SUNflower+6

A comparative study of the development of road safety in Greece, Portugal, Spain and Catalonia

Simon Hayes (DSD), Susana Serrano (DSD), Laia Pages Giralt (SCT), Pilar Zori (DGT), Yannis Handanos (Trademco), Chryssanthi Lymperi (Trademco), Dimitris Katsochis (Trademco), António Lemonde de Macedo (LNEC), João Lourenço Cardoso (LNEC), Sandra Vieira Gomes (LNEC)

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Dirección Gral. de Tráfico
TRADEMCO
LNEC

SOUTHERN GROUP

SUNflower plus:

A COMPARATIVE STUDY OF THE DEVELOPMENT OF ROAD SAFETY IN GREECE, PORTUGAL, SPAIN AND CATALONIA

Simon Hayes (DSD), Susana Serrano (DSD), Laia Pagès Giralt (SCT), Pilar Zori (DGT), Yannis Handanos (Trademco), Dimitris Katsochis (Trademco), António Lemonde de Macedo (LNEC), João Lourenço Cardoso (LNEC), Sandra Vieira Gomes (LNEC)

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Authors:	Simon Hayes (DSD), Susana Serrano (DSD), Laia Pagès Giralt (SCT), Pilar Zori (DGT), Yannis Handanos (Trademco), Dimitris Katsochis (Trademco), António Lemonde de Macedo (LNEC), João Lourenço Cardoso (LNEC), Sandra Vieira Gomes (LNEC)
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DSD (Disseny d Sistemes i Desenvolupament)
Escoles Pies 102
08017 Barcelona
Spain
Telephone: +34 93 272 46 20
Telefax: +34 93 272 46 21

Foreword

The number of road traffic crashes, fatalities, and casualties is decreasing in all European countries, as in other high-income and highly motorized countries in the world. Despite an ongoing increase of motorization, we manage to reduce the numbers of death and (seriously) injured by investing in the safety quality of the road traffic system. However, the toll of crashes on our roads is still considered as unacceptably high. Almost all European countries are working with road safety targets, expressing their will to improve road safety. The European Commission itself is very ambitious indeed: to halve the number of fatalities during the first decade of the 21st century.

The SUNflower concept can be considered as an important contribution to the goal of reducing the road crash toll on our roads. It is based on comparing road safety policies, programmes and road safety performances in different European countries. Building upon a methodology developed by the original SUNflower project, the policies in different countries are compared and trends are identified. The results are of potential value for the countries involved, for other countries, and for the European Union. SUNflower+ offers the possibility for countries to learn from each other and by doing so, to speed up road safety improvements.

As the road safety problem is a complex one we need to understand the past as thoroughly as possible in order to learn from it and to even change the future. All who are familiar with this problem know that fast and easy solutions cannot improve road safety in a sustained way. Understanding the past in order to learn for the future is the essence of SUNflower+. The SUNflower methodology is data driven and knowledge based. Comparing policies and trends in different countries is of a very complex nature, never being sure of not overlooking an important factor, or one or two underlying forces. But surprisingly enough, the results are always astonishing, sometimes they confirm prejudices, often they are eye-openers, and sometimes they are groundbreaking.

SUNflower started in 1999 and reported its first result with *SUNflower: a comparative study of the development of road safety in Sweden, the United Kingdom and the Netherlands* in 2002. Based on this SUNflower is considered as a strong brand, appreciated and trusted. An honest and powerful methodology is now available.

It was decided to extend this first result and to expand it to SUNflower+6. In this study three groups of countries were formed: the original SUNcountries (Sweden, United Kingdom and the Netherlands), the Central group (Czech Republic, Hungary and Slovenia) and the South group (Greece, Portugal and Spain and Catalonia). In SUNflower+6, a first consideration is given to the impacts of regional road safety actions with the autonomous Region of Catalonia being benchmarked alongside Spain and other countries.

A large number of researchers from different countries was involved: David Lyman, Barry Sexton (TRL, United Kingdom), Göran Nilsson (VTI, Sweden), Peter Morsink, Divera Twisk, Willem Vlakveld, Cahrles Goldenbeld (SWOV, the Netherlands), Vojtěch Eksler, Jaroslav Heinrich (CDV, Czech Republic), János Gyarmati, Peter

Holló (KTI, Hungry), Bruno Bensa, David Krivec, Nina Bolko (OMEGAconsult, Slovenia), Simon Hayes, Susana Serrano (DSD, Catalonia/Spain), Laia Pages Giralt (SCT, Catalonia), Pilar Zori (DGT, Spain), Yannis Handanos , Dimitris Katsochis (Trademco, Greece), António Lemonde de Macedo, João Lourenço Cardoso, Sandra Vieira Gomes (LNEC, Portugal)

The results are summarized in five documents:

- SUN — *An extended study of the development of road safety in Sweden, the United Kingdom, and the Netherlands*
- Central — *A comparative study of the development of road safety in the Czech Republic, Hungary, and Sloven*ia
- South — *A comparative study of the development of road safety in Greece, Portugal, Spain, and Catalonia*
- Footprint study — *Development of a footprint methodology for road safety benchmarking of the SUNflower+6 countries (to be published)*
- Final report — *A comparative study of the development of road safety in the SUNflower+6 countries (to be published)*

In the Foreword of the Sunflower report (2002), I expressed my wish that the study would be used as a model and trigger off further comparable studies. From one study to five, in which nine countries and one autonomous region has participated. I am grateful for that result and I expect for the same success as the initial SUNflower study.

I would like to thank the whole SUNflower+6 team. Their task was a very challenging one and everybody worked hard to produce high-quality reports. I am grateful for the European Commission and all our other sponsors in the different participating countries to make this study possible. I do hope the results will find their way to further reduction of the number of casualties on our roads.

Fred Wegman

Content

Executive summary

This report is one of three area reports that examine the road safety performance of the nine countries participating in the SUNflowerplus project. This area report compares the road safety situation of the *Southern countries of Greece, Portugal and Spain* (including a separate analysis for the Spanish *autonomous region of Catalonia*)[1].

The aim of this report is to identify the major road traffic risk differences between Southern European countries based upon a comparative approach initially applied by the SUN (Sweden, United Kingdom & the Netherlands) countries, and focussed on the analysis of fatalities by users of different modes of road transport.

The method for comparing the Southern countries has been developed from that of the original SUNflower report (SWOV, 2002), and is reflected in the organisation of the chapters:

- Description of national policy and plans.
- Description of the transport context.
- Fatalities by road user mode and collisions between modes.
- Case studies for: *drink-driving, seat belts, young drivers, speed management, pedestrians, mopeds and motorcycles*.

In some cases (for example, young drivers and pedestrians), the indicators used to compare the situation in the Southern countries are common to those reported in the SUN and Central areas. In other cases (for example, speed management) the situations are very different and there is less scope for comparison.

SUNflower+6 compares statistics for road fatalities in terms of fatalities within 30 days of the accident. In all three Southern countries, the figures are based on national factors applied to police data recording deaths within 24 hours. In producing indicators, various efforts to improve data systems have been detected. In general, a greater use of information and communications technologies could improve the process of data registration as well as facilitating improved analysis.

All three countries (and the autonomous region of Catalonia) have published a plan covering a period of three or more years (including the current year of 2005) that sets quantified targets for a reduction in the number of road accident fatalities. Such progress in road safety planning is a relatively new aspect of road safety activity in the Southern countries studied. The targeted reductions for Portugal are even more ambitious than those of the EU White Policy paper proposing a halving in road deaths by 2010, whilst those for Spain and Catalonia are in line with the European overall projection and those for Greece are more modest.

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[1] the other reports cover the original SUN countries (new cases) and the Central countries of Czech Republic, Hungary and Slovenia.

Progress in casualty reduction

Current trends in all three countries (and in Catalonia) show a positive reduction in fatalities, but the trend has not been a steady overall progressive reduction (as in the SUN countries). In percentage terms, for the decade 1993-2003, the reductions in mortality rates (fatalities / 10^6 inhabitants) range from 17% for Greece to 41% in the case of Portugal (21% for Spain, 27% for Catalonia); for fatality rates (fatalities / 10^6 vehicles) from 40% for Spain to 64% for Portugal (44% for Catalonia, 53% for Greece); and for risk exposures (according to the veh-km estimates available) from 40% for Catalonia to 57% for Portugal (47% for Spain, 51% for Greece). It has to be noted that, in absolute terms, the rates of the Southern countries at the start of the 21st century are not dissimilar to the rates of the SUN countries at the start of the 80's.

The last decade has seen an important development in roads infrastructure and in vehicle stock (especially cars and powered two wheelers) in all three countries. On the one hand, the varying trends and the changes in roads and vehicles make it difficult to quantify the impact of specific measures; on the other hand, there is a good basis for the comparison in so far as the Southern countries seem to be facing similar changes and challenges.

Role of mode split and traffic density

Measures of risk exposure in terms of kilometres travelled are not yet being systematically monitored at national/regional level with the precision required to examine exposure by mode, age, sex of driver, road type etc.. Where travel exposure indicators could not be developed, the analysis has generally been developed in terms of population.

Spain (41.6 million population in 2002) has approximately four times more inhabitants than Greece or Portugal. At just over 80 persons per sq. km., Greece and Spain have the lowest population densities. Spain has more than five times the number of passenger cars than Greece, but less than four times the number for Portugal. Catalonia comprises 6% of the area of Spain, but 16% of its passenger car stock. The motorway length per area is similar for Portugal and Spain, being four times that of Greece; in terms of motorway length per capita, Spain has the highest ratio, and that for Portugal is around 2.8 times that for Greece.

Analysis of collision matrices

The analysis of collision matrices shows that the percentage of car occupants involved in all fatalities varies from 47% for Greece to 61% for Portugal, and up to 65% for Spain (when vans are included with cars). The lower proportion of passenger car fatalities for Greece is partly related to the lower level of motorisation, but also to the relatively high ownership of motorcycles; Greece has the highest proportions of motorcyclist, pedestrian and lorry occupant fatalities. Spain, Portugal and Catalonia have higher proportions of car occupant and mopedist fatalities.

Combined, the fatalities of riders of motorized two wheelers (mopeds and motorcycles) account for between 15% (Spain) and 23% (Greece and Portugal) of all fatalities. These figures - for Southern countries with relatively large stocks of motorized two wheelers – are comparable with around 17% for Great Britain and the

Netherlands, (see SWOV, 2002). One of the factors explaining the lower fatality rates for motorcyclists and mopedists in Spain and Catalonia (compared to Greece and Portugal) is the higher rate of helmet usage. In Greece youngsters do not legally have access to a moped until a year later than Spain or Portugal; the consequent lower exposure probably contributes to the relatively low proportion of mopedist fatalities.

For drink and driving safety

Drink-driving remains a serious problem for Southern countries with a total of between 1200 and 2000 persons killed in 2003. Greece, Spain (and Catalonia) have obtained good records of alcohol levels of killed drivers. The evolution of the legislative framework across the Southern countries is similar (all apply a general limit of 0.5 g/l of alcohol in blood), but with some differences (Greece and Spain apply lower limits for young drivers, Greece and Portugal apply intermediate and higher limits). In addition, all three countries apply random screening tests; in 2003, some 1.3M breath tests were performed in Greece (1 check per 3 cars, approaching the 1 per 2.5 cars target set by EC), some 900,000 controls were made in Portugal (1 test per 5.5 cars) and over 2.5M controls were realised in Spain (includes 400,000 tests in Catalonia, but excluding controls in the Basque Country and those by local urban police), amounting to around 1 test per 7 cars. The relatively good performance of Portugal may be attributed to earlier lowering of the general limit and the strictest sanctions

For pedestrian safety

Portugal presents, in general terms, the worst rates for pedestrian fatalities and injuries. However the trends point to a convergence towards similar present rates to those presented by the other two countries and the autonomous region, especially in the cases of killed and seriously injured. These current rates, however, are still well over those for Sweden and the Netherlands, and more effort needs to be made in areas such as the coordination of low-cost infrastructure improvements, the standardisation of minimised signal crossing times, etc.. Generally, the age pattern of pedestrian fatalities for the Southern countries is similar to that for Sweden, with elderly pedestrians being a particularly vulnerable group for Greece.

For seat belt safety

Seat belt wearing rates by Greek drivers are well below those of the other countries. With seat belt use in KSI accidents just over 40%, there is a great opportunity for saving lives by improving seat belt usage by Greek drivers. The rates achieved in other Southern countries exceed 80%; in Portugal this may be at least partially attributed to suspension of those drivers repeatedly found not wearing the seat belt; in Spain the programme of continued monitoring has facilitated targeting of publicity and enforcement by age, sex and location. Greece, Spain, and Catalonia show low belt wearing rates for rear seat occupants and for urban roads; Portugal does not have disaggregated information. Whilst part of the improvement in driver seat belt wearing may be attributable to the improved safety features of new cars, it is evident that police enforcement has contributed to raising the belt wearing rates for all countries in recent years.

It is estimated that somewhere between two-thirds and three-quarters of children in the Southern countries and region that were killed (in 2003) were not using the appropriate child restraint system. It is evident that the administrations have been making efforts to obtain information about this problem, but further efforts are required to ensure more complete recording (both of usage levels in accidents, and the monitoring of numbers of sanction penalty notices issued).

For Powered Two Wheeler safety

The number of motorcycles in Southern countries is increasing, particularly in Greece and Portugal. Catalonia has a notably high stock of motorcycles (in 2003, almost a third of the Spanish total, almost half the stock of Greece). Motorcycle fatalities per capita show improvements for both Greece and Portugal, although by 2003 the former remains three times, and the latter two times, the level of Spain. Similar improvements are seen for fatalities per motorcycle, although the rate for Portugal in 2003 is four times that of Greece and six times that of Spain / Catalonia. In 2003, for Greece, two out of every three killed motorcyclists were not wearing a helmet, compared with approximately one in seven of the killed motorcyclists in Spain, 1 in 10 for Portugal, and 1 in 25 for Catalonia. There are proportionately more young killed motorcyclists in Greece (half are aged 20 to 29) than in Spain (highest age group being 30 to 39) and Catalonia (highest age group is 40 to 49). Portugal appears to have a particular problem with motorcyclist fatalities driving off road, especially on rural roads.

The number of mopeds is increasing in Spain and Catalonia, is decreasing in Portugal, and appears to be stagnant in Greece. The trend in fatality rates per capita for mopeds shows great improvement for all counties but especially for Portugal. Nonetheless, for 2003, the rate for Portugal remains four times that of Greece, with Spain and Catalonia at almost twice the Greek figure. In terms of fatality rates per moped, for 2003, the rate for Portugal is twice that of Spain / Catalonia, and almost ten times that of Greece. A major factor relating to the good performance of Greece concerns the higher minimum age (16) for obtaining a moped driving licence, as well as the higher test requirement.

For Young driver safety

The relative risk ratio compares the number of drivers in fatal accidents related to the population aged between 18 and 25 years with those of the 30 to 59 age group; for all the countries for the most recent year (2003) the ratio is between 1.5 and 2.0, indicating that this is a common problem, of similar magnitude. The trends show an improvement for Portugal (from over 2.0 in 2001) and a slight worsening for Greece and Spain (from 1.2 in 1997). It was also found that young Southern males are five times more likely to be involved in fatal accidents than young females. Data for Spain and Greece indicates that, in terms of accidents per licence holder, the younger age group is three times more likely to be involved in road accidents than the older age group.

Considering the data for 2003, the types of accident in which young drivers of Southern countries are over represented are single accidents (especially Greece and Spain), accidents at weekends (particularly Portugal) and accidents with several passengers present (particularly Catalonia, Spain and Greece). The problem of dangerous driving by young drivers during the weekend nights is particularly severe

in Southern countries due to the combination of good climate and extended late night activities.

For Speed management

The only available mean of comparing speed-related fatalities is the police accident reports. The recent trends show fatality reductions for Portugal and Greece. In spite of the higher level of speed controls performed in Spain, speed-related fatalities (according to police reports) remain almost unchanged.

Catalonia is the first location of the Southern countries to implement automated camera systems to manage excessive speeding, and the first results show that this type of system is very effective in reducing speeds, infringements and accidents. A similar speed management system is being deployed across the rest of Spain during 2005 and 2006.

Specific recommendations for the European Commission

The Southern countries thus far examined by applying the SUNflower approach show that this approach is useful for identifying common characteristics, in identifying the better practice(s) and the areas that the lesser performer(s) need to address, and provides hints for the types of measures that could facilitate improvements. If the EU is to achieve the 2010 target of halving road fatalities, the contribution has to come from those countries where there is a high potential for improvement. The Southern countries of Greece, Portugal, and Spain (including Catalonia) are making progress towards this ambition, but more needs to be done to ensure that progress is sustained and that best practice is more widely adopted. Whilst some of the challenges can be considered to be “improved housekeeping” such as improving seat belt and helmet wearing performance, sustained enforcement will require the adoption of improved technologies and procedures (for example, camera-based speed management, point-based driver demerit). The proposal made in the SUNflower report, for the EU conditional subsidy of enlarged national / regional investment on large-scale implementation of intensified enforcement on speeding, drink-driving and seat belt/ child restraint is highly relevant. Guidelines on surveying / monitoring speed and seat belt wearing would also be helpful, and would probably have to accompany possible incentives.

The Commission should:

- note that a similar approach of conditional subsidy is equally applicable to the powered two-wheeler problem. The SUNflowerplus benchmarking shows where improvements should start, (helmet enforcement, improved driver training);

- give consideration to supra-national initiatives that enhance vehicle safety for powered two wheelers (and not just four-wheeled vehicles) and which make it easier to automatically detect infringements made by drivers of such vehicles (for example, helmet-use advisors):

- note that, if the overall EU objective of halving fatalities is to be achieved, it is likely that stricter legislation will be needed in areas such as alcohol motor ignition control or the adoption of accident recorders:

- fund a study to quantify exposure levels for powered two-wheeler (PTW) riders; this should also benchmark insurance costs and levels of non-insured usage.

- note the overall high share of PTW fatalities, and make greater efforts to develop appropriate technological solutions to make PTWs safer- Much more needs to be done to introduce protection systems such as external air bags for PTW users.

- note that benchmarking of basic parameters (vehicle, user, road) is hampered by a lack of good data about roads.

- fund a project to facilitate knowledge transfer concerning the introduction of attributes from digital navigation maps; apart from providing precise and consistent quantification of road lengths by type, such tools can be applied to determine road lengths by speed limits and other inventoried elements; cross-tabulating black spots by problem type (young drivers, single vehicle accidents, ...) could facilitate insights about how to efficiently programme the deployment of police (seat belt, speed, drink) controls.

- note that, unlike some northern European countries, mobile phone-based location has not yet been applied to the collection and data processing of accidents in the studied Southern countries; the use of such technology to geo-reference accidents and other performance indicators can be exploited to reduce police effort, better deploy resources, target enforcement, etc..

- note that benchmarking at the national level has not been able to provide insights about the relative performance of areas with respect to the use of safer modes (public transport, walking, etc.). To examine this, a study is recommended that applies the SUN method at the regional / urban level.

Specific recommendations for the SUN countries

<u>Common (for all territories studied)</u>

There is a common need to maintain (and in some cases increase) the police control effort directed at young drivers, drinking-drivers and speeding drivers.

There is a need to improve the procedures and databases to enhance police effectiveness for tracking and dealing with re-incident drivers of serious infringements (drinking, speed, non-use of protective systems). The introduction / improvement of points-based driving licences should facilitate improved tracking of habitual offenders, should include reduced thresholds for young drivers, and should cover drivers of powered two-wheelers. The re-training of drivers who lose their licence is an opportunity that can reduce certain types of accidents such as single vehicle accidents (applicable especially to car drivers in Greece and Spain).

Measures of risk exposure in terms of kilometres travelled need more precision to examine exposure by mode, age, road type etc. The need to monitor actions by road type implies the improvement of databases and, typically, information exchange between administrations.

All countries could save lives if the rear seat belt wearing rates were raised.

All countries need to improve the monitoring of Child Retention System usage, and the monitoring of related sanctions. Once the data recording is improved, attention should be given to analysis of usage rates of children by age.

The analysis of motorcycle and moped relative risk ratios identifies higher risks in urban areas. This result leads to a recommendation for more enforcement of road discipline (controls of drink-driving, red-light jumping, excess speed as well as helmet wearing) in urban areas targeted on PTW users.

For Greece

Improving driver compliance with the existing seat belt law is an area where Greece, in particular, could save lives. By applying the same approach to drink-driving (active, intensive police control and monitored sanctions) it is likely that seat belt-related safety performance can be much improved.

