EMS response time and the treatment potential of permanent medical facilities. In other words, their message is limited mostly to the availability of trauma care services and, to a lesser extent, to their quality, e.g. in terms of shares of higher-quality resources.

The combined indicator is based on available data and therefore, provides an indication of a "higher"/ "lower" level of the trauma management system's performance *relatively* to other countries in the sample.

Neither the trauma management performance indicators' set nor the combined indicator should be considered as an overall estimate of the trauma care system in the country. The combined indicator should be treated only as an indication of a "higher"/ "lower" level of the trauma management system's performance *relative* to other countries in the sample considered.

11 Conclusions

This report compared the safety performance of 27 European countries – the25 EU member states, Norway and Switzerland. The comparison was done for seven road safety related areas: alcohol and drugs, speeds, protective systems, daytime running lights, vehicles (passive safety), roads, and trauma management. When indicator values were available but not comparable due to e.g. lack of data quality, this was explained.

In general, comparing the countries' performances is difficult. The main reasons are the lack of data, suspicious quality of the data, or the incomparability of the (seemingly similar) data due to different circumstances of measurement. As an example of the latter one might think of speed measurements for different road types in different countries, or on similar road types with completely different characteristics.

In a number of cases, the choice for a specific performance indicator has depended on the availability of data. This has, for example, been the case for the indicator for alcohol usage; while the optimal indicator would concern the usage rate of alcohol in the general driver population, the unavailability of data in a number of the (larger) country, has led to a more indirect indictor. Details about the development of the safety performance indicators can be found in Hakkert, Gitelman and Vis (2007).

In spite of all considerations and limitations, we have been able to present a great number of comparisons in this report, or to present the figures that can form the basis for future comparisons. Reliable comparisons could be made for the areas daytime running lights, protective systems, vehicles (passive safety), and trauma management. Only limited comparisons could be made for the areas speeds and roads. Due to great differences in data quality between the different countries, comparisons in the area alcohol and drugs was not possible. The results for that area are presented for information only and will form the basis for future study.

References

1. ETSC (2001): Transport Safety Performance Indicators. European Transport Safety Council.
2. ETSC (2006). Pinning them down on their promise. Flash 1, Road Safety Performance Index. European Transport Safety Council, July 18.
3. Hakkert, A.S, Gitelman, V. and Vis, M.A. (Eds.) (2007) Road Safety Performance Indicators: Theory. Deliverable D3.6 of the EU FP6 project SafetyNet.
4. Luukkanen L. (2003). Safety management system and transport safety performance indicators in Finland. Liikenneturva – Central Organisation for Traffic Safety in Finland.
5. OECD (2005). Handbook on Constructing Composite Indicators: Methodology and User Guide. Organisation for Economic Co-operation and Development, Brussels.
6. Vis, M.A. and Van Gent, A.L. (Eds.) (2007) Road Safety Performance Indicators: Country Profiles. Deliverable D3.7b of the EU FP6 project SafetyNet.

Appendix A Estimation of overall seat belt wearing rates for indicators SPI-A and SPI-B.

The following table present the estimate of overall seat belt wearing rates by passenger car and van occupants in the 25 EU member states. This is based on known (valid) indicator values and estimates for countries where the values are not available. The weighting was done on the number of million passenger car person kilometers traveled ('mio pkm') in particular countries in 2004 (DG TREN, 2005).

Country	1000 mio pkm	SPI-A (%)	SPI-B (%)
BE	109,89	71	40
CZ	68,60	72	41
DK	61,00	87	63
DE	854,10	96	89
EE	10,02	74	30
EL	64,00	60	25
ES	346,00	74	50
FR	738,60	97	85
IE	24,00	86	75
IT	710,99	71	30
CY	3,16	70	30
LV	10,00	77	32
LT	19,39	75	30
LU	6,00	80	60
HU	46,40	67	34
MT	1,50	96	28
NL	146,10	90	64
AT	81,28	83	52
PL	172,40	78	50
PT	97,00	86	50
SI	15,50	80	55
SK	25,20	65	45
FI	59,59	87	65
SE	96,30	92	73
UK	677,00	93	84
Overall		**86**	**66**

From the table it can be seen that the value of indicator SPI-A for the 25 EU member states in 2005 is estimated as 86% and the value for the indicator SPI-B as 66% ('Overall').