Young drivers are over represented in single accidents. This may be related to lower concentrations of traffic, the relative quality of the roads, or other factors. Greek authorities already apply differential treatment of young drivers in drink-driving law. Closer attention to seat-belt and helmet wearing enforcement could be particularly directed to young drivers.

More attention should also be given to pedestrian safety in through roads and new measures should be studied (artificial lighting, improvement of pedestrian visibility, etc.).

An obvious recommendation is that Greek authorities should address the low level of helmet usage (both motorcycles and mopeds) by better police enforcement and increased sanctions.

One way to increase police enforcement (of seat belts and helmets) would be to incorporate such controls into the drink-driving checks; some rationalisation of police deployment may be needed, but this could improve overall effectiveness without too requiring a big increase in policing.

For Portugal

The disaggregation of seat belt wearing infringements by front / rear seat occupants would improve knowledge about the relative impact of safer vehicles, police seat belt enforcement etc.

In order to improve the understanding of young drivers' attitudes, data collection should be more developed. In particular, it would be of interest to compare the involvement of drivers in accidents by age of holding a driving licence (this data is reported for the other countries, for 2003).

More needs to be done to facilitate safe pedestrian movements on both urban roads and on rural roads passing through towns, with elderly people at night as the design criteria; improved infrastructure needs to be reinforced by the continued effort to educate road users of all ages.

Portugal experiences a higher proportion of elderly mopedist fatalities; re-training courses and / or enforcement of helmet usage could be appropriate measures.

The higher relative risk ratio for Powered-Two-Wheelers PTWs in Portugal has been investigated in terms of accident types in comparison with share of vehicle stock; it is recommended that Portuguese PTW users need improved training or the introduction of a points driving licence that can curb reckless driving.

For Spain

The importance of drink-driving cannot be understated. It is proposed that Spain makes greater efforts to fully record the controls made at accidents; on the one hand, this means recording the accident severity; on the other hand, it means a legal interpretation of the the intermediate and higher alcohol levels so that stricter punishments can be applied without having to follow court procedures. The severity of sanctions for such offences should be increased at least to Portuguese practice.

Stricter legal measures to be considered that include the setting of a standard BAC level of 0.2 g/l for motorcyclists, or the establishment of a common minimum punishment of unconditional suspension of the driving licence for 6 months for anyone passing the limit.

Spain should seek measures to improve rear seat belt use.

The number of fatalities due to speeding shows no sign of lowering. The introduction of automatic detection should be a way to reduce them and to change driver behaviour. Experience gained through early deployment in Catalonia needs to be reviewed so as to facilitate wider deployment in other regions, and to ensure effective monitoring by road type at the various levels.

Data reporting of pedestrian urban casualties should be improved to better know the real scope and nature of the problem.

For Catalonia

In spite of coordinated efforts (of policing and marketing of “Zero tolerance”), drink and drive continues to be an important problem. Catalonia shows a relatively low detection level of drunk drivers (1 out of 7 cars tested) and this can only be increased through increasing police controls.

Catalonia has installed speed cameras and this should increase the number of speed offenders detected in an efficient manner. To build upon the encouraging initial results, camera control needs to be extended to cover the entire road network (of locations with speed-related accidents) so as to ensure a change in driver behaviour. It should be possible to compare performance for different road types, taking into account the varying exposure levels.

The use of child restraint system and rear seat belt is very low. Catalonia should give more attention to this point and the authorities should consider a campaign to increase driver awareness about the consequences.

Catalonia has a high level of powered two wheeler ownership and usage, and shows a relatively good performance in terms of helmet enforcement. However, the authority should consider whether its participation in ENCAP vehicle testing could facilitate a testing of new protective devices for motorcycle users (e.g. external air bags). It should also investigate how licensing might be improved (plate type, electronic tags, etc..) to facilitate recognition of motorcycles at automated speed controls.

1. Objectives & methodology

1.1. The objectives of the comparative study

In 2002, the SUNflower report was published marking the finalisation of a project which described, and managed to partially explain, the road safety trends and implemented policies of the three countries with the lowest accident levels; Sweden, the United Kingdom and the Netherlands – the SUN countries (SWOV,2002). The study has inspired researchers in many countries throughout Europe and finally became a basis for a new project – SUNflowerplus – which extends the scope of the original work – both in terms of the case studies examined and the geographic coverage. In this new project, the Southern countries comprise Greece, Portugal and Spain, and the autonomous region of Catalonia [2]. This report is one of three documents which examine case study material for three sub-areas of Europe (in addition to the follow-up study for the SUN countries (SWOV et. al., 2005)., there is a comparative study of road safety development in the central european countries of Czech Republic, Hungary and Slovenia (CDV et. al., 2005)).

As the road safety records of the Southern countries (in terms of key indicators such as fatality rate per capita or per vehicle) need to be further improved to reach the levels of the SUN countries, it is very challenging to carry out an examination of road safety practices following the lines adopted by the SUN partners. The core of this study comprises a comparison of the three countries and autonomous region of Southern Europe. This analysis aims to contribute to outcomes defined by the European Commission in the Road Safety Action Plan for the period up to 2010, which was drawn up in 2003 as part of the policy actions defined in the White Paper (EC, 2003). These actions should be seen as an attempt by the European Commission to marshal efforts around the target of halving the number of road deaths over the period 2001- 2010.

The objectives of this comparative study [3] are to:

- define indicators and assemble the best possible data so as to examine the specific case studies and overall policy;

- provide insights concerning the reliability of different data sources for comparing road safety policies and actions in European countries;

- identify the strengths and weaknesses of each country / region through comparative benchmarking;

[2] National interest in Spain was not apparent until alter the commencement of the Project whereas interest in participating was manifested by Catalonia from the start.

[3] In addition to the three comparative area studies, SUNflower+ will deliver a Footprint study and Final Report.

- (in conjunction with the studies of the other two areas) to contribute to a science-based understanding of differences between benchmark values;

- to propose conclusions and findings aimed at optimising the development and implementation of road safety policy and actions in Europe.

This comparative study for the Southern territories (three countries and one autonomous region) has been performed collaboratively by a national research laboratory (Laboratório Nacional de Engenharia Civil – LNEC – for Portugal), and two consultants (Trademco for Greece, and DSD for Spain and Catalonia), each supported by the respective organisations responsible for road safety Direcção Geral de Viação (DGV) for Portugal, Dirección General de Tráfico (DGT) for Spain and Servei Català de Trànsit (SCT) for Catalonia.

1.2. The methodological approach

The basis of the approach used in SUN and SUNflowerplus is the benchmarking of three countries. For the Southern group, the autonomous region of Catalonia forms a fourth element which is compared in addition to the countries of Greece, Portugal and Spain.

An initial exercise that facilitates the subsequent benchmarking is the description of the background provided by the national and regional road safety plans. This description sets out to address the bottom two levels of the target pyramid.

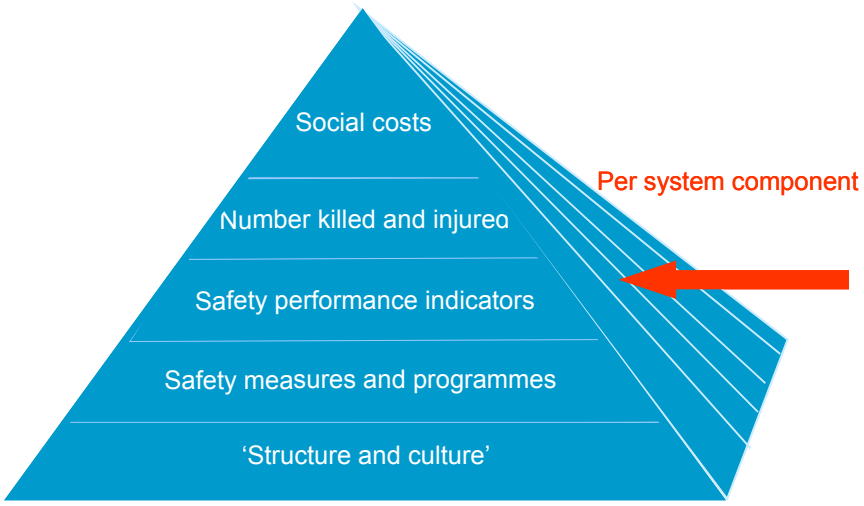


Figure 1.1. *A target pyramid illustrating benchmarking by system (or territory)*

(Source: Wegman, 2001, inspired by the Road Safety Strategy 2010 of New Zealand)

This study does not attempt to value the social costs of road accidents. The comparison centres upon the number of road accident fatalities. Where considered to be useful the comparison includes other accident statistics (personal injury, total

numbers of accidents..) but the main focus is upon police reports of persons killed (this being a basis for a reliable comparison of system performance[4]).

At the centre of the comparison are the case studies. Trying to identify the major road safety problems of the Southern countries, altogether seven topics have been selected and analysed as so-called “case studies”. The selection of these topics was made in consultation with the sponsoring organisations and with a view to ensuring a sufficient core of common topics within the overall SUNflowerplus nine country comparison. The seven case studies of the Southern comparative study are:

- Drinking and driving
- Seat belts
- Young drivers
- Speed management
- Pedestrians
- Powered Two-Wheelers: Mopeds
- Powered Two-Wheelers: Motorcycles.

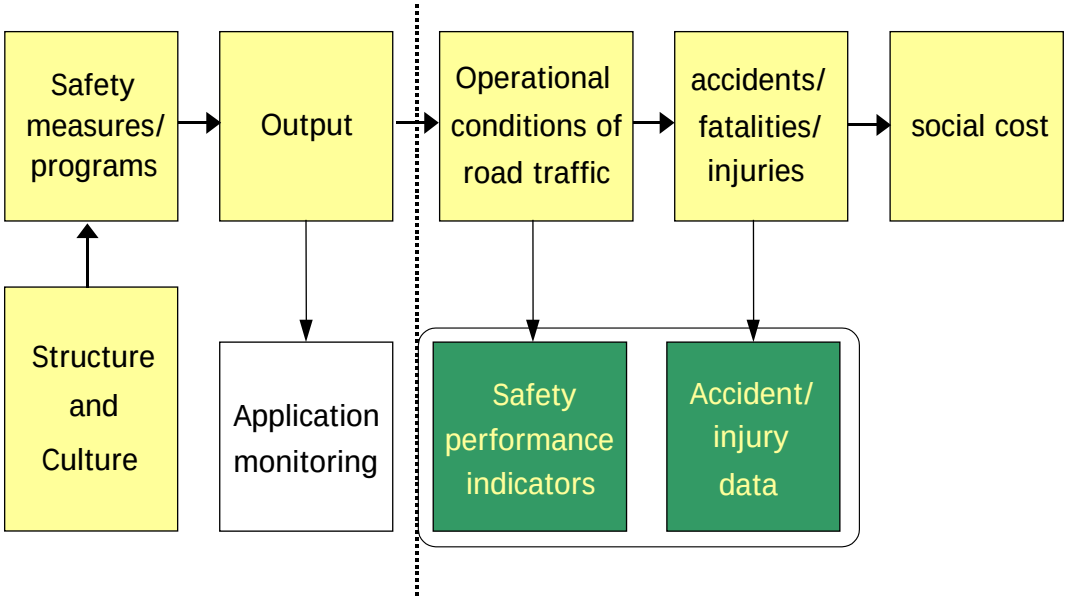


Figure 1.2. *Road safety target pyramid transformed into chain system* (Source: CDV et. al., 2005).

[4] In order to maintain comparability between the Southern countries and the rest of the SUNflowerplus countries, as well as ensuring a basis for further international comparison, the study is based upon persons killed within 30 days of accident occurrence – this, in spite of the recording of accidents on the basis of deaths within 24 hours; information about factoring is contained in chapter 2.

One of the key features of the SUN study was the retrospective analysis of data trends, covering up to several decades in some instances, as a way of finding insights to explain difference identified by the benchmarking, and then propose possible quantitative contributions according to the differences in actions of the listed chronological evolution of key actions. This approach is less straightforward when the countries under consideration do not exhibit a common steady downward trend in numbers of annual road fatalities. This is considered to be one of the facts that has led to another perspective of the Sunflowerplus case study work as proposed by the Central group, Figure 1.2. This approach attempts to give an increased emphasis to those recent / current key actions of national road safety programmes, and illustrates how the work is active in the definition of key safety performance indicators (SUNflowerplus is working in active cooperation with the Safety-net project in this respect). The work reported in this study adopts a similar line to that of the Central countries group.

In the work on comparative analyses of indicators, the SUNflowerplus project (http://sunflower.swov.nl) bases the majority of the fundamental data definitions upon the definitions of IRTAD (www.irtad.de), extending these where necessary with a glossary developed for the project.

1.3. The potential usefulness of the study

The study relies strongly on the use of high quality data that must be comparable. It is thus implicitly and firstly an attempt to get insight in the reliability of the use of national data for international comparisons and, as such, is a preliminary test for the use of other national data in the IRTAD-database for national road safety purposes. Secondly, it is an attempt to define the relevant benchmarks (size and nature of programmes/action plans/measures, intermediate and final outcomes) for a road safety comparison. Thirdly the study aims to contribute to the science-based understanding of differences between benchmark values. Fourthly the study tries to customise the findings into “good practices” for road safety comparisons. Finally, it is aimed to learn how road safety policies and/or actions can be optimized in the participating countries. Thereby it is meant to contribute to the improvement of road safety programmes and/or actions of the countries in the EU and of the EU itself.

Thus, by determining the underlying effective elements in policies and programmes of the SUN countries and the assessment of their impacts on the improvement of road safety, the results support the optimisation of the future road safety strategies for each CEE country. The study contributes a proven methodology for:

- Road safety comparisons of countries.

- Bench marking of road safety measures and their effect evaluation.

- Study outcomes that can be used by the European Commission for their future road safety policy.

- Other EU member states EU applicants states and other countries for their road safety plans and advice on effective measures.

2. Road safety policy and organisation and the traffic background

This chapter provides an introduction to the main road safety plans and policies. It also describes the organisation of road safety activities, and provides a presentation of the transport background.

2.1. Introduction to the main road safety plans and policies

The listing of the evolution of key interventions to promote road and traffic safety for each of the areas studied – Greece, Portugal, Spain and the autonomous region of Catalonia - forms an integral part of the study. This is attached at Appendix A.

2.1.1. Road Safety Policy in Greece

During the last two decades, road accidents in Greece are the cause for the death of almost 6 citizens per day. Every year more than 20.000 road accidents with casualties occur in the Greek roads, in which more than 2.000 drivers, passengers and pedestrians are killed and about 30.000 are injured. Road accident related fatalities and material damages result in an important financial and social cost and, therefore, the improvement of road safety constitutes a high priority for Greece.

The actual low level of road safety in Greece can be improved if Greek authorities exploit successful experience from other countries and abandon the approach of fragmentary actions and traditional separation of competencies among involved authorities. The necessary prerequisite for the improvement of road safety in Greece is the development and implementation of a strategic plan and the adoption of an integrated road safety policy, which will allow the efficient coordination of all related actions and measures.

Within the above context, the Ministry of National Economy assigned a research project for the "Development of a Strategic Plan for the improvement of Road Safety in Greece 2001 - 2005" carried out by the Department of Transportation Planning and Engineering of the National Technical University of Athens (NTUA-DTPE) in collaboration with the Australian Road Research Board (ARRB Transport Research). The objective of this research project was the development of the first Strategic Plan for the improvement of Road Safety in Greece, the implementation of which can lead to a decrease of 20% up to 2005 and 40% up to 2015 in the number of persons killed in road accidents.

The finalisation of the Strategic Plan and its implementation was based on a broad consultation process and a detailed literature research. The selected structure of the Greek road safety Strategic Plan concerns four main directions / programmes, which should be implemented by the four main State Authorities (Ministries) responsible for road safety and at the same time correspond to the four basic axes of actions necessary to improve road safety. These four main programmes concern: the safe road environment (Ministry of Environment, Physical Planning and Public Works), the safety of the road user and the safe vehicles (Ministry of Transport and

Communications), the effective road safety enforcement (Ministry of Public Order) and the effective post-crash treatment (Ministry of Public Health).

According to the proposed structure, the authority responsible for the coordination of the implementation of the Plan is the Road Safety Interministry Committee. Moreover, this Committee has also exclusively the responsibility to implement actions concerning two horizontal key areas, such as: (a) the promotion policy and (b) the quantified monitoring system, achieving thus scale economies and increased efficiency in these two domains which are considered critical for the success of the Plan.

Each of the directly involved Ministries is responsible for the design and the implementation of a main Programme of actions and will be responsible to carry out the respective annual review of what has been achieved in comparison with the targets set, independently of the results of the other Programmes. Having taken into consideration the proposals made by the involved Ministries and Authorities as well as the best practice found internationally, the priority axes (see list below) and the respective road safety actions were selected.

The success of the Interministry Committee's mission requires its continuous support from the Council of Road safety Experts as well as from a corresponding Support Mechanism, which is proposed to be an independent administrative body, preferably with no connection to the four directly involved Ministries, under the supervision of the Interministry Committee. Furthermore, an important role in the implementation of the four main road safety Programmes belongs to the services of other Ministries, the Universities and the Research Institutes as well as to the involved NGOs.

The proposed implementation timetable indicates how the five-year Road Safety Strategic Plan 2001 - 2005 should be implemented and managed. The Road Safety Interministry Committee, responsible for the implementation of the Strategic Plan, should finalise this implementation timetable and take all the necessary dispositions for its efficient execution. The plan proposes an integrated Quantified Monitoring System during the whole implementation period of the Strategic Plan, which will ensure the success of the Plan allowing:

- the non-stop monitoring of the road safety level,

- the recording of the Plan's progress and the identification of any delays,

- increase of the user confidence level, necessary for the continuation of the initiatives that prove to be successful,

- the identification of measures and initiatives that did not bring the expected results.

Main prerequisites for the success of the Strategic Plan for the improvement of road safety in Greece is the existence of the necessary political will together with the allocation of necessary funding as well as the development of the sense of emergency, which will lead to the efficient implementation of the four main Action Programmes. It is further recognized that the practical realisation of the road safety target requires the appropriate combination of technical measures and enforcement

as neither funding nor political will alone are ever sufficient to lead to the desirable road safety levels.

Selected road safety priority axes (Road Safety Plan for Greece)

- The Safe Road Environment (Ministry of Environment, Regional Development & Public Works)
  1. Establishment of a coordination and monitoring unit
  2. Black Spot identification and treatment
  3. Improvement of signing, marking and road equipment
  4. Improvement of artificial lighting
  5. Improvement of pavement anti-skid characteristics
  6. Road safety measures in urban areas
  7. Implementation of road safety audits
  8. Elaboration and adoption of standards and Research
- Safety of the User and the Safe Vehicle (Ministry of Transport)
  1. Establishment of a coordination and monitoring unit
  2. Upgrade of the drivers and instructors training and examination systems
  3. Programmes of traffic education
  4. Modernisation of the vehicle technical inspection
  5. Improvement and implementation of the legislation framework
  6. Incentives for the improvement of passive safety equipment
  7. Research for the analysis of accident causes
- Efficient enforcement for road safety (Ministry of Public Order)
  1. Establishment of a coordination and monitoring unit
  2. Improvement of the Traffic Police services
  3. Improvement of the accident data recording system
  4. Improvement of the immediate intervention system
  5. Integrated enforcement programme
  6. Improvement of the Fire Brigade services
- Efficient post crash treatment (Ministry of Health)
  1. Establishment of a coordination and monitoring unit
  2. Provision of equipment to emergency services
  3. Development of emergency plans and local coordination centres
  4. Improvement of injuries emergency treatment at the hospitals
  5. Research for the minimisation of road accident consequences

2.1.2. Road Safety Policy in Portugal

Traffic accidents in Portugal reached their highest peak during the 70's (in 1975 the number of 2676 fatalities in road accidents was reported). Since then more attention has progressively been devoted to road safety issues, and a slow but almost constant decrease in accident and fatality rates has been achieved. At the same time, and especially after Portugal has joined the EU in 1986, road transport has experienced a very substantial growth. Nevertheless in absolute terms, although the number of injury accidents has increased (by almost 50% from 1980 to 2000), the number of related fatalities has decreased (by almost 25% in that same period).

As a matter of fact, it was after 1970 that the most important measures specifically directed to road safety were taken, at various levels of intervention and at various stages. An example is the mandatory use of seat belts, which started in 1977 only for front seat car drivers and passengers in roads outside urban areas. It was not before 1992 that this obligation was extended to the case of all kinds of roads, and only in 1994 to every car occupant.

As regards drivers, for example, a legal blood alcohol lower limit of 0.80 g/l was firstly established in 1982, which was lowered to 0,5 g/l in 1990. Also some safety campaigns with very specific targets were part of this process.

As far as vehicles are concerned, it was only in 1992 that vehicle inspections became mandatory.

Most of these measures, as well as the definition of speed limits for the different kinds of roads and vehicles, were included in the so called "Highway Code", which has been subject to several revisions, and complementary legislation. That document can therefore be considered as the main instrument for the implementation of road safety policies until recently.

The road infra-structure plays also an important role in this context. Until the 80´s the Portuguese road network presented in general poor conditions, with old geometric design standards not complying with modern traffic demands, in particular with respect to road safety. By then, the National Road Plan issued in the 40´s, with minor adjustments, was still valid. A very deep modification in the Country's overall road structure, and especially as regards the National Roads Network, took place in 1985, with the publication of a new Plan, which reduced substantially the length of that main National Network (from over 20 000 km to around 10 000 km), but introduced very significant technical upgrades to comply with, in the design and construction of the roads belonging to this new network. Therefore the implementation phase of the Plan, which followed, required a huge effort in new road building over the whole Country. This phase overlapped with the Portuguese adhesion to the EU, which also contributed to the increase of structural funding for this purpose. As a result, most of the motorways were built in the last ten years to near 2 000 km, including the improvement of the accessibilities on the Metropolitan Areas of Lisbon and Porto. All these modifications required a revision of the said Plan that gave rise to the present 2000 Road Plan.

As mentioned before, besides the Highway Code, and its regulations, few other instruments were available for implementing road safety strategies, either in urban

or in rural roads. In 1997, however, a decision was taken by the Government to create a National Road Safety Council, which brought together the institutions with leading responsibility and activity in the road safety area in Portugal (see 2.2.2), having, among other duties, an advisory role in the definition, implementation and follow-up of safety policies. Within its scope, and until 2001, the General Directorate for Traffic produced, on a yearly rate basis, documents called Integrated Road Safety Plan (PISER). These documents were rather a congregation of annual action programs issued by the main bodies involved in this area, with their own strategies and resources. It was however a first step to a more comprehensive and target oriented real road safety plan.

This plan only came to being in the beginning of 2003, following a decision of the Government through the Secretary of State for Internal Administration, assigning to the Safety Council its elaboration. For this purpose a technical coordination commission and nine thematic working groups were established, which worked on the Plan in the second half of 2002.

The National Road Safety Plan (PNPR – Plano Nacional de Prevenção Rodoviária) became, thereafter, the main instrument for achieving a national safety strategy, towards the reduction by 50% until 2010 of the number of persons dead or seriously injured in road accidents, with reference to the corresponding mean values from 1998 to 2000, following overall targets recommended by the EC.

Although this objective may be considered too ambitious, it was viewed as a decisive factor to accelerate the downward trend of the Portuguese road safety indicators towards mean values in the EU. Furthermore, and taking into account the specific characteristics of the Portuguese traffic system and accident patterns, the above reduction target was increased to 60% as regards accidents involving pedestrians or two-wheeled vehicle riders, as well as accidents in urban areas.

The Plan covers, in an integrated approach, the main areas of intervention for road safety in Portugal. As part of its framework two distinct levels of action were considered. Firstly a strategic level, covering three “structuring” areas where permanent developments ought to take place: I – Continuous education of the road user; II – A safe road environment; III - Legal framework and enforcement. Secondly an operational level, directed to the implementation of short/medium term measures, included in action programmes for nine priority “thematic” areas or objectives: 1 – Safer driver’s speeds; 2 – Enhanced safety for pedestrians; 3 – Enhanced safety for two wheeled vehicle riders; 4 – Fight against driving under the influence of alcohol and drugs: 5 – Fight against fatigue driving; 6 – Greater and better use of in-vehicle safety devices: 7 – Less accidents involving heavy vehicles; 8 – A safer road infra-structure; 9 – Better aid to injured persons in road accidents.

A good inter-relation between the above mentioned levels and their components constitutes one of the assumptions for the success of the Plan, which will be subject to an interim evaluation at the end of 2005.

2.1.3. Road Safety Policy in Spain

Figure 2.1 provides a summary of the main stages in the evolution of road safety in Spain, presenting the trend in personal injury accidents against the main changes in legislation and policy implementation.

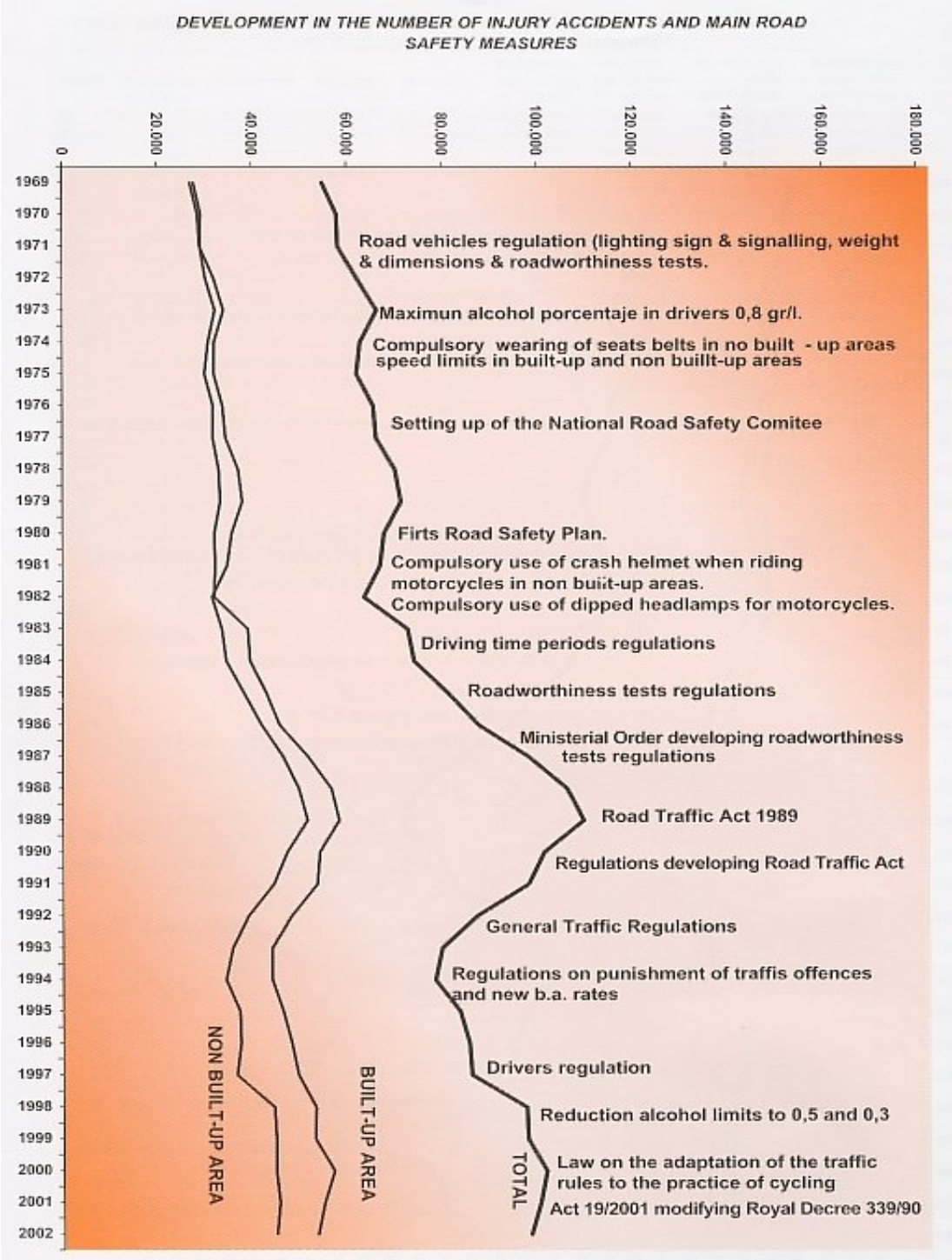


Figure 2.1. *Evolution of the number of traffic accidents and the most important road-safety measures in Spain (Source: DGT,2002)*

The accident level rose sharply in the early 80s having been stable at just over 60,000 personal injury accidents per year during the 70s (amongst other things, the 70s saw the introduction of the first alcohol and speed limits, and the obligatory use of helmet and lights for motorcyclists on interurban roads). The number of personal injury accidents peaked in 1989 at over 110,000, the year with 176,599 victims when the Road Traffic Act was introduced. The early 90s saw a decline in accident levels; in addition to the new legislation this is possibly associated with major improvements in roads infrastructure and a growth in the vehicle fleet[5]. Since 1994, when the accident level was around 80,000 accidents and 120,000victims, and up to the end of the 90s the accident level worsened. Alcohol limits were tightened at the end of the decade. Since 2000 the level has stabilized at around 100,000 personal injury accidents and 150,000 victims per annum.

In April of 1976 the National Road Traffic Safety Commission was created. One of the principal functions of the Commission is the development of road safety plans. In 1980 the National Road Safety Programme was published. This, the first national road safety plan, comprised 6 lines of action:

- Enforcement and control,
- Education, training and dissemination,
- Refurbishment of safety materials and loan of services,
- Regulation,
- Accident studies and programme development,
- Monitoring and control.

In the initial years three-year plans (1981-1983, 1985-1988) were run in conjunction with annual plans (1980, 1984) but from 1989 to 2004 the plans were realized on an annual basis.

The manifesto of the national Government elected in 2004 sets out to reduce road fatalities by 40% by 2008, adopting 2003 as the reference year. This means saving 2160 lives in 2008 compared to the 5399 persons killed in 2003. This is the first time that a quantitative target has been set for reducing road fatalities in Spain.

The DGT has recently published the “Strategic Road Safety Plan 2005-2008” (DGT, 2005), the first of a series of three documents setting out:

- Special measures 2004-2005
- Plan for Key Actions 2005-2008, and the
- Municipal Road Safety Plan.

The measures for 2004-2005 are listed as being:

- Introduction of the points-based driving licence
- Creation of the National Road safety Observatory

[5] Between 1993 and 2003, the vehicle stock, including mopeds, rose 40%, the number of licensed drivers by 24%, the kilometrage of high-capacity roads by 61%, (DGT, 2005).

- Strengthening of the Higher Council for Road Safety
- Increased deployment of police agents
- Introduction of technology-supported surveillance
- New campaigns for groups exposed to high risk
- New model for driver training
- Municipal Road Safety Plans.

In addition to the road safety plans, the Jefatura Central de Tráfico in the first place and the Dirección General de Tráfico thereafter, have managed media communications (posters, press, radio and television). Already in the '60s some of the issues such as pedestrians, drink-driving, speed and helmet use were covered, with seat belt usage being addressed in the '70s and young drivers at the end of the '80s.

The evolution of the communication campaigns is marked by the year 1992, the year when realism was introduced into the media spots (although simulations, these contained content that portray the crude reality of accidents and their consequences). In that year personal injury accidents were reduced by almost 11,000 and victims dropped from 162,000 to 155,000. The themes of the campaigns were speed, seat belt (especially rear seats), young drivers, helmets and drink-driving.

Since 2004, the communication campaigns are realized in conjunction with enforcement campaigns and the publication of educative materials In this way, an integrated approach is made. The most recent campaigns concern speed, drink-driving, helmet, seat belt and use of mobile phones.

2.1.4. Road Safety Policy in Catalonia

Figure 2.2 provides a summary of the main stages in the evolution of road safety for the autonomous region of Catalonia. The trend is generally similar to the overall trend for Spain, Figure 2.1. Following a continued rise in the numbers of all kinds of road accidents in the 60s and early 70s, a period of stabilisation at around 19,000 personal injury accidents per annum is identified during the late 70s and early 80s. Stage 2 marks a steep rise in accidents – especially on interurban roads – up to 1990. This is followed by Stage 3, a period of sharp, sustained reduction of accidents, attributed to greater enforcement. The mid 90s show a moderate increase in accident levels (Stage 4) with personal injury accidents stabilising at around 22,500 at the end of the last century – this Stage 5 marking the transfer of police competence from national to regional level.

The road safety level of the year 2000 has been adopted as a reference for the last two Catalonia Road Safety Plans, each covering a three year period. The Road Safety Plan for 2002-2004 aimed to achieve a 15% reduction in the 5145 persons killed or severely injured on Catalan roads (in 2000). The Catalan Road Safety Plan for 2005-2007 aims to achieve a 30% reduction in the 891 persons killed (in 2000, figures for deaths at 30 days). As the following figure shows, this target is consistent with the target set by the European White Paper of a halving of fatalities by 2010.

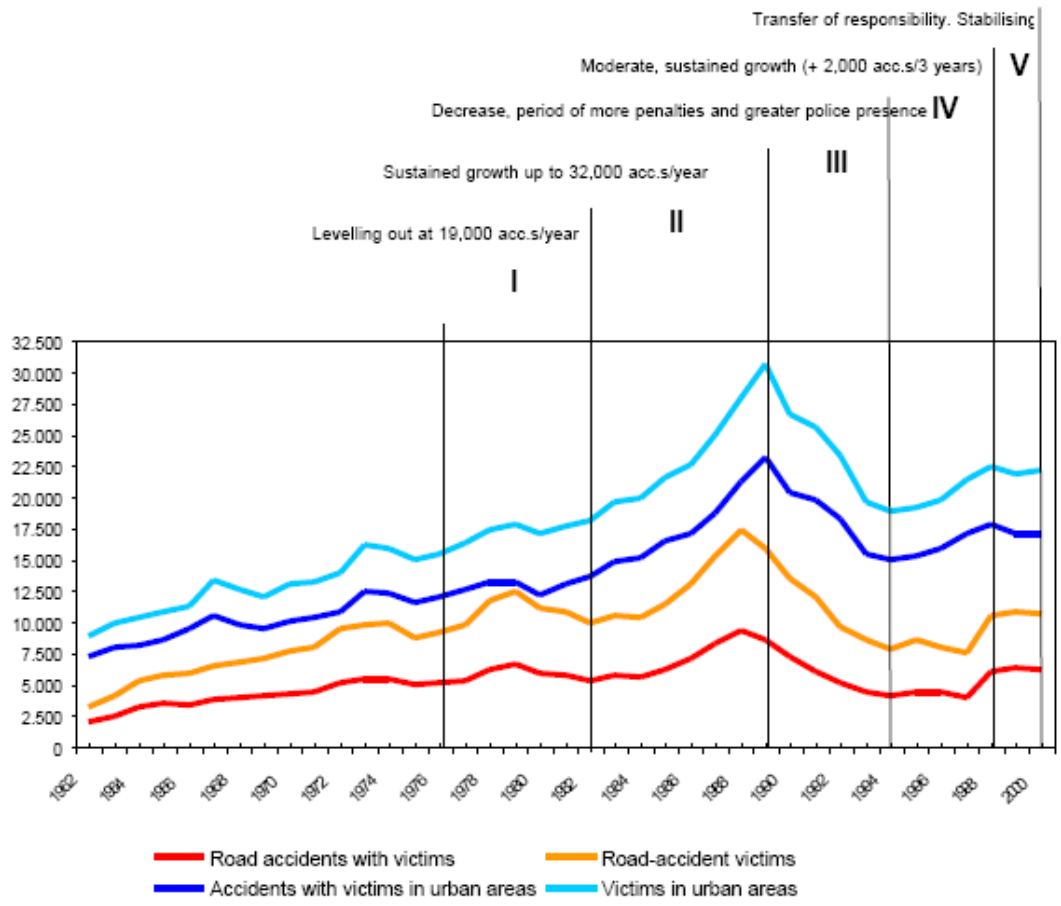


Figure 2.2. *Evolution of the number of traffic accidents and the most important road-safety measures in Catalonia. (Source: SCT, 2002)*

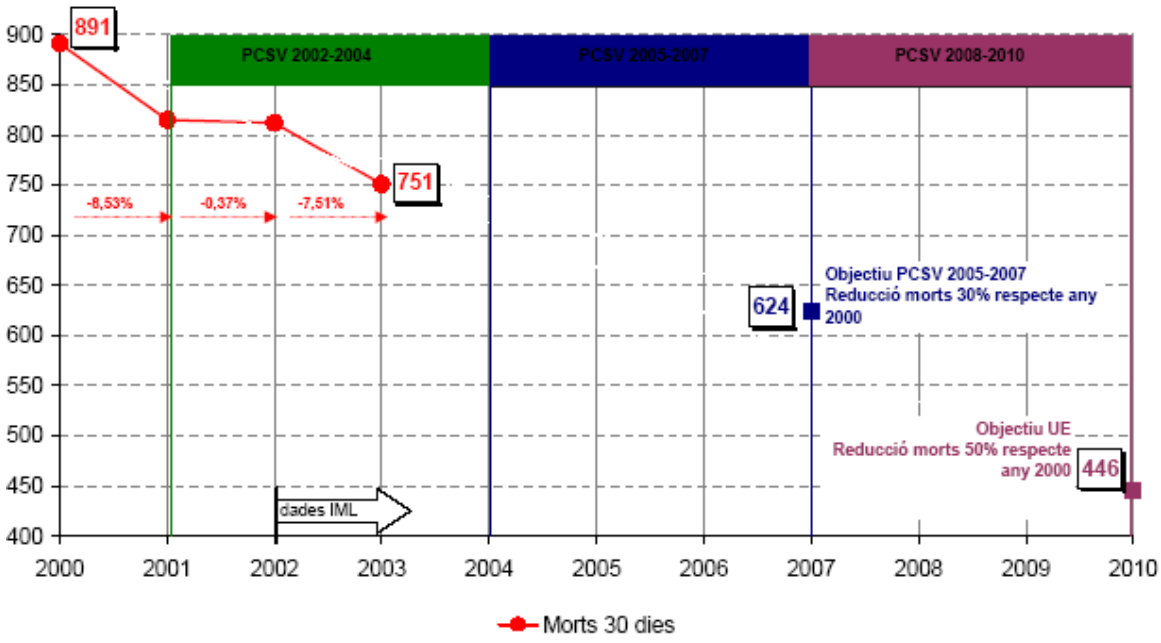


Figure 2.3. *Objective of the Road Safety Plan for Catalonia (Source: SCT, 2005, fig from pdf , p8)*

There are 6 strategic lines set out in the Catalan Road Safety Plan for 2005-2007, namely:

- political actions supporting the policy, (aiming to change cultural values)
- reduction of risk exposure
- reduction of accident impacts
- improving information systems
- research and investigation
- plan management and execution.

2.2. Organisation for road safety

2.2.1. Greece

All the main authorities and other organisations (Non Governmental Organisations, Universities and Research Institutes) are - in one way or the other - involved in road safety in Greece and are making efforts for the improvement of road safety. The direct involved are:

- Ministry of Environment, Physical Planning and Public Works
- Ministry of Transport and Communications
- Ministry of Public Order
- Ministry of Health

For Greece, all statistics available concern fatalities recorded at the scene of the accident. Information on each accident is gathered in a Road Accident Data Report (RADR). These reports are filled by the police and processed by the respective department of the National Statistical Service of Greece under the Ministry of Public Order.

2.2.2. Portugal

In Portugal, at the national level, overall responsibilities for road safety are legally assigned to the General Directorate for Traffic (DGV - Direcção Geral de Viação), under the Ministry for Internal Administration. Also under the same Ministry are the two main enforcement bodies: the Traffic Brigade of the National Guard (BT/GNR) for rural roads, and the Public Security Police (PSP) for urban areas.

The Portuguese Roads Administration (EP - Estradas de Portugal, E.P.E.), under the Ministry of Public Works, Transports and Communications, is responsible for the administration of the National Roads Network (RRN - around 12 000 km of the main links: Principal Itineraries, Complementary Itineraries and National Roads). Local rural and urban networks are managed by the municipalities. Part of the RRN (around 1800 km of motorways) are managed by private concessionaires. All these

bodies have assigned duties as far as road safety is concerned, especially related to the infrastructure and its environment.

Other entities, in the private sector, play also a role in the road safety field, such as the Portuguese Association for Accident Prevention (PRP – Prevenção Rodoviária Portuguesa), namely in conducting public awareness campaigns, training and education support actions.

Road safety research in Portugal has been mainly carried out, in a systematic way, by the National Laboratory for Civil Engineering (LNEC- Laboratório Nacional de Engenharia Civil) through the Planning, Traffic and Safety Division of its Transportation Department, under the Ministry of Public Works, Transportation and Communications. Some safety research is also undertaken at the Universities, namely as regards human behaviour and vehicle safety.