Appendix B Trauma management basic data

B.1 Basic data pertaining to some of the figures

Data pertaining to Figure 10.1 is given in the following table:

	BE	CZ	DK	DE	EE	EL	CY	LV	HU	MT	NL	AT	PT	SE	UK	NO
(3a)	0.29	0.19	0.26	0.22	0.66	0.01	0.10	0.21	0.21	0.03	0.03	0.62	0.46	0.22	0.17	0.44
(3b)	0.25	0.49	n/a	0.79	0.16	0.03	0.30	0.08	0.28	n/a	0.08	n/a	n/a	n/a	0.39	0.22

Data pertaining to Figure 10.2 is given in the following table:

	BE	CZ	DK	DE	EE	EL	CY	LV	HU	MT	NL	AT	SK	SE	UK
(5) (%)	15.0	15.1	5.6	73.6	n/a	100	22.2	24.1	13.1	54.5	0	19.3	66.4	0	64.2
(6)	9.03	3.61	3.60	6.42	5.51	1.94	3.70	7.15	0.96	1.70	1.62	3.83	2.65	4.47	4.65

Data pertaining to Figure 10.3 Is given in the following table:

	BE	CZ	DK	DE	EE	EL	CY	LV	HU	MT	NL	AT	SK	SE	UK	NO
(8) (%)	95	100	100	85	27	99	100	100	100	n/a	0.6	100	13	100	21	93
(9)	0.46	0.61	0.87	0.92	0.68	0.69	0.92	1.23	0.96	0.39	0.40	2.80	2.60	0.57	3.20	1.47
(11)	0.32	1.13	0.65	1.21	n/a	n/a	n/a	0.4	0.72	n/a	0.56	1.91	n/a	0.24	1.74	0.73

B.2 Calculations of rankings for combined performance indicator

B.2.1 Ranking of countries by "ranks A" method

Countries	Countries' ranks according to separate safety performance indicators*														Sum of ranks	Average rank A	No of missing values	Combined estimate of the TM level**
	(3a)	(3b)	(5a)	(5)	(6)	(8b)	8)	(9)	(11)	(19)	(20)	(21)	(24a)	(25)				
Portugal	3														3	3.00	13	
Germany	8	1	2	2	3	3	5	7	3	2	2	1	3	1	43	3.07	0	**H**
Austria	2		12	8	7	7	1	2	1	2	1	1		4	48	4.00	2	**RH**
Estonia	1	8	3		4	4	6	11		3		1			41	4.56	5	**RH**
Czech Rep.	11	2	6	9	9	2	1	12	4	2	2	1	1	3	65	4.64	0	**RH**
Latvia	10	10	4	6	2	1	1	5	9	3	2	3			56	4.67	2	**RH**
Norway	4	7				10	4	4	5		2				36	5.14	7	**RH**
Belgium	5	6	7	10	1	5	3	14	10	2	1	1	1	8	74	5.29	0	**M**
United Kingdom	12	3	13	4	5	10	7	1	2	1	1				59	5.36	3	**M**
Denmark	6		11	12	10	8	1	9	7	1	1	1			67	6.09	3	**M**
Hungary	9	5	8	11	15	6	1	6	6	2	3	3		5	80	6.15	1	**RL**
Slovakia			9	3	11	10	8	3				1			45	6.43	7	**RL**
Cyprus	13	4	5	7	8	10	1	8					5	6	67	6.70	4	**RL**
Greece	16	11	10	1	12	9	2	10				2	5	2	80	7.27	3	**RL**
Malta	15		1	5	13	10		16				3	1	7	71	7.89	5	**L**
Sweden	7		13	13	6	10	1	13	11			3			77	8.56	5	**L**
The Netherlands	14	9	13	13	14	10	9	15	8	2					107	10.7	4	**L**

*** See the meanings in country profiles**

**** Levels: H – high, RH – relatively high, M – medium, RL – relatively low, L – low.**

The countries are sorted according to the trauma management (TM) system's level; Portugal is excluded from the consideration due to many (over 7) missing values of performance indicators.

Ranks A: a direct ranking of countries according to the values of each safety performance indicator, with equal weights for all indicators**.**