Since 1997 a framework for getting together the institutions with leading activities in road safety, has been set forth through the creation of the National Road Safety Council (CNSR), which has, among other duties, an advisory role in the definition of national safety policies and programs. The General Directorate for Traffic, the Police bodies (GNR and PSP), the General Directorate for Land Transport (DGTT), the General Directorate for Health, the Portuguese Roads Institute, the Portuguese Insurance Institute, the Medical Emergency Institute (INEM), the National Firemen Service, and General Directorates from the Education sector, are some of the CNSR members from the public administration. Besides those members, the CNSR includes, as invited members, other associations, such as motorway concessionaires, the Portuguese Driver's Club (ACP), the Portuguese Association for Accident Prevention (PRP), the National Association of Municipalities (ANMP) and the Portuguese Road Centre (CRP).

The National Road Safety Council operates not only at the central level but also at the district level (18 Districts in Portugal), through the so called District Commissions for Road Safety, which report to the main Council and congregate district delegations of the above mentioned institutional members.

The preparation of the National Road Safety Plan, which was launched in March 2003, was addressed to a Technical Commission designated by the said Safety Council. After the approval of this Plan, by the Council of Ministers, a new component was introduced in the safety organisation scenario, since two commissions were thereafter created for the follow-up of the implementation of its programmed actions (to be carried out by various entities), and for the evaluation or its results, against quantified targets that, within its scope, were established for the first time in Portugal, namely a 50% reduction of fatalities and serious injuries in road accidents, until 2010. The first commission ensures a high level support and supervision, having as acting members appointed representatives from seven Secretaries of State: Internal Administration; Justice; Education; Health; Public Works; Transports and Local Administration. The second commission, which reports and gives direct counselling on this subject to the first commission and to the National Road Safety Council, is an executive board with technical experts appointed by seven selected bodies (DGV, IEP, LNEC, BT/GNR, PSP, PRP, ANMP, and the Department of Primary and Secondary Education), chaired by a representative of the Secretary of State for Internal Administration.

2.2.3. Spain and Catalonia

Spain is governed at three levels: central level, regional level and local (municipal) level. There are 17 autonomous regions and 2 autonomous cities in Spain, with the Basque Country and Catalonia being those exercising the greater level of autonomy. These regions are composed of 50 provinces and 2 autonomous cities, and this level provides a means for managing traffic and coordinating local police activity in some regions.

The organisation with lead-responsibility for road safety in Spain is the Dirección General de Tráfico of the Ministry of the Interior. Through the Higher Council for Road Safety the DGT coordinates actions involving various ministries including the ministries of public works (Fomento) and health, as well as numerous other organisations. It is the ONSV ("Observatorio Nacional de Seguridad Vial") that monitors road safety, generates intelligence from statistics, and coordinates related research and investigations.

Proposals for new laws governing road traffic are made by the DGT and then enter the parliamentary process. New road traffic laws are applicable in all parts of the Spanish territory.

The DGT directly exercises control of traffic police on interurban roads and in some urban areas. The autonomous regions of Catalonia and the Basque Country exercise direct control of traffic police on interurban roads in their regions and in some urban areas. In urban areas where exists local police, they are responsible of traffic control.

Within the regional government of Catalonia's Department of the Interior, the Servei Català de Trànsit (SCT) is responsible for road safety policy. It is the SCT who communicates the road accident statistics for Catalonia to the DGT. The mechanism for reporting from the local police of each Municipality is different from that of the rest of Spain and, since 2003, fatalities are recorded for 30 days from hospital returns in addition to the application of general factors for conversion from 24-hour police records.

The conversion of 24h-fatalities to 30-day fatalities is realized in Spain (and Catalonia) using conversion factors derived by studies made since 1993 by the Spanish government DGT (DGT, 2001). The factors vary according to the type of injured-person (pedestrian, driver and passenger, both for urban and interurban locations) and by year and are applied to give an estimate of the number of seriously-injured persons who die within the 30 day period after the initial 24 hours.

2.3. The common and different policy and organisational features

2.3.1. Comparison of current road safety policies

Table 2.1 compares the objectives of the current road safety plans of the Southern countries with those of the SUN countries. The existence of defined quantitative targets for fatality reductions in all the countries is in line with the recommendations set out in the first road safety report of the World Health Organisation (WHO, 2004).

The quantitative target for fatalities in Portugal is the same as the EU target. For Spain and Catalonia the targets are lower than the 50% target in the EC White Paper – but they are subject to earlier review than 2010; projecting the targets to 2010 suggests that the targets for these countries are in line with EU policy. The target for Greece is less ambitious than those of the other Southern countries; a 40% reduction being aimed for by 2015.

It is also noted that, with the exception of Spain[6], the reference years for the Southern countries are similar to the reference year of 2000 proposed by the EU White Paper. The reference years for the SUN countries are earlier years, possibly reflecting the continued monitoring of previous national targets.

In addition to the fatality reduction objective, Portugal and the UK set additional fatality objectives and the UK also sets other non-fatality objectives.

	Base Line	Target year	Objective: fatalities	Additional objectives (fatalities)	Other objectives
UK	1994-1998	2010	-40%	-50% child fatalities	-10% slight injuries /veh-km
Netherlands	1985	2010	-50%		-40% hospitalized victims
Sweden	1996	2007	-50%		
Greece	2001	2015	-40%		
Portugal (Pub. 2003)	1998-2000	2010	-50%	-60% pedestrian -60% two wheelers -60% urban roads	
Spain	2003	2008	-40%		
Catalonia	2000	2007	-30%		

Table 2.1. *Comparison of the targets and related parameters of the current road safety plans of the Southern and SUN countries.*

2.3.2. Key actions

The table below attempts to present the most important measures (statutory provisions) taken for road safety improvement in Greece, Portugal, and Spain (including Catalonia).

The evolution of the legislative framework across the Southern countries contains more similarities (e.g.: alcohol limit for general drivers, progressive introduction of mandatory use of protective systems) than differences.

[6] The reference of 2003 is considered to mark a change in political power; the levels of accidents for the years 2000 and 2003 are not so very different.

Measure	Greece	Portugal	Spain & Catalonia
50 km/h the speed limit inside built up areas		1994	1992
Compulsory use of front seat safety belts in passenger cars	1987	1977-interurban 1992-all roads	1974-interurban 1992-all roads
Compulsory use of rear seat safety belts in passenger cars	1993	1994	1992
Compulsory use of safety child seat	1999	1994	1992-seat belt 2004- CRS
Regulation of drivers' consumption of alcohol (0,05%)	1998	1990	1999
Compulsory wearing of safety helmets (motorcycles & mopeds)	1986	1970	1980-interurban 1992-urban roads
Compulsory wearing of helmets for cyclists	-	-	2003-interurban
Use of DRL (daytime running lights or dipped beam) for vehicles	-	-	1980 for motorcycles
Pedestrians' priority on zebra crossing	Since long ago	Since created	Since long ago
Motorcycles to be equipped mandatory with registration number	Since long ago	Since long ago	Since long ago
Limited use of mobile phones while driving		2001	2004
Extended and continuous control of alcohol consumption	1994	1982, 1990	1985
Increase the severity of penalties	Not applicable	1994	1993, 1998
Introduction of driver licence demerit point system	Before 1991 Revised 2003	1998 (1)	Projected for 2005

Table 2.2. *Major road traffic measures and their introduction in Southern countries*

1 Although not a points-based licence, habitual offenders of serious offences are automatically suspended.

2.3.3. Organisation

The organisation of road safety in Spain appears to be more complex than in Greece or Portugal. In part, this is probably due to the larger size of the territory and the greater population. The main difference concerns the greater autonomous action of some regions of Spain with regard to aspects such as the setting of road safety targets, the collection of road accident data and the organisation of police enforcement. This may be due to a greater variety in regional culture and history. As far as this study is concerned the case of Catalonia is studied alongside the case of Spain, and any differences should thus be identified and analysed. Nevertheless, the main responsibility for improving the current situation lies with organisation of the central government, and the organisation of the DGT (in terms of police activity in recording road accidents as well as in many aspects of enforcement) is similar to the police organisation in Greece and Portugal.

2.4. The transport background

Recent available data describing the road transportation system are summarized in *Table 2.3*. The estimation of motor vehicle kms is in some cases based on sales of

petroleum (e.g. the case of Spain (INSIA, 2004)), for which a time series has been computed. For Catalonia, time-series estimates have also been published based on petroleum sales (IDES, 2001) and, more recently in 2004, surveys have been realized to estimate interurban motor veh-kms for different vehicle and road types. This latter estimate, and the others, are considered to be "ad hoc" in that no monitoring programme is yet established to yield time-series data. For Spain, time-series are available for different vehicle since 1987 and for road type since 1986, but only for "State-managed Interurban Road Network".

Figures for road user person kms are taken from EUROSTAT statistics (see References). When used to compute distance travelled per person, these statistics give values for Greece and Portugal that are similar to values produced for the SUN countries in the original study. The value for Spain is only for "State-managed Interurban Road Network".

Spain has approximately four times more people than Greece or Portugal. It is the largest country, being more than five times the size of Portugal but less than four times the size of Greece. Catalonia comprises 6% of the area of Spain. At just over 80 persons per sq. km., Greece and Spain have the lowest population densities.

The available estimates of total road lengths show a similar pattern to the different levels of population. Comparing the percentages of roads of motorway standard over total road length, Greece (0.6%) has a less developed network than the others (around 1.5%). However, it is difficult to gauge the reliability and accuracy of the road kilometrage; this situation should change once figures become available from digital maps developed for road navigation applications. The motorway network comprises approximately 1,5% of the road network of Portugal, Spain and Catalonia.

Spain has more than five times the number of passenger cars than Greece, but less than four times the number for Portugal; Catalonia comprises 16% of the passenger car stock of Spain, as well as the population (16,08%). Passenger cars are a low percentage of the Greek vehicle stock, suggesting some differences in vehicle classifications. Almost 20% of vehicles in Greece are lorries whilst the figure for Portugal is very low at 2.8%. Whilst Spain has the largest powered two-wheelers stock in absolute numbers (motorcycles and mopeds), Greece has the largest number of powered two-wheelers per capita – both for motorcycles and mopeds; the levels for mopeds being around three times those of the other countries; for motorcycles the rate is more than twice that of Spain[7] and more than five times that of Portugal.

For the years to which the presented data correspond, the motorized kilometres travelled are similar for Portugal and Spain at almost 14 thousand veh-kms per motor vehicle. For Catalonia and Greece, they are lower than 12,000 veh-km. Travel in terms of motorized kilometres per capita is highest for Spain and lowest for Greece. For Catalonia, some of the factors that may explain these differences are the compactness of the territory and the high number of vehicle movements through the territory. For Greece, one of the explanatory factors could be the lower car stock.

[7] Almost a third of Spain's motorcycle stock corresponds to Catalonia.

Estimates of kilometres travelled on motorways are only available for Portugal and Catalonia, with the Catalan network carrying substantially higher traffic levels in terms of per capita or levels of motorization.

2002	Greece	Portugal	Spain	Catalonia	Note
Road traffic fatalities	1,634	1,675	5,347	812	
Road traffic fatal accidents					
Population (million)	10.99	9.89	41.55	6.79	1
Road length (thousand km)	120.0	125.0	665.2	61.7	
Motorway length (km)	742	1,835	9,739	937	2
Area (thousand km^2)	131.96	89.04	505.99	32.11	
Motor vehicles (million)	5.74	5.59	25.07	4.22	
Passenger cars (million)	3.69	4.98	18.7	3.0	
Lorries (3,5 tonnes) (thousand)	1,109	158	1,935	281	3
Van/station-wagon (thousand)			2,324	420	3
Motorcycles (million)	0.91	0.15	1.52	0.43	
Mopeds (million)	1.61	0.46	2.04	0.31	
Other motor vehicles (thousand)			557.0	0.09	
Motor vehicle km (x 10^9)	67.94	73.75	345.52	49.61	4
Motor vehicle km on motorways (x 10^9)		10.23	74.34	17.89	2, 5
Cycle kilometres (x 10^9)					
Motorcyclist kilometres (x 10^9)			0.635	0.58	5
Mopedist kilometres (x 10^9)					
Road user person-km (x 10^9)	136.33	109.1	788.75		6
% passenger cars of motor vehicles	64	89.1	74.7	71.1	
% lorries of motor vehicles	19	2.8	7.7	6.7	
Metre road length per capita	10.6	12.6	16.0	9.1	1
Metre motorway length per 1000 inhabitants	67.5	186	234.4	111.2	
Population density per area km^2	83.3	111.5	82.1	211.4	
Kilometre road length per area km^2	0.88	1.40	1.31	1.92	
Metre motorway length per area km^2	5.6	21	19.2	23.5	
Mot. Veh. kms on motorway per mot. veh.		1.83	2.97	4.24	5
Mot. Veh. kms on motorway per person		1.03	1.79	2.63	5
% of motor vehicle km on motorways		13.87	64.7	87.1	5
Motor vehicles per inhabitant	0.52	0.565	0.6	0.6	
Motor vehicle km ('000) per motor vehicle	11.84	13.19	13.8	11.8	4
Motor vehicle km ('000) per inhabitant	6.18	7.46	8.32	7.31	4
Kilometres travelled per person	12,400	11,030	18,980		
Motor vehicle kms per road km and day	2,032	1,616	1,423	2,201	
Mot. Veh. kms per motorway km and day		15,272			

Table 2.3. *Characteristics of the road transportation systems in Greece, Portugal, Spain (inc. Catalonia) and Catalonia.*

1 For Spain and Catalonia, INE projections from 2001 census, published in 2005. For Greece, projections from 2001 census.

2 Motorways + Autovía (a road, failing to comply with all the requirements established for motorways, which has two separate carriageways for each traffic directions, and restricted access to adjacent premises. It must avoid level crossings, trains and trams included; as well as to be

level crossed by any kind of road, path or way, according to Article 62 of the Law on Traffic, Motor Vehicles and Road Safety)
Motorways 11.26 vkm, Autovía 6.63 vkm

3 For Spain & Catalonia, Lorries are all lorries (<3500 and >3500). Van/station vagon, it is only vans.
4 Figure for Greece is estimated for 2001. Catalonia is 2000 estimate (Pedragosa & Aragay, 2001).
5 For Catalonia, it is year 2004 and only rural roads. For Spain, only "State-managed Interurban Road Network"
6 For Greece and Portugal, data from Eurostat year 2002 and 2000 (walking and cycling). For Spain data from Ministerio Fomento and only for "State-managed Interurban Road Network"

2.5. Conclusions

Road safety policies of the Southern countries are now based upon quantified targets for reducing road fatalities.

The evolution of the legislative framework across the Southern countries contains more similarities (eg: alcohol limit for general drivers, progressive introduction of mandatory use of protective systems), than differences.

The organisation of safety activities at central level shows a lead ministry engaged in both the development of police activity across the territory as well as the coordination of activities across various ministries.

In the case of Spain, the largest of the countries studied, some of the regions have assumed the lead for organising some road safety matters – as is the case for Catalonia and Basque Country.

Generally, the vertical coordination of safety activities from central and regional to the local level is not well-developed. This can be at least partly explained by the efforts to improve police enforcement with respect to a common perception of problems concentrated on the interurban roads.

Over the last decade, the transport systems have experienced increases in road networks (especially high-capacity roads) and in the numbers of vehicles and drivers. These changes have undoubtedly had impacts upon road safety performance, such that it is quite difficult to identify the impact of key legislative developments. Basic indicators about the road kilometrage, about the use of motorways, about the usage of high-risk modes such as powered two-wheelers, are not available. None of the Southern countries yet produce a statistical time-series about the travel patterns of their citizens in a way that can be used to assess road safety exposure (i.e. by mode of travel, by age and sex of a person, and for all road types); thus, the extent to which system differences can be quantified is limited.

3. Traffic safety situations in the Southern SUNplus countries

The reported data for the overall road safety comparison between Greece, Portugal, Spain and Catalonia are given in for 2002 in Table 3.1.

2002	Fatalities	Severely injured	Slightly injured	Population (million)	Motor vehicles (million)	Vehicle km (billion = 10^9)	Vehicles per inhabitant
Greece	1,634	2,608	19,851	10.99	5.74	67.94 (1)	0.522
Portugal	1,675	4,770	51,851	9.89	5.59	73.75	0.535
Spain	5,347	26,156	120,761	41.55	25.07	345.52	0.603
Catalonia	812	3,994	25,897	6.79	4.22	49.61	0.622

Table 3.1. *Basic data of Portugal, Greece, Spain and Catalonia for 2002*

1 Year 2001

It is generally accepted that the registration rates and definitions of fatalities are generally consistent among the three countries. Coming from this assumption, the fatality rates (the road traffic fatalities per amount of inhabitants, motor vehicles and motor vehicle kilometres) could initially be considered as shown in Table 3.2.

2002 Fatality rates	Per population (hundred thousand)	Per Motor Vehicle (ten thousand)	Per Motor veh-km (billion)
Greece	14.87	2.85	24.05
Portugal	16.94	3.00	22.71
Spain	12.87	2.13	15.48
Catalonia	11.96	1.92	16.37

Table 3.2. *Fatality rates in Portugal, Greece, Spain and Catalonia for 2002*

By any of the three rates definitions, the rates for Greece and Portugal are quite similar. The rates for Spain and Catalonia are generally lower, with Catalonia having the lowest rates per population and motor vehicle, and Spain having the lowest rate per motor veh-km.

Compared to SUN countries (figures for 2000, reported in SWOV, 2002), the rates for Greece and Portugal are about 2.5 times higher (all definitions) and the rates for Spain and Catalonia are twice as high (somewhat less for fatalities per motor vehicle).

Compared to SUN+ Central countries (Czech Republic, Hungary and Slovenia), the rates for Greece and Portugal are slightly higher in terms of fatalities per population and similar to the Czech Republic in terms of fatalities per motor vehicle. The rates per population or motor veh-km of Slovenia are similar to those of Spain and Catalonia, but these have lower rates per motor vehicle.

2002	Rates of severely injured per amount of			Rates of slightly injured per amount of		
	Population	Motor vehicles	Vehicle km	Population	Motor vehicles	Vehicle km
Greece	23.73	4.54	38.39	180.66	34.58	292.18
Portugal	48.24	8.53	64.68	524.33	92.76	703.06
Spain	62.95	10.43	75.70	290.64	48.18	349.51
Catalonia	58.82	9.46	80.51	381.40	61.37	522.01

Table 3.3. *Reported rates of Severely and Slightly Injured for Portugal, Greece, Spain and Catalonia*

Table 3.3 presents the rates for severely and slightly injured persons. It is observed that Portugal has a relatively lower rate of severely injured, and a corresponding higher rate of slightly injured, than Spain and Catalonia. Such differences are due to differences in the definitions. However, there are also possible differences in the under-reporting of accidents. This may be another reason why Greece exhibits significantly lower injury rates (about half than in the other cases). Because of these uncertainties, the SUN+ study is focussed upon the comparison of accidents involving fatalities.

3.1. Road users and fatalities

In Table 3.4 to Table 3.7 the numbers of fatalities in different types of collisions between transport modes and in single accidents are presented. Table 3.8 to Table 3.11 shows the same for percentages of these fatalities. Only for this section, the information is referred to year 2003. For Portugal, the numbers are only for national road network.

The percentage of car occupants involved in all fatalities varies from 47.4% for Greece to 61% for Portugal, and up to 65.4% for Spain (when vans are included with cars). The relatively low proportion of car occupants for Greece is due to the high percentage of motorcyclist involvement in road fatalities (19.3%). Motorcyclist involvement in fatalities also figures as the second ranked victim type for Portugal (14% of all fatalities being motorcyclists). The second ranking of fatalities for Spain and Catalonia are pedestrians (at 15% and 16% respectively). Pedestrians are the third ranked victim type for Greece (16%) and Portugal (9%). Motorcyclists are the third ranked victim type for Catalonia (11%). Mopedists are ranked equal third in Spain (7%, with motorcyclists), and are fourth ranked in Portugal and Catalonia (9% and 8% respectively). Lorry occupants are fourth in the ranking for Greece (6.7%).

Summarising the above:

- Greece has the lowest proportion of passenger car fatalities, but has the highest proportions of motorcyclist, pedestrian and lorry occupant fatalities

- Spain, Portugal and Catalonia have higher proportions of car passenger and mopedist fatalities.

Greece 2003	Fatalities											
Killed as	In single accidents	In collision with *									Other acc. **	Total
		Car	Lorry	Bus	Motor	Moped/ Cycle	Animal	Train	Tram	Other/ Unknown		
Car occupant	334	177	105	32	10			9		24	70	761
Lorry occupant	43	18	24	4	3	1		3		6	6	108
Bus occupant	16				1						21	38
Motorcyclist	118	91	38	5	14	1		1		9	33	310
Mopedist	17	22	4	3	3	1		1		1	1	53
Cyclist	1	11	3		1			1		2	2	21
Pedestrian		139	63	6	33	2				14		257
Other	48	2	2	2				1			2	57
Total	577	460	239	52	65	5		16		56	135	1,605

Table 3.4. *Collision matrix with fatalities for Greece*

* Refers to two vehicle accidents ** Refers to more than two vehicle accidents

Portugal 2003	Fatalities										
Killed as	In single accidents	In collision with									Total
		Car	Lorry	Bus	Motor	Moped/ Cycle	Animal	Train	Tram	Other/ Unknown	
Car occupant	214	160	52	6	1	1				91	525
Lorry occupant	10	2	3							7	22
Bus occupant	1										1
Motorcyclist	40	57	1	2	6	3				8	117
Mopedist	19	41	9	2	2					5	78
Cyclist	4	21	4		1					2	32
Pedestrian		64	5	1		2				8	80
Other	1	1	2								4
Total	289	346	76	11	10	6				121	859

Table 3.5. *Collision matrix with fatalities for Portugal*

Note: only national Road network

Spain 2003	Fatalities											
Killed as	In single accidents	In collision with *									Other acc. **	Total
		Car	Van	Lorry	Bus	Motor	Moped/ Cycle	Animal	Train	Other/ Unknown		
Car occupant	1,413	798	162	313	38	1	3	14	4	18	447	3,211
Van occupant	123	57	35	46	1				1	5	49	317
Lorry occupant	100	8	1	20	2					2	26	159
Bus occupant	13	8	1								5	27
Motorcyclist	151	121	23	19	2	4	2			5	40	367
Mopedist	99	174	28	33	6	2	10			10	29	391
Cyclist	6	35	7	11		2	1			3	13	78
Pedestrian		513	62	47	24	22	23		2	19	75	787
Other	39	14	3	2	1						3	62
Total	1,944	1,728	322	491	74	31	39	14	7	62	687	5,399

Table 3.6. *Collision matrix with fatalities for Spain*

* Refers to two vehicle accidents ** Refers to more than two vehicle accidents

Catalonia 2003	Fatalities											
Killed as	In single accidents	In collision with *									Other acc. **	Total
		Car	Van	Lorry	Bus	Motor	Moped/ Cycle	Animal	Train	Other/ Unknown		
Car occupant	164	108	32	35	2	1	1	2		2	79	426
Van occupant	14	1	9	4						1	6	35
Lorry occupant	6	2		3							4	15
Bus occupant	1											1
Motorcyclist	29	32	8	2	1	1				3	11	87
Mopedist	13	28	4	6	1		3			2	5	62
Cyclist	2	6	1	1						1	1	12
Pedestrian		71	14	8	4	5	4			5	7	118
Other	7	1		1							2	11
Total	236	249	68	60	8	7	8	2	0	14	115	767

Table 3.7. *Collision matrix with fatalities for Catalonia*

* Refers to two vehicle accidents ** Refers to more than two vehicle accidents

Greece 2003	Fatalities (percentage)											
Killed as	In single accidents	In collision with *									Other acc. **	Total
		Car	Lorry	Bus	Motor	Moped/ Cycle	Animal	Train	Tram	Other/ Unknown		
Car occupant	20.8	11.0	6.5	2.0	0.6			0.6		1.5	4.4	47.4
Lorry occupant	2.7	1.1	1.5	0.2	0.2	0.1		0.2		0.4	0.4	6.7
Bus occupant	1.0				0.1						1.3	2.4
Motorcyclist	7.4	5.7	2.4	0.3	0.9	0.1		0.1		0.6	2.1	19.3
Mopedist	1.1	1.4	0.2	0.2	0.2	0.1		0.1		0.1	0.1	3.3
Cyclist	0.1	0.7	0.2		0.1			0.1		0.1	0.1	1.3
Pedestrian		8.7	3.9	0.4	2.1	0.1				0.9		16.0
Other	3.0	0.1	0.1	0.1				0.1			0.1	3.6
Total	36.0	28.7	14.9	3.2	4.0	0.3	0.0	1.0		3.5	8.4	100.0

Table 3.8. *Collision matrix percentage with fatalities for Greece*

* Refers to two vehicle accidents ** Refers to more than two vehicle accidents

Portugal 2003	Fatalities (percentage)										
Killed as	In single accidents	In collision with									Total
		Car	Lorry	Bus	Motor	Moped/ Cycle	Animal	Train	Tram	Other/ Unknown	
Car occupant	24.9	18.6	6.1	0.7	0.1	0.1				10.6	61.1
Lorry occupant	1.2	0.2	0.3							0.8	2.6
Bus occupant	0.1										0.1
Motorcyclist	4.7	6.6	0.1	0.2	0.7	0.3				0.9	13.6
Mopedist	2.2	4.8	1.0	0.2	0.2					0.6	9.1
Cyclist	0.5	2.4	0.5		0.1					0.2	3.7
Pedestrian	0.0	7.5	0.6	0.1		0.2				0.9	9.3
Other	0.1	0.1	0.2								0.5
Total	33.6	40.3	8.8	1.3	1.2	0.7				14.1	100.0

Table 3.9. *Collision matrix percentage with fatalities for Portugal*

Note: only national Road network

Spain 2003	Fatalities (percentage)											
Killed as	In single accidents	In collision with *									Other acc. **	Total
		Car	Van	Lorry	Bus	Motor	Moped/ Cycle	Animal	Train	Other/ Unknown		
Car occupant	26.2	14.8	3.0	5.8	0.7	0.02	0.1	0.3	0.1	0.3	8.3	59.5
Van occupant	2.3	1.1	0.6	0.9	0.02				0.02	0.1	0.9	5.9
Lorry occupant	1.9	0.1	0.02	0.4	0.04					0.04	0.5	2.9
Bus occupant	0.2	0.1	0.02								0.1	0.5
Motorcyclist	2.8	2.2	0.4	0.4	0.0	0.1	0.04			0.1	0.7	6.8
Mopedist	1.8	3.2	0.5	0.6	0.1	0.04	0.2			0.2	0.5	7.2
Cyclist	0.1	0.6	0.1	0.2		0.04	0.02			0.1	0.2	1.4
Pedestrian		9.5	1.1	0.9	0.4	0.4	0.4		0.04	0.4	1.4	14.6
Other	0.7	0.3	0.1	0.04	0.02						0.1	1.1
Total	36.0	32.0	6.0	9.1	1.4	0.6	0.7	0.3	0.1	1.1	12.7	100.0

Table 3.10. *Collision matrix percentage with fatalities for Spain*

* Refers to two vehicle accidents ** Refers to more than two vehicle accidents

Catalonia 2003	Fatalities											
Killed as	In single accidents	In collision with *									Other acc. **	Total
		Car	Van	Lorry	Bus	Motor	Moped/ Cycle	Animal	Train	Other/ Unknown		
Car occupant	21.4	14.1	4.2	4.6	0.3	0.1	0.1	0.3		0.3	10.3	55.5
Van occupant	1.8	0.1	1.2	0.5						0.1	0.8	4.6
Lorry occupant	0.8	0.3		0.4							0.5	2.0
Bus occupant	0.1											0.1
Motorcyclist	3.8	4.2	1.0	0.3	0.1	0.1				0.4	1.4	11.3
Mopedist	1.7	3.7	0.5	0.8	0.1		0.4			0.3	0.7	8.1
Cyclist	0.3	0.8	0.1	0.1						0.1	0.1	1.6
Pedestrian		9.3	1.8	1.0	0.5	0.7	0.5			0.7	0.9	15.4
Other	0.9	0.1		0.1							0.3	1.4
Total	30.8	32.5	8.9	7.8	1.0	0.9	1.0	0.3	0.0	1.8	15.0	100.0

Table 3.11. *Collision matrix percentage with fatalities for Catalonia*

* Refers to two vehicle accidents ** Refers to more than two vehicle accidents

3.2. Age groups and road user groups

The age distribution of fatalities in the Southern countries and region show Greece, Spain and Catalonia as being similar (Figure 3.1).

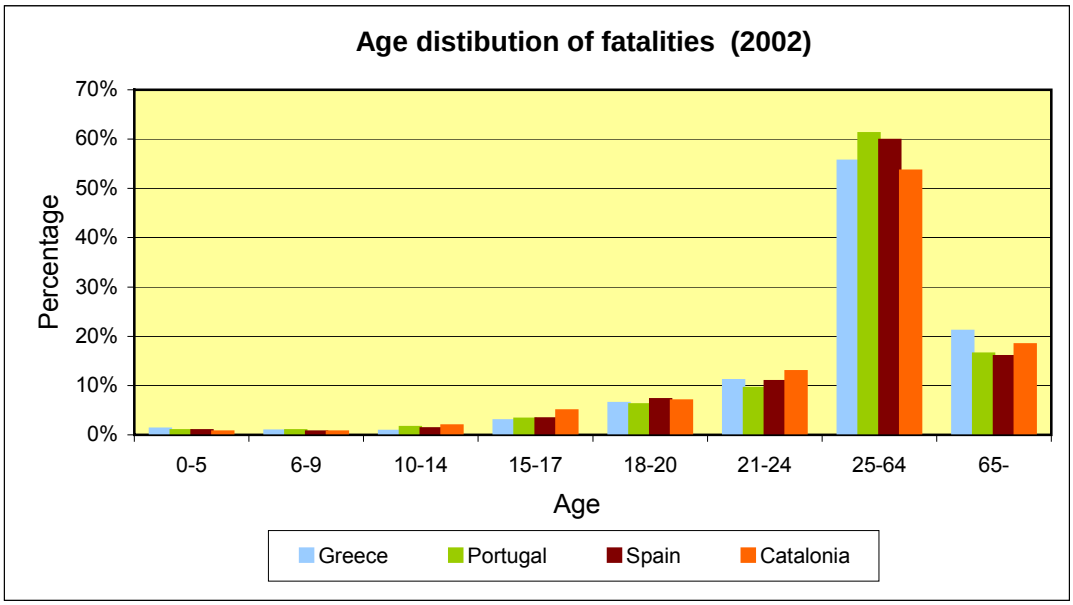


Figure 3.1. *Percentage distribution of fatalities in Greece, Portugal, Spain and Catalonia.*

The distribution of the age groups in the population shows the Spanish (especially the Catalans) as being a little older, Figure 3.2.

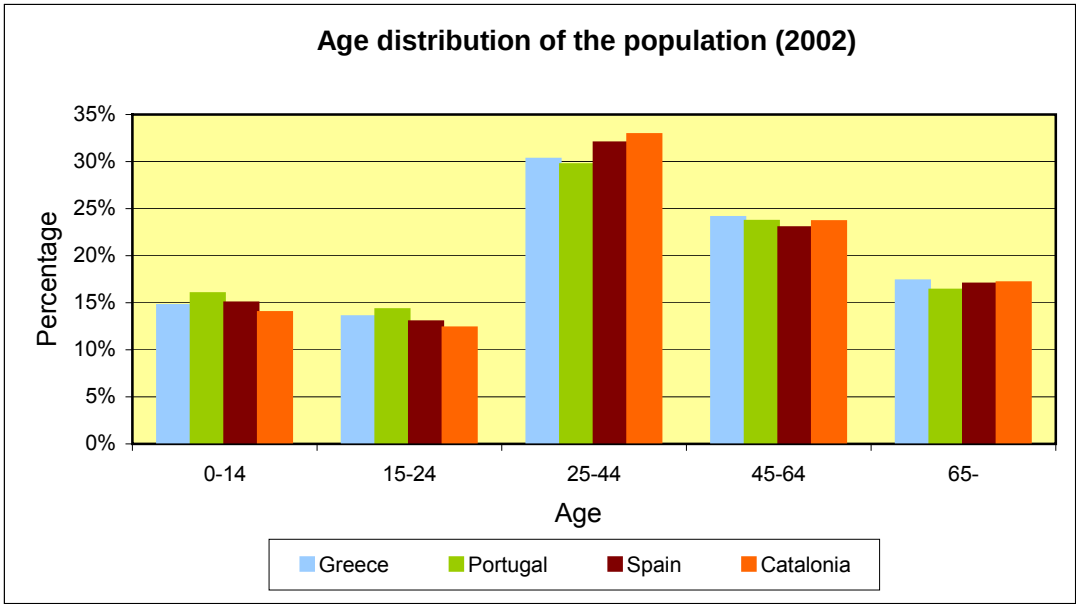


Figure 3.2. *Percentage distribution of population in Greece, Portugal, Spain and Catalonia.*

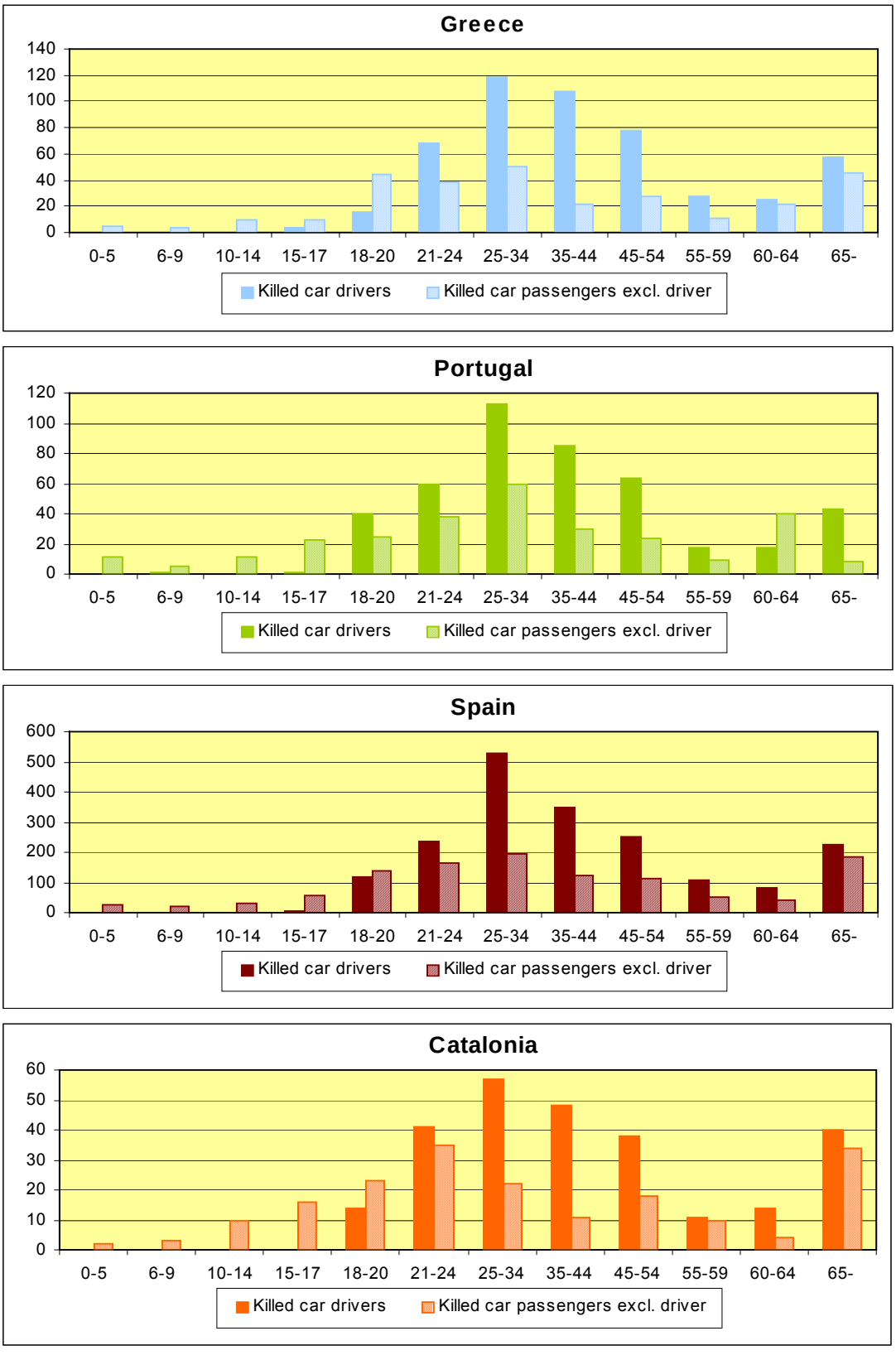
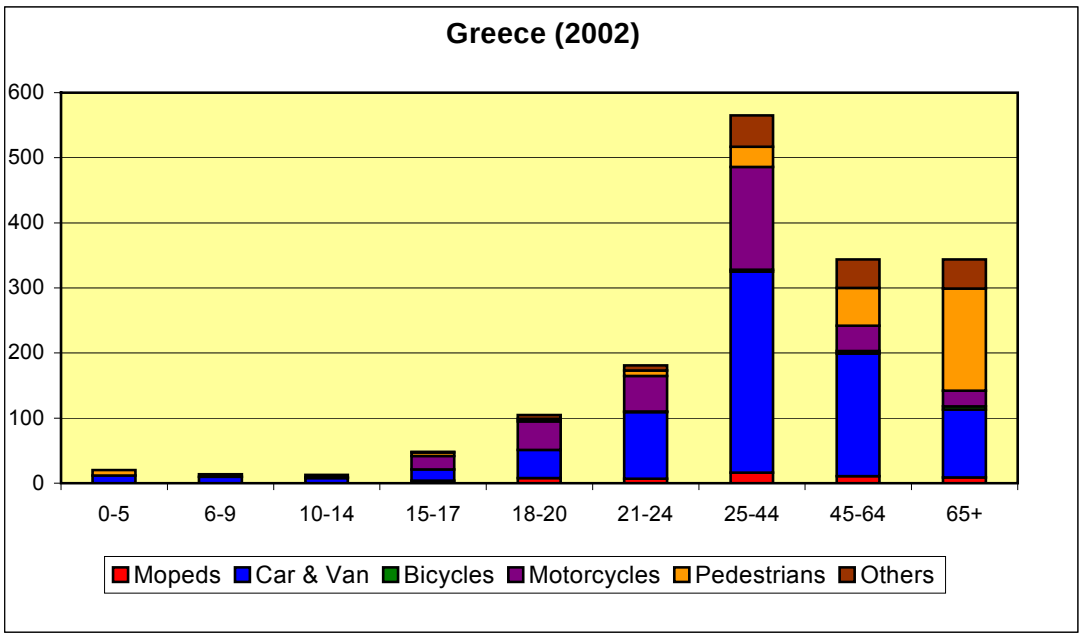
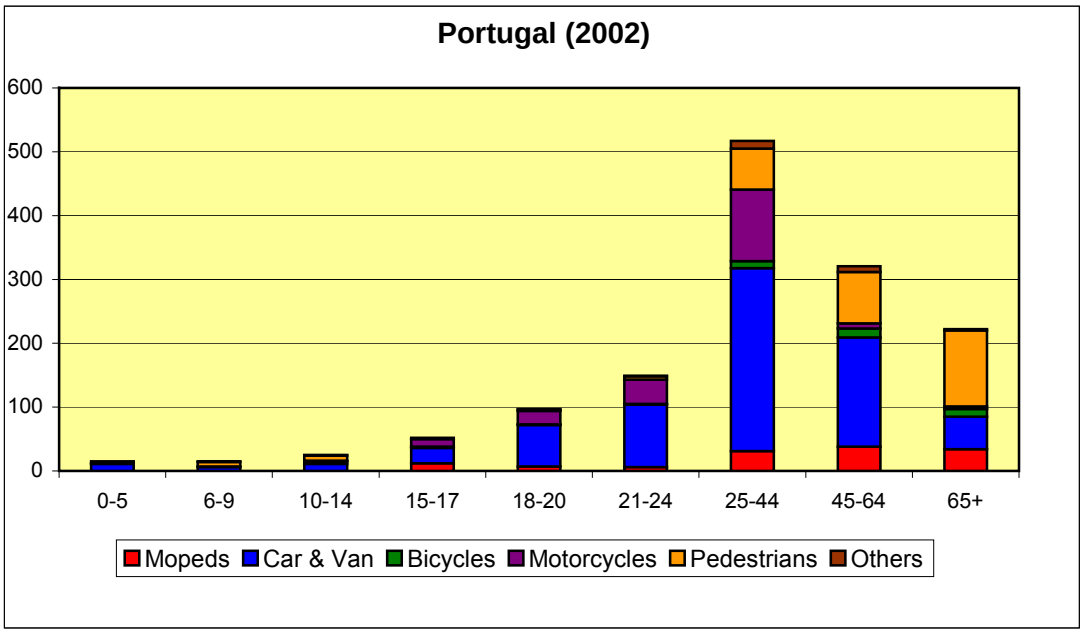


Figure 3.3. *Age distribution of killed car drivers and passengers in Greece, Portugal, Spain and Catalonia (2002)*

The age distributions of fatalities in different road user groups are also compared. Figure 3.3 gives the age distribution of killed car drivers and killed car passengers for each country and region. In the age group 18 to 20 more drivers are killed than passengers in Portugal whereas the reverse is true for the other countries. The proportion of fatalities over 65 years of age is relatively high for Catalonia.