B.2.2 Ranking of countries by "ranks A-1" method

Countries	Countries' ranks according to separate safety performance indicators*														Average weighted rank A-1	No of missing values	Combined estimate of the TM level**
	(3a)	(3b)	(5a)	(5)	(6)	(8b)	(8)	(9)	(11)	(19)	(20)	(21)	(24a)	(25)			
Portugal	0.176														0.18	13	
Germany	0.471	0.059	0.235	0.118	0.176	0.353	0.294	0.412	0.176	0.235	0.118	0.059	0.176	0.059	0.21	0	**H**
Latvia	0.588	0.588	0.471	0.353	0.118	0.118	0.059	0.294	0.529	0.353	0.118	0.176			0.31	2	**RH**
Czech Rep.	0.647	0.118	0.706	0.529	0.529	0.235	0.059	0.706	0.235	0.235	0.118	0.059	0.059	0.176	0.32	0	**RH**
Estonia	0.059	0.471	0.353		0.235	0.471	0.353	0.647		0.353		0.059			0.33	5	**RH**
Austria	0.118		1.412	0.471	0.412	0.824	0.059	0.118	0.059	0.235	0.059	0.059		0.235	0.34	2	**RH**
Belgium	0.294	0.353	0.824	0.588	0.059	0.588	0.176	0.824	0.588	0.235	0.059	0.059	0.059	0.471	0.37	0	**RH**
Norway	0.235	0.412				1.176	0.235	0.235	0.294		0.118				0.39	7	**M**
Hungary	0.529	0.294	0.941	0.647	0.882	0.706	0.059	0.353	0.353	0.235	0.176	0.176		0.294	0.43	1	**M**
United Kingdom	0.706	0.176	1.529	0.235	0.294	1.176	0.412	0.059	0.118	0.118	0.059				0.44	3	**M**
Denmark	0.353		1.294	0.706	0.588	0.941	0.059	0.529	0.412	0.118	0.059	0.059			0.47	3	**RL**
Cyprus	0.765	0.235	0.588	0.412	0.471	1.176	0.059	0.471					0.294	0.353	0.48	4	**RL**
Greece	0.941	0.647	1.176	0.059	0.706	1.059	0.118	0.588				0.118	0.294	0.118	0.53	3	**RL**
Malta	0.882		0.118	0.294	0.765	1.176		0.941				0.176	0.059	0.412	0.54	5	**RL**
Slovakia			1.059	0.176	0.647	1.176	0.471	0.176				0.059			0.54	7	**RL**
Sweden	0.412		1.529	0.765	0.353	1.176	0.059	0.765	0.647			0.176			0.65	5	**L**
The Netherlands	0.824	0.529	1.529	0.765	0.824	1.176	0.529	0.882	0.471	0.235					0.78	4	**L**

*** See the meanings in country profiles**

**** Levels: H – high, RH – relatively high, M – medium, RL – relatively low, L – low.**

The countries are sorted according to the trauma management (TM) systems' level; Portugal is excluded from the consideration due to many (over 7) missing values of safety performance indicators.

Ranks A-1: similar to ranks A, with different weights for the safety performance indicators.

B.2.3 Ranking of countries by "ranks B" method

Countries	Countries' ranks according to separate safety performance indicators*														Sum of ranks	Average rank B	No of missing values	Combined estimate of the TM level**
	(3a)	(3b)	(5a)	(5)	(6)	(8b)	(8)	(9)	(11)	(19)	(20)	(21)	(24a)	(25)				
Portugal	1														1	1.00	13	
Germany	2	1	1	1	1	1	3	2	2	2	2	1	3	1	23	1.64	0	**H**
Austria	1		4	3	3	2	1	1	1	2	1	1		3	23	1.92	2	**RH**
Denmark	2	0	4	4	4	3	1	3	4	1	1	1	0	0	28	2.00	3	**RH**
Czech Republic	4	2	2	4	3	1	1	4	2	2	2	1	1	2	31	2.21	0	**RH**
Latvia	4	4	2	2	1	1	1	2	4	3	2	3			29	2.42	2	**RH**
Belgium	2	3	3	4	1	2	2	4	4	2	1	1	1	4	34	2.43	0	**RH**
United Kingdom	4	2	5	2	2	4	5	1	1	1	1				28	2.55	3	**M**
Estonia	1	4	1		2	2	5	4		3		1			23	2.56	5	**M**
Norway	2	3				4	3	2	2		2				18	2.57	7	**M**
Slovakia			3	1	4	4	5	1				1			19	2.71	7	**RL**
Hungary	4	3	3	4	5	2	1	2	3	2	3	3		3	38	2.92	1	**RL**
Cyprus	4	2	2	3	3	4	1	3					5	4	31	3.10	4	**RL**
Greece	5	5	4	1	4	3	2	3				2	5	1	35	3.18	3	**RL**
Malta	5		1	2	5	4		4				3	1	4	29	3.22	5	**RL**
Sweden	2		5	5	2	4	1	4	5			3			31	3.44	5	**L**
The Netherlands	5	4	5	5	5	4	5	4	4	2					43	4.30	4	**L**

*** See the meanings in country profiles**

**** Levels: H – high, RH – relatively high, M – medium, RL – relatively low, L – low.**

The countries are sorted according to the trauma management (TM) system's level; Portugal is excluded from the consideration due to many (over 7) missing values of safety performance indicators.

Ranks B: according to the values of each safety performance indicator, the countries are ranked using five groups of the performance level.