Figure 3.4 shows the age distribution of fatalities for all modes in each country / region. The figure identifies a high proportion of motorcyclist fatalities in Greece and Catalonia for those aged 25 to 44, and for Greece in the lower age groups. The high proportion of pedestrian fatalities in the elderly group is particularly noticeable for Greece, Portugal and Catalonia.





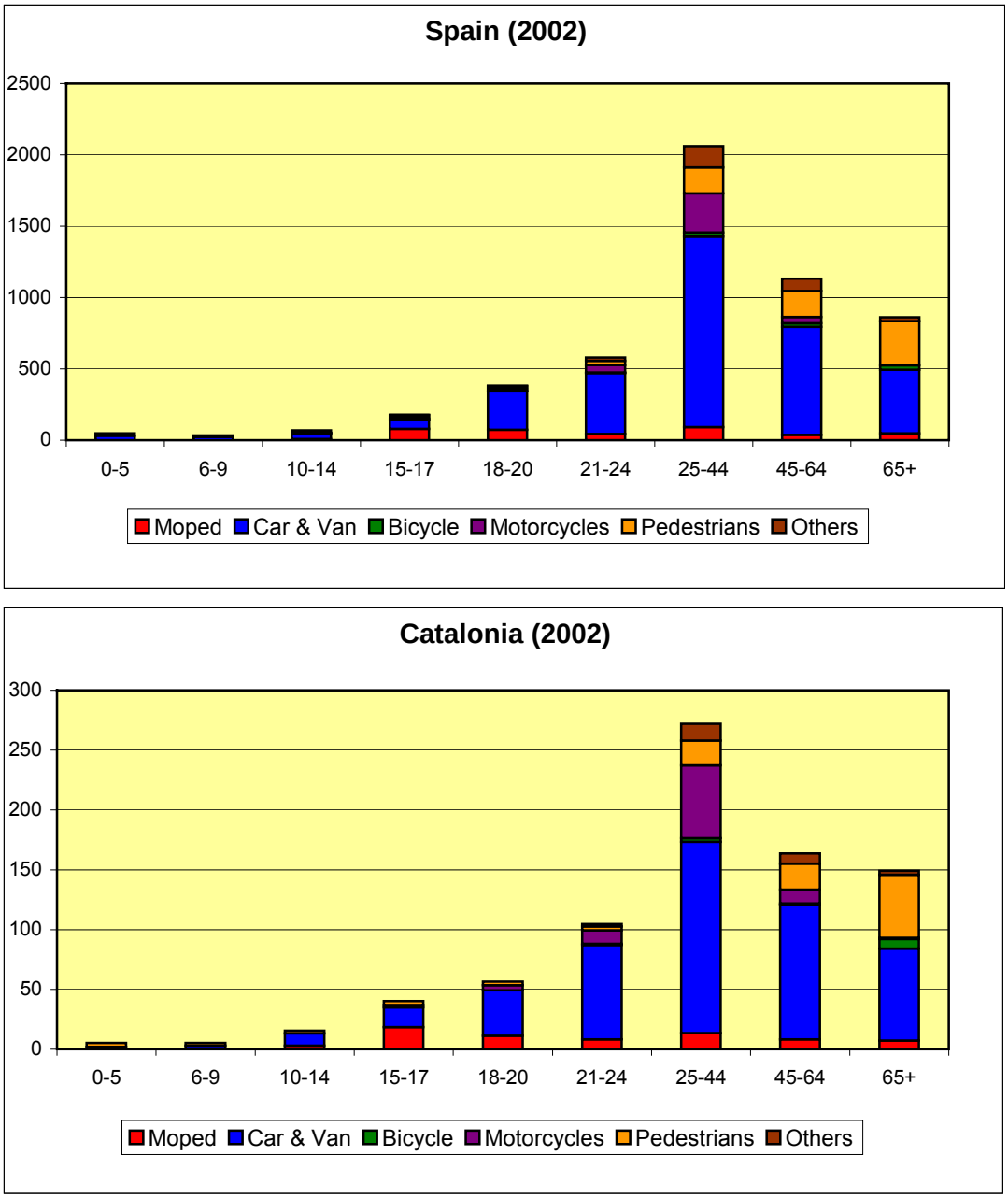


Figure 3.4. *Fatalities per age group and transportation mode in Greece, Portugal, Spain and Catalonia (2002)*

3.3. Road user rates

Greece (2002)	Fatalities	Fatality distribution	Fatality risk distribution 68 *10^9 vkm	Vehicle kilometrage 10^9 vkm (1)	Fatality rate 10^9 vkm	Person kilometrage 10^9 pkm	Fatality rate 10^9 pkm
Car occupant	793	48.5%	11.7			86.58	9.16
Lorry occupant	92	5.6%	1.4				
Bus occupant	9	0.6%	0.1			22.35	0.40
Motorcyclist	341	20.9%	5.0			22.40	35.36
Mopedist	55	3.4%	0.8				
Cyclist	14	0.9%	0.2			0.8 (2)	17.50
Pedestrian	279	17.1%	4.1			4.1 (2)	68.05
Other	51	3.1%	0.8				
Total	1634	100.0%	24.05	67.94	24.05	136.23	11.99

Portugal (2000)	Fatalities	Fatality distribution	Fatality risk distribution 75*10^9 vkm	Vehicle kilometrage 10^9 vkm	Fatality rate 10^9 vkm	Person kilometrage 10^9 pkm	Fatality rate 10^9 pkm
Car occupant	786	52.8%	10.4	67.3	12.17	86.5	9.1
Lorry occupant	29	1.9%	0.4				
Bus occupant	4	0.3%	0.1			11.8	0.3
Motorcyclist	86	5.8%	1.1	7.7	36.75	7.0	40.4
Mopedist	197	13.2%	2.6				
Cyclist	49	3.3%	0.7	0.3	163.33	0.3	163.3
Pedestrian	337	22.6%	4.5			3.5	96.3
Other	0	0.0%	0.0				
Total	1488	100.0%	19.76	75.3	19.76	109.1	13.64

Spain (2002)	Fatalities	Fatality distribution	Fatality risk distribution 346*10^9 vkm	Vehicle kilometrage 10^9 vkm (3)	Fatality rate 10^9 vkm	Person kilometrage 10^9 pkm	Fatality rate 10^9 pkm
Car occupant	3105	58.1%	8.99	94.68		335.87 (4)	8.52 (4)
Van occupant	342	6.4%	0.99				
Lorry occupant	173	3.2%	0.50	19.54			
Bus occupant	15	0.3%	0.04			50.05 (4)	0.28 (4)
Motorcyclist	401	7.5%	1.16	0.635		14.62 (4)	34.40 (4)
Mopedist	383	7.2%	1.11				
Cyclist	96	1.8%	0.28			0.8 (2)	105 (2)
Pedestrian	776	14.5%	2.25			14.7 (2)	61.1 (2)
Other	56	1.0%	0.16				
Total	5347	100.0%	15.48		15.48	416.04	12.85

Catalonia (2002)	Fatalities	Fatality distribution	Fatality risk distribution $50*10^9$ vkm	Vehicle kilometrage 10^9 vkm (5)	Fatality rate 10^9 vkm	Person kilometrage 10^9 pkm	Fatality rate 10^9 pkm
Car occupant	462	56.9%	9.31	30.89			
Van occupant	36	4.4%	0.73	3.97			
Lorry occupant	21	2.6%	0.42				
Bus occupant	1	0.1%	0.02				
Motorcyclist	91	11.2%	1.83	0.60			
Mopedist	70	8.6%	1.41				
Cyclist	13	1.6%	0.26				
Pedestrian	112	13.8%	2.26				
Other	6	0.7%	0.12				
Total	812	100.0%	16.37		16.37		

Table 3.12. *Fatality distribution, vehicle and person exposure and fatality rates for different modes in Greece, Portugal, Spain and Catalonia (2002)*

1 Year 2001
2 Year 2000
3 Only “red a cargo del estado”
4 Only interurban area
5 Only rural area

3.4. Conclusions

The analysis of the collision matrices provides information about the relative contribution that the different modes make to the overall accident performance. Greece has the lowest proportion of passenger car fatalities, but has the highest proportions of motorcyclist, pedestrian and lorry occupant fatalities, whilst the others have higher proportions of car passenger and mopedist fatalities.

The analysis of road fatalities by age, mode and car driver/passenger also helps to identify the areas where a country’s performance may be improved. In the age group 18 to 20 more drivers are killed than passengers in Portugal whereas the reverse is true for the other countries; either the travel culture of young Portuguese is different or, perhaps, young drivers in Greece, Spain and Catalonia are more conditioned by the respective training / regulatory processes. Also, higher proportions of motorcyclist fatalities in seen for Greece and Catalonia for those aged 25 to 44, and for Greece this pattern also applies to the lower age groups.

The collision matrices can facilitate insights into the relative importance of different conflicts (single vehicle, type of vehicle contributing to pedestrian fatalities, or proportion of collisions involving more than two vehicles) to further investigate the identified differences.

The comparison of road user fatality rates can only be tentative, given the fact that the Southern countries have not yet established a statistical time series of indicators for monitoring travel risk exposure. Having said that, the comparison of rates based

on motor vehicle-kms is highest for Greece and lowest for Spain and Catalonia. It is interesting to note that that the estimates of risk rates for car occupants derived from vehicle-kms and from person-kms are comparable for each case (Greece, Portugal and Spain). Further comparison of risks by mode using the person-kms estimates could be worth investigating once the results of the other two regional SUNflower+ studies become available.

The fatality rates of powered two wheelers, based on estimates of person kms, range from 34.4 (Spain) to 40.4 (Portugal) deaths per 10^9 pkm. For Portugal motorized two-wheeler fatality rates are estimated from both person kms and motor veh-kms and the rates suggest that this travel mode to be around four times more dangerous than cars. The rates based on person kms cannot be checked with veh-kms for the other countries. The higher fatality rate for motorized two wheelers for Spain (at over five times the car fatality rate) is due to the fact that person kms are only for interurban roads and that motorized two-wheeler are used more urban areas (as see in chapters 9 and 10). To derive a fatality rate for motorized two-wheelers for Catalonia, fatalities for interurban roads could be examined, or regional person kms estimates could be requested to Eurostat.

4. Drinking and driving

This chapter presents the case study on drinking and driving in Portugal, Greece and Spain (both at the national level and for the region of Catalonia). In the first section of the chapter the situation in each region is analysed, focusing on the period 1994-2003. In terms of this analysis, there is a description of the official countermeasures, followed by information on the extent of drinking and driving and a presentation of available evidence on the effectiveness of the countermeasures. The second section of this chapter includes a presentation that compares the three cases (Greece and Portugal with Spain, and then Greece and Portugal with Catalonia), both on countermeasures and the extent of the problem. This section ends with a discussion aiming at the provision of some explanation for the similarities and differences observed. There are also a number of conclusions, which may help to form a suitable policy to alleviate the examined problem in the Southern group territories.

4.1. Drinking and driving in South countries

In order to make a comparison between examined regions feasible, the situation in each case has to be described in a way that would be as uniform as possible. There are three distinct sections for each country: official countermeasures, extent of the problem of drinking and driving, as well as evaluation of countermeasures. Official countermeasures against drinking and driving include legal definitions of the offence of drinking and driving, police powers to detect offenders, as well as sanctions imposed and general treatment of drinking drivers. Of particular interest are both components of countermeasures, namely the official regulations and the actual practice with regard to the measures. The quality of the actual practice description depends on availability of official statistics. Results of special studies with additional information are supplementary sources of information. There may be considerable differences between countries in this respect, making it difficult to draw a correct and meaningful comparison of performance indicators related to the problem examined. In a similar way, data available for evaluation and the design of relevant studies may vary significantly. Furthermore, it is likely that for some aspects no proper evaluation is possible at all.

4.1.1. Greece

4.1.1.1. Official countermeasures

Regulations

In terms of a general revision/reformation of the Road Traffic Code of Greece in 1999, the lower authorized blood alcohol limit was set at 0.5g/l of blood. There is also an intermediate limit at 0.8 g/l, as well as the higher limit of 1.1g/l. The type and severity of sanction imposed are corresponded to the ranges defined by the aforementioned thresholds. The nature of sanctions is generally both penal and administrative. The following categories are formed, with respect to blood measurements:

Category A (BAC 0.5-0.8 g/l): fine of 78 euro, plus a penalty of 3 points ("bonus malus") according to the existing point system (at 25 points the licence is suspended).

Category B (BAC 0.8-1.1 g/l): fine of 156 euro and suspension of the driver's licence for 3 months.

Category C (BAC above 1.1 g/l): fine of 625 euro, suspension of driver's licence for 6 months and imprisonment of at least 2 months.

An important possibility provided is that, if fines are paid on the spot, then they are reduced to half of their value. Administrative measures are imposed on the spot, in the event of breath testing. The major change that has been established during the last years includes the definition of equivalent thresholds in terms of breath concentration (BrAC). The categories listed above are similarly defined in BrAC terms:

Category A: 0.25-0.4 mg/l, B: 0.4-0.6 mg/l, C: above 0.6 mg/l of air

As stated implicitly above, there are two means of conducting alcohol checks, namely blood and breath. The Road Traffic Department of the Greek police is the entity charged with the organisation and performance of checks. There are two separate departments aiming at two levels (national roads – city roads). There is regular co-operation with all relevant ministries (Ministry of Health & Welfare, Ministry of Public Order, Ministry of Transport & Communications). The police have the power to stop drivers at random and require a screening breath test. A detection check is obligatory in case of a fatal accident, whereas in case of injury indications should exist to provide justification. A blood test is performed on dead bodies, as well as on all drivers taking part in a fatal accident, except from cases where this is not possible. Generally tests should be conducted by two (2) police officers. Two (2) steps are required for a complete evidential test. It is the second trial that counts as a valid measurement. A driver's refusal to be tested is regarded equivalent to a BAC exceeding 1.1 g/l, leading thus to the application of category C sanctions. As for recidivism, if a driver is found to have a BAC exceeding 1.1g/l within two (2) years from a previous offence, an immediate 5-year disqualification is imposed, in addition to fine and imprisonment. Prescription time generally is 1 year, except from cases regarded as severe.

Since August 26th 2002, a more conservative BAC lower limit has been introduced with respect to specific categories of drivers. This measure concerns young drivers (i.e. holding their licence for less than 2 years), drivers of vehicles heavier than 3.5 tons, bus drivers (including school buses), drivers of ambulances and drivers of vehicles with dangerous carriage. Thus, for these types of drivers Category A is defined as BAC between 0.2-0.8 g/l or, equivalently: BrAC 0.1-0.4 mg/l.

Practice

Fighting the drinking and driving problem was one of the main incentives of the "On the Road 2001-2005" campaign that was launched by the Greek state in 2001. The idea is to improve enforcement and drivers training. In the following year (2002), "BOB" campaign (first introduced in 1995 in Belgium) was applied in Greece. The objective of this is to enhance public awareness on the drinking and driving issue, as

well as to gain public acceptance through a series of measures to state this phenomenon. Exactly because the importance of publicity had been realized, the Automobile & Touring Club of Greece (ELPA) along with the highest circulation car magazine ("4Trochoi") and a car rental company (AVIS) were involved to promote the project.

Alcohol level tests as a means to discourage drinking and driving were only introduced in 1994. The number of screening tests performed annually by the Greek police reveals a trend of significant increase over time. It is indicative that, while in 1998 only about 200,000 tests were performed, in 2002 this value went up to slightly more than 1 million (and over 1.2 million in 2003). Over the same period of time, the absolute number of positive screening tests has increased somewhat slower, from almost 14,000 in 1998 to 49,000 in 2002.

In terms of percentage, the fraction of tested drivers that were over limit has declined from 7-8% to 4.5%. This could be perceived as a natural response of most drivers to drink and drive less often, realising a greater danger to be caught. Overall, it may be attributed to the significant growth of the number of total tests performed annually.

Greece	1998	1999	2000	2001	2002	2003
Accidents with casualties	24,819	24,231	23,127	19,710	16,852	15,751
Deaths	2,182	2,116	2,088	1,895	1,654	1,605
Vehicles (*1000)	4,323	4,690	5,061	5,390	5,741	5,968
Screening tests per year	202,161	246,611	365,388	710,998	1,034,502	1,271,217
Positive	13,996	17,665	30,507	49,464	48,947	45,546
% positive	6.9%	7.2%	8.3%	7.0%	4.7%	3.6%
Accidents with casualties with at least one test performed	4,403	4,775	4,836	6,856	6,634	7,965
% of accidents with casualties where at least one test has been performed	17.7%	19.7%	20.9%	34.8%	39.4%	50.6%
Total tests of drivers involved in accidents with casualties	6,095	6,728	6,756	10,093	9,927	12,197
Tests performed per accident	1.38	1.41	1.40	1.47	1.50	1.53
Positive in accident	1,106	1,125	1,129	896	653	668
Tests with no definite result yet	2,454	2,395	2,664	3,184	2,556	2,909
% positive in accident	30.4%	26.0%	27.6%	13.0%	8.9%	7.2%
Total fatal accidents	1,921	1,876	1,803	1,669	1,438	1,400
Fatal accidents with at least one test performed	1,510	1,464	1,525	1,363	1,208	1,201
% of fatal accidents where at least one test has been performed	78.6%	78.0%	84.6%	81.7%	84.0%	85.8%

Greece	1998	1999	2000	2001	2002	2003
Total tests of drivers involved in fatal accidents	2,129	2,115	2,038	1,974	1,771	1,759
Tests performed per fatal accident	1.41	1.44	1.34	1.45	1.47	1.46
Positive in fatal accident	263	219	239	184	135	126
Tests with no definite result yet (fatal accidents)	1,004	975	1,008	1,045	1,029	1,006
% positive in fatal accident	23.4%	19.2%	23.2%	19.8%	18.2%	16.7%

Table 4.1. *Drink & Drive and general road traffic information about Greece*

As mentioned in regulations, it is the official policy to test all drivers involved in fatal accidents. There has been significant progress, but still this has not been totally achieved yet. The fraction of fatal accidents with a test performed has increased from 30% in 1990 to constantly over 75% since 1997 (85% in 2000). Completeness is further suppressed by the fact that for almost 50% of these accidents (with an existing record) no information is available on BAC of any driver involved.

The profile of alcohol offenders is not surprising, considering the findings of the original SUN report. The number of drivers tested because of participation in fatal accidents has remained almost constant since 1997, close to 2,000 persons. About 200 persons appear to fail the test, but this is a severe underestimation. The actual number should be closer to 600 persons, as will be explained in the next section. The vast majority of registered violators are male (97%), whereas about half are less than 35 years old. Rehabilitation courses as a means of facing the problem are not incorporated in the culture of the system in Greece yet. So far, legislation and enforcement are only focused on the application of sanctions to offenders.

4.1.1.2. Extent of the problem

Data regarding the extent of drinking and driving in Greece should be considered somewhat incomplete. As explained in the description of practice, during the past few years the percentage of fatal accidents with a test performed was between 80-85%. This is interpreted to 1,400-1,500 fatal accidents per year for the period after 1996. A 25-30% of these accidents reveal the presence of a driver over limit. Transferring this proportion to the total of fatal accidents yields a typical value in the range 450-550 accidents annually. Figure 4.1 exhibits the trend of fatal accidents with a driver over the limit (average values: 32.5% 1991-1995, 27.2% 1996-2001).

It should be noted that the proportions presented in the figure have to be viewed with some caution, since they are calculated as the ratio of fatal accidents with a driver over limit over these fatal accidents for which at least one test with known result had been performed. Equivalently, fatal accidents with no tests at all, or with absolutely no results known on the test(s) realized, have been excluded. This will be further commented in the conclusions section.

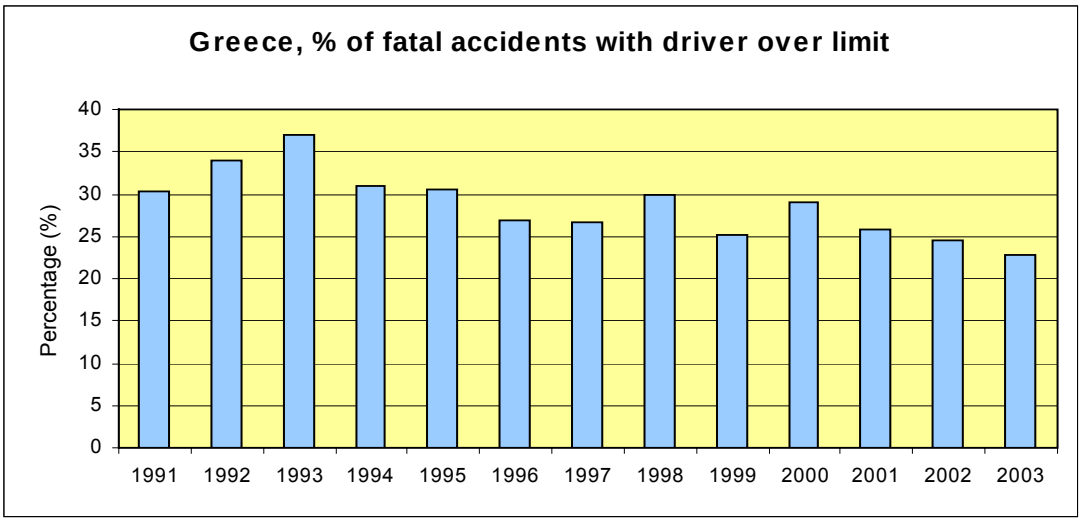


Figure 4.1. *Percentage of fatal accidents with driver over the limit (0.05%) in Greece*

It is encouraging that the proportion in question was under 25% for the first time in 2002 (24.4%), to decrease further in 2003 (22.7%).

According to the findings of the SARTRE 2 project in 1997, Greek drivers show a rather satisfactory self-reporting of driving under alcohol influence. In a question on having driven for at least one day over the last week, being probably over limit, positive responses reached a top 13,1% (EU average at 3.8%). On the contrary, they demonstrated a low perception of some danger to be tested. When asked on the probability to be tested on a typical trip, they yielded positive responses in just 5.5%.

The proportion of driver fatalities (all vehicle types) with a BAC over the 0.05% limit remained almost constant from 1996 to 2001 at about 33-34%. Again, this ratio is calculated taking into account only cases of killed drivers with a known BAC. The calculation of proportions of registered killed drinking drivers over all driver fatalities would not allow for a comparison on a common basis, because the fraction of cases where no test has been performed, or the result of the test is not known, is variable (and non-negligible). Earlier than 1996, absolute values of registered violators are significantly lower, indicating that it is very likely for the test procedures and results storage methods have been quite improved, reducing the level of underestimation. It has been estimated that a drinking driver is involved in about 25-30% of all traffic fatalities during the period 1996-2001, with some improvement in 2002-2003.

Greece	1998	1999	2000	2001	2002	2003
Alcohol positive	175	131	153	113	86	89
Alcohol negative	273	261	235	227	181	192
No definite result yet	483	508	508	506	503	520
Total controls	931	900	896	846	770	801
Total fatalities	1,261	1,228	1,193	1,131	979	1,010
% tested / total fatalities	73.8%	73.3%	75.1%	74.8%	78.7%	79.3%
% positive	39.1%	33.4%	39.4%	33.2%	32.2%	31.7%

Table 4.2. *Drink & Drive toxicology tests of driver fatalities, Greece*

4.1.1.3. Evaluation of countermeasures

There are no studies completed so far based on time series of numbers of traffic accidents and/or victims. Therefore, no educated guesses can be made to assess the impact of countermeasures. Still, there is a general impression that a major factor contributing to the improvement of the situation is the intensification of enforcement by the police. It is reminded that in a period of just 4 years the Greek police have managed to perform 5 times more tests on drivers annually. The stabilisation and, eventually, reduction of fatal accidents and casualties can be viewed as a success indeed, taking into account the traditionally bad attitude of Greek drivers, combined with a constant, significant increase of the passenger cars fleet and total number of kilometres travelled annually. Of course, there are other factors that have enhanced road safety as well. It is not feasible to exclude other measures' influence in order to isolate each factor's separate effect on the drinking and driving problem. Potentially the impact of the countermeasures is very important, regardless of infrastructure improvement and vehicles renewal. Again, it does not seem an easy task to appoint a proper share of contribution among countermeasures themselves. The effect of increased enforcement, fines increase or breath test limits introduction alone (that is in the absence of the other measures) is unknown. Overall, intensified enforcement is the factor with the greater effect.

Numbers of drink drive related fatalities do not really reveal significant improvement in Greece. The proportion of alcohol related fatalities according to official records was in the range 25-30% for the period 1996-2001. In fact, the average value for this period is 27%. Notable reduction was recorded in 2002 (24.3%) and 2003 (21%). According to the Road Traffic Police, the proportion of drivers over limit in total checks (not only in accidents) has already decreased a lot in the past 2-3 years.

4.1.2. Portugal

4.1.2.1. Official countermeasures

Regulations

In Portugal, legal blood alcohol limits are defined in the "Road Code". The maximum limit is set at 0.5 g/l. For drivers passing the limit, the application of sanctions depends upon the degree of excess; there is an intermediate level at 0.8 g/l and an upper level of 1.2 g/l. These limits define intervals into which increasing levels of offenses are considered, corresponding to different types and severity of sanctions, namely: from 0.5 to 0.8 g/l, a fine (from 240 to 1,200 Euros) and driving license disqualification (1 month to 1 year); from 0.8 to 1.2 g/l, a fine (from 360 to 1,800 Euros) and disqualification (2 months to 2 years); and more than 1.2 g/l, a disqualification (3 months to 3 years) or prison (1 year maximum), that may be swapped (according to a judge decision) for a daily fine. The maximum period in which this fine may be applied is 120 days, and the infractor is obliged to make a daily payment or pay the whole fine at once.

According to the Portuguese legislation, every driver involved in a road accident should be tested for alcohol test.

Practice

Each year in Portugal, near one million of random roadside breath tests are currently performed to detect alcohol. The absolute number of detected infringements has grown, from 19,099 in 1998 to 29,205 in 2002. At this stage, mention should be made to improvements in the enforcement strategy towards drinking and driving and in the corresponding screening procedures by the police.

As regards drivers involved in accidents, around 55,000 tests were performed in 2001, according to the Portuguese Road Safety Plan – PNPR. However, and despite the legislation, it is estimated that, in the case of those accidents, around 14,000 drivers are not submitted to those tests.

Portugal	1998	1999	2000	2001	2002
Accidents with casualties	49,319	47,966	44,159	42,521	42,219
Deaths	2,126	1,995	1,860	1,671	1,675
Vehicles (*1000)	4,208(1)	4,508(1)	5,340	5,507	5,593
Alcohol tests	853,671	917,386	906,324	996,205	906,471
Drink & drive infringements	19,099	25,115	23,148	26,236	29,205
% positive	2.2%	2.7%	2.6%	2.6%	3.2%

Table 4.3. *Drink & Drive and general road traffic information about Portugal*

1 Without motorcycles.

Official countermeasures also include campaigns against drink and driving. This subject has been included in several Portuguese campaigns since 1982. From this date to 2003, twelve campaigns included drink and driving issues.

4.1.2.2. Extent of the problem

According to available Portuguese statistical data, the percentage of fatal accidents on which at least one driver presented a blood alcohol level over the limit, has decreased from 4.7 % in 1991 to 2.7 % in 2001 and has experienced a small increase in the following years (3.0 % in 2002 and 3.2 % in 2003). These values, however, don't give a complete picture of the situation; as far as fatal accidents are concerned, it is estimated that a very large percentage of the drivers involved are not submitted to the test (see Table 4.4). Between 2000 and 2003, the average percentage of fatal accidents in which drivers were not submitted to an alcohol test was 62%.

However, considering the number of fatal accidents in which at least one alcohol test was performed, different percentages are obtained (see Figure 5.2). From 2000 to 2003, the percentage of fatal accidents in which at least one driver was over the alcohol limit changed from 6.6% to 10.5%.

A study undertaken by the INML – National Institute for Forensic Medicine, as mentioned in the PNPR, revealed that 27% of the drivers killed in road accidents presented blood alcohol levels over the legal limit. As a result of this finding, a target was set in the PNPR to decrease by 50% the number of fatalities presenting illegal blood alcohol levels. Referring to the percentage of the INML study, it is therefore targeted, to bring to less than 13.5%, the percentage of killed drivers and pedestrians with illegal blood alcohol levels.

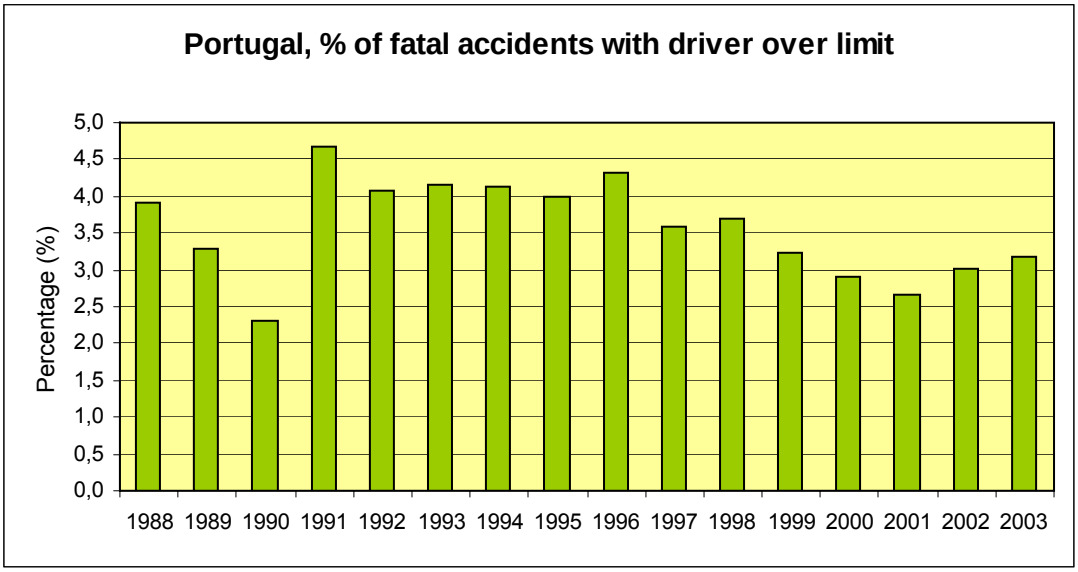


Figure 4.2. *Percentage of fatal accidents with driver over the limit (0.05%) in Portugal*

Note: calculated for all fatal accidents in which at least an alcohol test was made

Year	Fatal accidents in which an alcohol test was made	Fatal accidents in which an alcohol test was made (%)	Total fatal accidents
1988	721	32.4%	2,224
1989	724	34.5%	2,101
1990	720	34.6%	2,078
1991	826	37.1%	2,225
1992	933	43.8%	2,131
1993	1,008	53.9%	1,870
1994	951	55.2%	1,724
1995	982	52.9%	1,856
1996	535	28.5%	1,880
1997	1,072	61.9%	1,732
1998	967	58.7%	1,647
1999	535	33.8%	1,582
2000	560	38.6%	1,450
2001	528	40.1%	1,316
2002	571	43.2%	1,323
2003	373	30.5%	1,222

Table 4.4. *Fatal accidents in which at least an alcohol test was made related with the total fatal accidents – Portugal*

4.1.2.3. Evaluation of countermeasures

No Portuguese studies have been developed based on time series of numbers of traffic accidents and/or victims.

In spite of the limitations on the available data, it is possible to assume that some campaigns and especially increased enforcement, have contributed to the tendency that is possible to detect towards a decrease in the number of drivers with illegal blood alcohol levels.

4.1.3. Spain

4.1.3.1. Official countermeasures

Regulations

In 1998 the law was approved that establishes a lower authorized blood alcohol limit set at 0.5g/l of blood, or 0.25 mg/l of air in breath, and reducing the limit from the previous level of 0.8 g/l in blood. It applies to all drivers except professional drivers - i.e. those drivers of vehicles heavier than 3,5 tons, bus drivers (including school buses), drivers of ambulances and drivers of vehicles with dangerous carriage- and those holding a driving licence for less than two years, for whom the limit is 0.3 g/l in blood, or 0.15 mg/l of air in breath tests.

Of the two means of conducting alcohol checks, namely blood and breath, concentration in breath (the etilotest) is the method that is in use in Spain. The police have the power to stop drivers at random and require a screening breath test.

A detection check is obligatory in case of a driver involved in an accident. A driver's refusal to be tested is regarded as a very serious offence, leading thus to the application of the sanctions comprising a fine imposed along with a suspension of the driver's licence for 1-3 months and imprisonment for 6-12 months, and the immobilisation of the vehicle.

It is the police agent responsible for the control who initially assesses whether the driver is under the influence of alcohol. The nature of sanctions (those registering positive) is generally both penal and administrative. Administrative sanctions are imposed on the spot, in the event of breath testing, and can be paid if the driver is willing to accept the charge. An important possibility provided is that, if fines are paid on the spot, then they are subject to a 30% discount.

Although there is no specific intermediate or higher limit, "drunkenness" is a judicial concept that, whilst not being strictly defined, in practice is typically set above 1.0 g/l. The judge interprets the degree of drunkenness of each case and it is customary to apply the limit of 1.0 g/l to prioritise those cases that are taken to court, (and those that are processed administratively). There is no time limit regarding the execution of court cases.

A driver is able to request a second alcohol test. Such tests are undertaken by health centres and are analysed by the National Institute of Toxicology (INT). If the test is registered positive the driver pays the costs of the test.

Practice

The number of alcohol tests increased in 1999 following the introduction of the lower 0.5g/l BAC limit (see Table 4.5). The reduction in total controls realized in 2000 is due to the transfer of competence to the Autonomous Region of Catalonia. The number of controls rises thereafter and exceeding, for the first time, 2 million alcohol tests in 2003. The number of tests relating to infractions has increased almost threefold between 1998 and 2003. The number of screening tests has also risen, if less dramatically. It has to be remembered that the totals presented above do not include the tests made by police in the autonomous regions of the Basque Country and Catalonia, nor the test carried out by police of the municipalities.

Spain	1998	1999	2000	2001	2002	2003
Accidents with casualties	97,570	97,811	101,729	100,393	98,433	99,987
Deaths	5,957	5,738	5,776	5,517	5,347	5,399
Vehicles (*1000)	21,306	22,411	23,284	24,250	25,066	25,169
Alcohol tests: accidents (*1000)	70	77	72	70	74	89
% positive in accidents	6.4	6.3	7.1	6.7	6.9	6.1
Alcohol tests: infraction (*1000)	86	145	100	136	166	260
Alcohol tests: screening (*1000)	1,468	1,713	1,580	1,603	1,655	1,715
Total Alcohol tests (*1000)	1,638	1,948	1,762	1,822	1,909	2,064
Overall % positive	3.5	4.0	5.0	4.8	4.3	4.0

Table 4.5. *Drink & Drive and general road traffic information about Spain*

1 Screening test are those performed by the ATGC (Agrupación de Tráfico de la Guardia Civil) and exclude those of the autonomous regions of Basque Country & Catalonia and local police.
2 Alcohol test: accidents is related to all accidents (with or without victims)

As part of the official countermeasures, DGT also include campaigns against drink and driving. The first campaign about drink-driving was made in 1961 “Una copa de más... puede ser una vida de menos”. In recent years special emphasis has been given to drink-driving campaigns, with 13 campaigns realized between 1989 and 2003 (almost one per year).

4.1.3.2. Extent of the problem

The following Figure 4.3 presents the proportion of drivers over the limit in accidents of all degrees of severity (both personal injury and property damage-only) in Spain for the period 1998-2003. This proportion has been in the range 6-7% over this period. Spanish data on the participation of drinking drivers in fatal accidents cannot be directly used in a comparison with the other Southern countries, because relevant information is not disaggregated to the same degree.

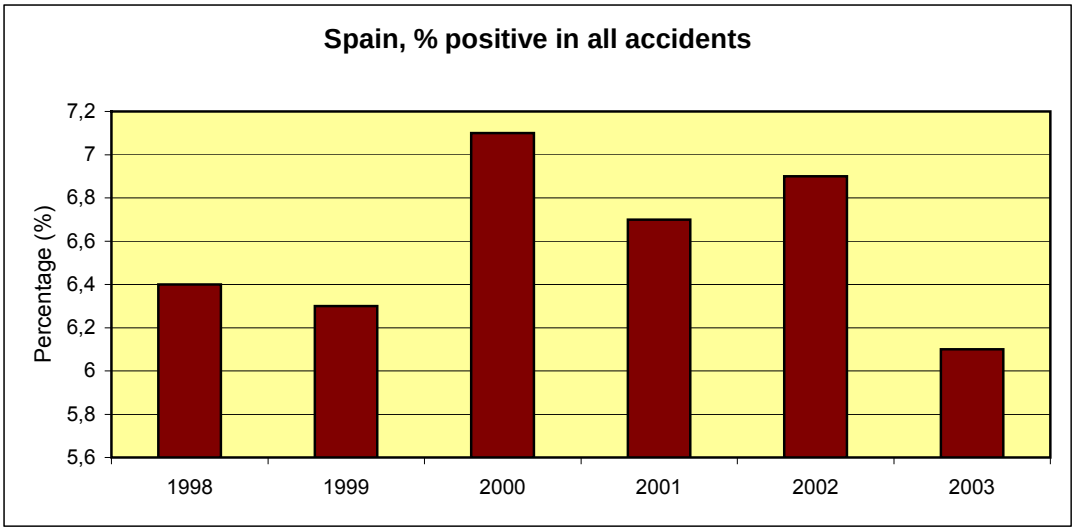


Figure 4.3. *Percentage of drivers over the limit (0.05%) in accidents in Spain*

In Table 4.6, comparable information is provided with respect to the proportion of killed drivers over limit. This proportion is slightly over 30% of driver fatalities and this is very similar to the case of Greece (although with different levels of testing).

Spain	2001	2002	2003
Alcohol positive	484	466	516
Alcohol negative	963	975	1150
Total controls	1.447	1.441	1.621
Total fatalities (30 days)	4.170	4.031	4.084
% tested / total fatalities	34,7%	35,7%	39,7%
% positive	33,4%	32,3%	31,8%

Table 4.6. *Drink & Drive toxicology tests of driver fatalities, Spain*

(Source: Instituto Nacional de Toxicología, Ministerio de Justicia)

A detailed study of the controls relating to alcohol during 2001 was commissioned by the DGT (inmark, 2003). The study examined controls realized by local police and by the Guardia Civil, by type of control, type of road, by characteristics of the driver and the vehicle, and by province. The average values of BrAC were found to be:

- 0.06 mg/l in preventative screening tests
- 0.08 mg/l in tests associated with a driving infringement, and
- 0.13 mg/l in tests associated with an accident.

Of the 6.6% of drivers registering positive, 3.5% were in the range 0.26 to 0.5 mg/l, with 2.1% between 0.51 and 0.75 mg/l, and 1.0% above 0.75 mg/l.

The same study shows that young persons (of less than 30 years) were the subject of almost 50% of the tests realized during weekends. During weekdays, drivers of more than 35 years of age constitute 48% of the persons tested (see Figure 4.4)

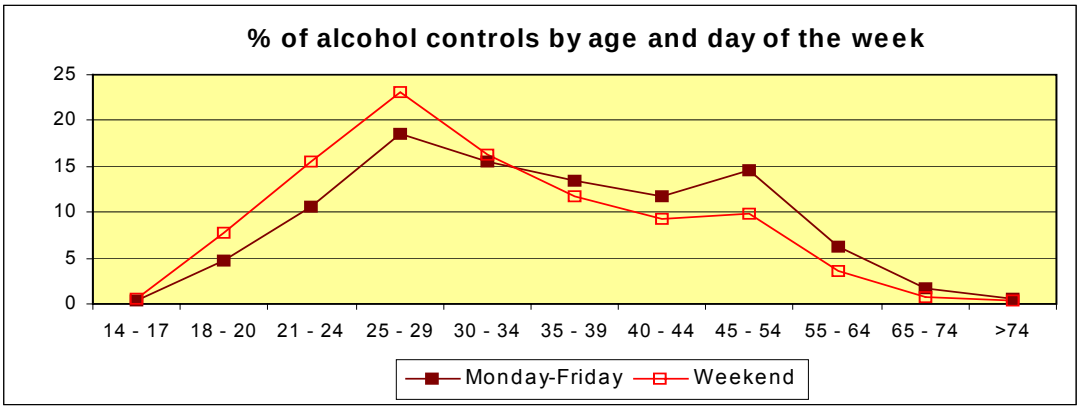


Figure 4.4 *Distribution of alcohol control in Spain by age and day of the week (2001)*

During weekends more than 50% of the controls in Spain are made at night. During weekdays there are less tests after midnight and more during the evening (see Figure 4.5). The same figure shows the percentage of positive test results by time of day and day of the week. The highest percentages occur in the early hours of the morning with a longer extension at weekends, as well as between the evening hours of 9 and 11. In spite of the higher positive percentages during weekends the average levels of alcohol are higher during the weekdays. During weekends 12.5% of drivers who result positive have a high level, whilst the corresponding figure for weekdays is 25.9%.

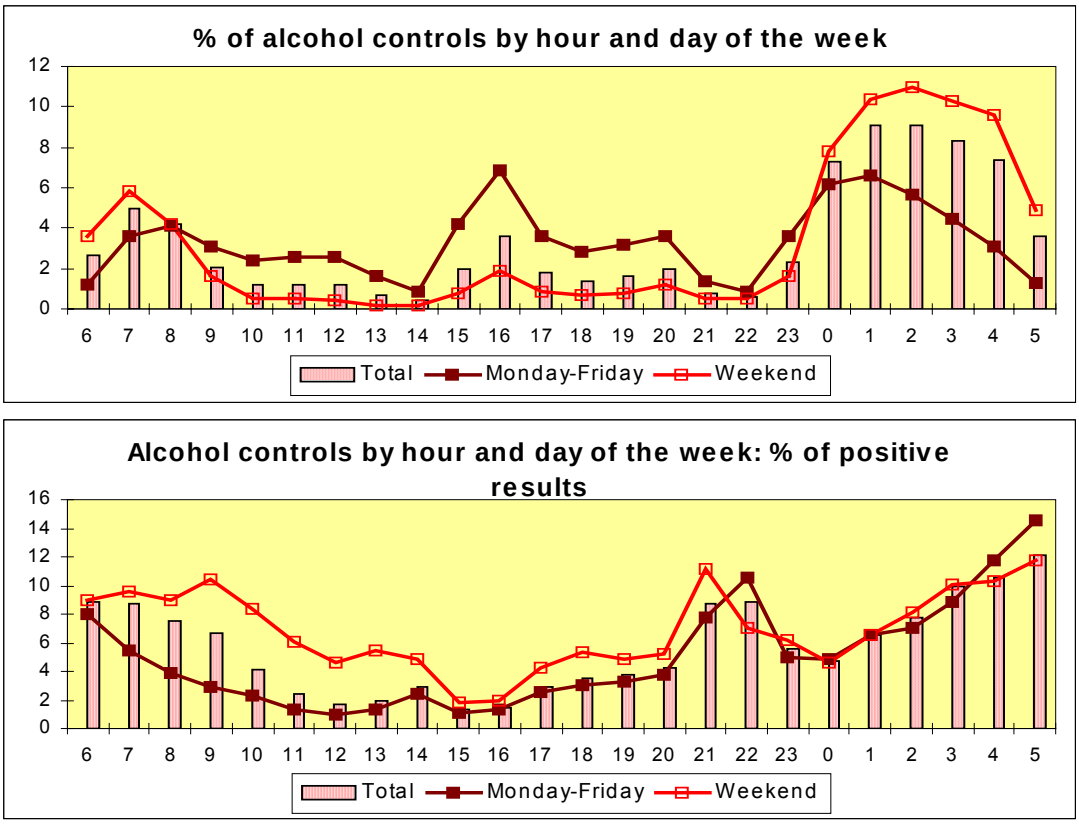


Figure 4.5. *Comparison of proportion of tests and positive results by hour and day of the week (Spain 2001)*

4.1.3.3. Evaluation of countermeasures

There are no studies completed so far based on time series of numbers of traffic accidents and/or victims. It is not easy to assess the impact of countermeasures from the information readily available.

In spite of a 12.5% increase in controls realized by national police (excluding those of the autonomous regions of the Basque Country and Catalonia), the percentage of positive results has only dropped by 1.6%.

4.1.4. Catalonia

4.1.4.1. Official countermeasures

Regulations

The lower authorized blood alcohol limit is set at 0.5g/l of blood. There is no specific intermediate or higher limit, at least with respect to the nature of the sanctions applied. There is some distinction to determine the exact fine imposed, but the classification of a violation as an administrative or criminal offence clearly depends on the entity charged to do so. These limits were established in 1998 and applied in 1999, reducing the lower limit from the previous level of 0.8g/l. The nature of imposed on the spot, in the event of breath testing. An important possibility provided is that, if fines are paid on the spot, then they are subject to a 30% discount.

Of the two means of conducting alcohol checks, namely blood and breath, concentration in breath (the etilotest) is the method that is currently used in Catalonia. The police have the power to stop drivers at random and require a screening breath test. Checks on alcohol levels are conducted by the police (Mossos d'Esquadra) on primary roads and non-urban local roads, and by the local police (Policia Local) on urban local roads. To give an idea about the relative police activity the controls realized in 2003 by the Mossos totalled 370,419 tests (87.9%), by the Local Police 47,664 tests (11.3%) and by other police some 3,313 tests (0.8%), according to the study report by SCT, 2003. The transfer of police competence took place between 1998 and 2000, and this makes it difficult to retrospectively extend the time series of Table 4.7.

A detection check is obligatory in case of a driver involved in a fatal accident. A driver's refusal to be tested is regarded as a very gross offence, leading thus to the application of the most strict sanctions. In particular, a fine is imposed along with a suspension of the driver's licence for 1-3 months and imprisonment for 6-12 months. It is also possible that the vehicle is immobilized. Since 1999 a more conservative BAC lower limit has been introduced with respect to specific categories of drivers, reduced to 0.3 g/l (or 0.5 mg/l of air in breath tests). This measure concerns young drivers (i.e. holding their licence for less than 3 years), drivers of vehicles heavier than 3.5 tons, bus drivers (including school buses), drivers of ambulances and drivers of vehicles with dangerous carriage.

Practice

A major campaign aimed at reducing drink driving ("Zero tolerance") was conducted in 2003.

Catalonia	2001	2002	2003
Total accidents with casualties	22,292	21,465	20,618
Deaths	817	812	767
Vehicles (*1000)	4,118	4,220	4,220
Preventative screening tests	327,400	350,609	401,142
Tests related to accidents with casualties	7,449	11,135	15,280
Tests associated with driving infringements	5,208	3,682	4,329
Suspicious driving	0	613	645
Total controls	340,057	366,039	421,396
Total tests of drivers involved in accidents	7,449	11,135	15,280
% Tests (accidents): total of accidents	33.4%	51.9%	74.1%
Screening tests per year	340,057	366,039	421,396
Screening tests per passenger car	1:8.6	1:8.2	1:7.1
Positive	22,407	21,244	18,726
% positive	6.6%	5.8%	4.4%
Positive in accident	2,130	1,981	1,922
% positive in accident	28.6%	17.8%	12.6%

Table 4.7. *Drink & Drive and general road traffic information about Catalonia & summary of countermeasure practices*

The number of screening tests performed annually by the Catalonian police reveals a trend of significant increase over time. It is indicative that, while in 2000 340,057 tests were performed in total, in 2003 this value went up to 421,396, an increase of 81,339 tests (24%). The increase corresponds mainly to an increase in the number of controls related to accidents involving personal injury (up by 7,831 from the 7,449 tests realized in 2001). Over the same period of time, the absolute number of tests registering positive has decreased slightly from 22,407 (6.6%) in 2000 to 18,726 (4.4%) in 2003. The tests per passenger car in 2003 are similar to those estimated to have been carried out in the Netherlands in 2000 (SWOV, 2002, p.46).

4.1.4.2. Extent of the problem

Figure 4.6 shows the trend for drivers over the limit in fatal accidents in Catalonia (1993-2003). According to the data recorded by the police at the moment of accident registration, the problem appears to have increased approximately threefold since the early nineties. However, these percentages are lower than those given in the SUN report (Sweden p.43 shows 8 to 10%, for example) and it is necessary to compare these figures with those from other sources (see below). Furthermore, the data available cannot distinguish between tests applied to drivers involved in accidents with fatalities and those involved in accidents with personal injury without fatalities.

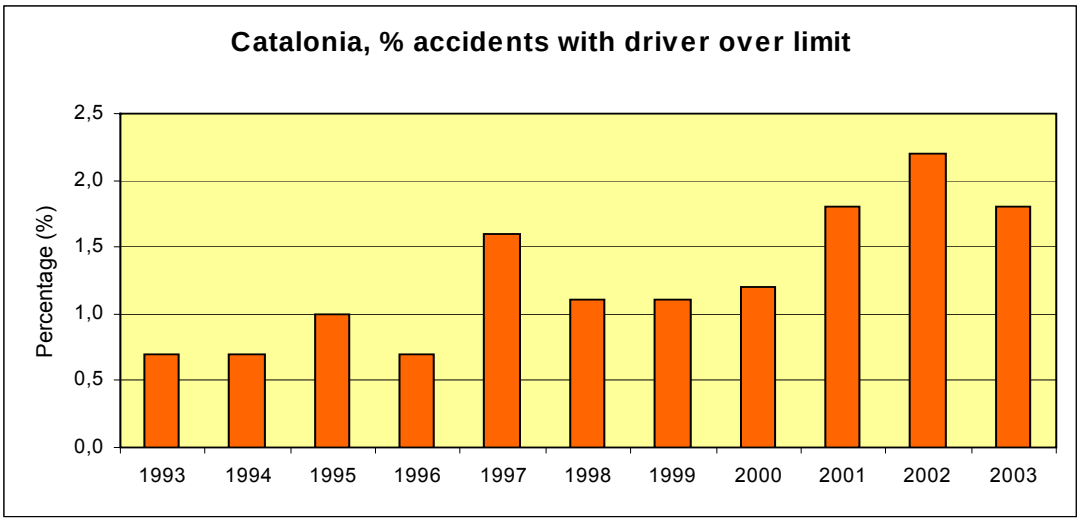


Figure 4.6. *Percentage of fatal accidents with driver over limit (since 1999: 0.05%) in Catalonia*

Figure 4.6 shows contradictory information to that obtained from toxicological tests of drivers killed in accidents. The percentage of accidents for which blood alcohol level of killed drivers is tested has increased from around one third in 2000 to more than two-thirds in 2003, i.e.: higher than the (2000) level reported to be registered in the UK (50%) but lower than the level in Sweden (90%).

Catalonia	2001	2002	2003
Alcohol positive	104	85	90
Alcohol negative	153	160	194
Total controls	259	245	284
Total fatalities (24h)	710	708	667
% tested / total fatalities	36.5%	34.6%	42.3%
% positive	40.2%	34.7%	31.7%

Table 4.8*. Drink & Drive toxicology tests of driver fatalities, Catalonia*

Table 4.8 presents the trend in levels of blood alcohol of drivers killed in road accidents in Catalonia. Although the trend shows a decrease in the percentage registered as positively over the limit, there is still a high proportion, one third, of drivers having an alcohol level above the limit. The SUNflower report does not indicate a clear reference value to which this figure can be compared, partly due to different limits, partly to data non-availability.

The third source of data about drink driving is the data relating to police screening tests (see Table 4.7) which shows that drivers registering positive in tests at accidents have reduced from 28.6% in 2001 to 12.6% in 2003. In part, this reduction is explained in terms of higher levels of control in recent years compared with more-selective controls aimed at more suspicious cases previously.

It can be concluded that the level of drink driving in Catalonia lies somewhere in the range between 12% (Table 4.7 positive in accidents) and 32%, and these levels are proposed to estimate the range of the problem. Thus, the potential for reducing

fatalities from the 2003 level of 767 killed lies between 90 (12%) and 245 lives (32%), with a mid-range value of 165.

Figure 4.7 compares the hours of the day when preventative controls realized by the police under direct control of SCT ("Mossos") are carried out, with the incidences of positive test results. The problem of drink driving is greatest during the nighttime.

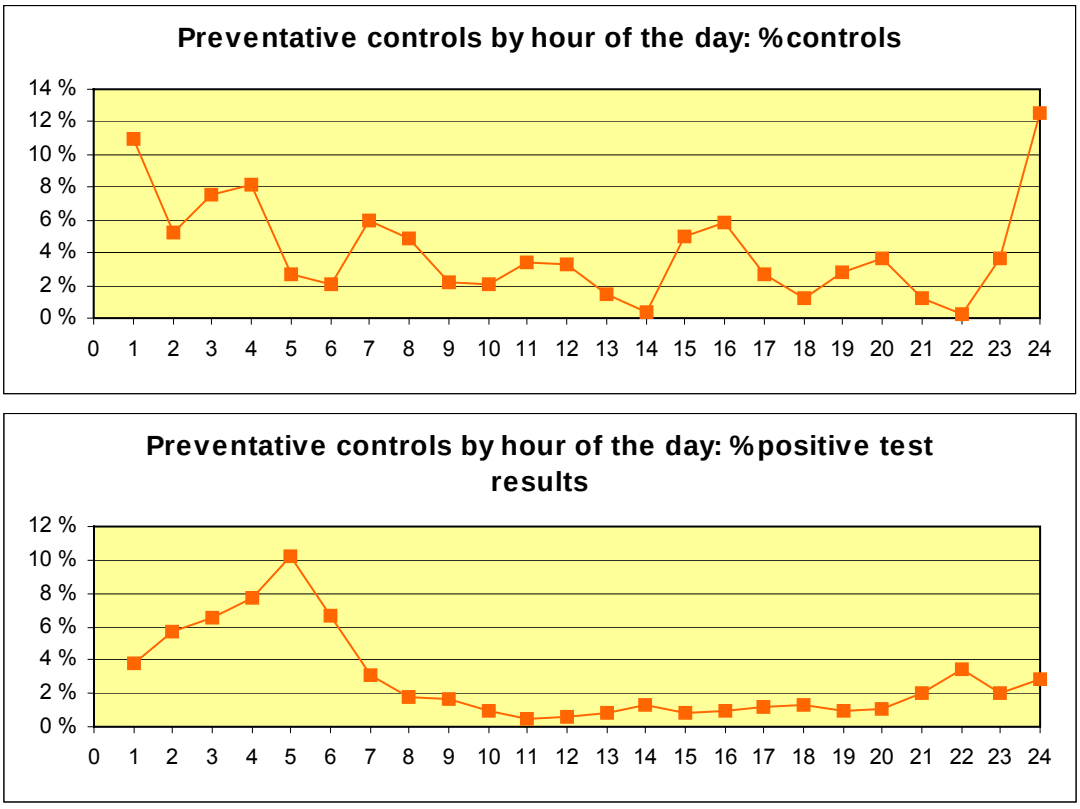


Figure 4.7. *Comparison of proportion of tests by SCT police and positive results by hour of the day for 2003 (After SCT, 2003)*

Table 4.9 shows the variation by day of the week and indicates that the drink-driving problem is most acute during weekends.

	Negative	Positive	Refused	Total	% controls	% positive
Monday	41,783	1,045	31	42,859	12.1	2.4
Tuesday	36,083	786	17	36,886	10.4	2.1
Wednesday	38,782	880	18	39,680	11.2	2.2
Thursday	37,733	913	28	38,674	10.9	2.4
Friday	44,878	1,293	40	46,211	13.0	2.8
Saturday	70,602	3,126	74	73,802	20.8	4.2
Sunday	72,842	3,815	90	76,747	21.6	5.0
Total	342,703	11,858	298	354,859	100.0	3.3

Table 4.9. *Comparison of proportion of preventative tests by SCT police and positive results by day of the week for 2003 (After SCT, 2003)*

4.1.4.3. Evaluation of countermeasures

The increase in the number of controls of drivers involved in accidents (a 24% increase in the total number of drink-drive screening tests) since 2001 has coincided with a reduction in the percentage of such drivers registering positive in alcohol tests: 28.6% in 2001, 17.8% in 2002 and 12.6% in 2003 (SCT, 2004, p.15). The reduction from 2001 to 2003 of 16 percentage points in drivers registering positive compares with a 8.5 percentage points reduction in the proportion of driver fatalities registering over the limit in toxicology tests.

The analysis of the stricter limits for young/professional drivers would require analysis of the recorded alcohol levels by driver category and age and is likely to be beyond the scope of the current study.

4.2. Comparison Between Southern Group Countries / States

4.2.1. Countermeasures

	Greece	Portugal	Spain & Catalonia
Low limit	1999: 0.5 g/l (blood)[1] 2001: 0.25 mg/l (breath)	1990: 0.5 g/l (blood) 2001: 0.2 g/l 2002: 0.5 g/l	1999: 0.5 g/l (blood)[2] 1999: 0.25 mg/l (breath)
Detection	Screening: Random + accidents Evidential breath testing	Screening: Random + accidents Evidential breath testing	Screening: Random, suspicion, violation + accidents Evidential breath testing
Minimum sanction	Fine (78 €) + 3 points of penalty	Fine (240 – 1200 €) + 1-12 months disqualification	Fine (302 €)
Intermediate limit	0.8 g/l (blood) 0.4 mg/l (breath)	0.8 g/l (blood)	n.a.
Intermediate limit minimum sanction	Fine (156 €) + 3 months disqualification	Fine (360 – 1800 €) + 2-24 months disqualification	n.a.
High limit	1.1g/l (blood) 0.6 mg/l (breath)	1.2 g/l (blood)	Note [3]
High limit minimum sanction	Fine (625 €) + 6 months disqualification + Prison (at least 2 months)	3-36 months disqualification + Prison (up to 12 months)	Fine up to 602 € Disqualification (1-6 years) Prison conditionally (6 months to 2 years)

Table 4.10. *Official countermeasures in the Southern Group countries*

1 Since 2002 this limit was decreased by 60% for professional and young drivers (0.2 g/l of blood, or 0.1 mg/l of breath)
2 Since 1999 this limit was reduced to 0.3 g/l of blood (0.15 mg/l of air) for professional and young drivers (less than 2 years driving experience).
3 In Spain (including Catalonia), the term drunkenness although not strictly defined is typically applied to cases registering above 1.0 g/l of blood.

Table 4.10 depicts comparatively the countermeasures applied in Greece, Portugal, Spain and Catalonia.

All four territories have similar blood alcohol level limits. In particular, the general limit is common in all cases (BAC of 0.5 g/l). The logic underlying behind sanction regime is similar in general, although there are some differences. Greece starts with a fine only, for drivers who are just over the limit. In Portugal, Spain and Catalonia the respective fine is at least double. In addition to that, only in Portugal, drivers are disqualified from driving for at least one (1) month. Portugal and Greece follow a structure with an intermediate limit, which is also common (set at 0.8 g/l). Finally, there is a high limit that implies more severe sanctions (1.2 g/l in Portugal, 1.1 g/l in Greece).

Notable differences are recorded with respect to additional or alternative sanctions imposed on offenders as a means of improvement of their driving behaviour. In Greece there are no measures related to that concept. In Portugal, offenders may be forced to repeat the driving code exams, to take extra classes or, in more serious cases, to render civil work in hospitals. In Spain and Catalonia, the administrations are studying the possibility to allow drivers to ask for re-educative programs, which would substitute fines (still to be implemented).

These measures provide some indication on each country's willingness and potential to prevent recidivism. Still, in the absence of specific rules dealing with repeat offenders, it is not possible to make a total judgement. According to the Greek RTC, if a driver is caught with a BAC exceeding 1.1 g/l within two (2) years from a previous offence, he/she is disqualified from driving for five (5) years.

A main element that is common in all investigated countries' system is the utilization of evidential breath testing (as evidence in court) and screening breath tests at the roadside (as a leading principle). This framework enhances the work of police tracking and processing drinking drivers. It is important that police have the power to stop and test drivers at random. Blood and breath are considered as means of conducting checks. A breath test is compulsory in case of personal injury accident. Table 4.11 presents countermeasures practice comparatively.

Year 2003	Greece	Portugal (2002)	Spain (1)	Catalonia
Screening tests per year	1.27 million	0.90 million	2.06 million	0.42 million
Per passenger car	1: 3.0	1: 5.5	1: 7.2	1: 7.1
Positive	45,500	29,200	82,000	18,700
In accident	800	1,850	5,500	1,900
Over limit	n.a.	n.a.	73,000	17,918
Positive per passenger car	1: 84	1: 171	1: 181	1: 160

Table 4.11. *Countermeasures practice Greece, Portugal, Spain and Catalonia*

1 For Spain, screening test are those performed by the ATGC (Agrupación de Tráfico de la Guardia Civil) and exclude those of the autonomous regions of Basque Country & Catalonia and local police. Screening test per passenger car excludes cars from the autonomous regions of Basque Country & Catalonia.

There are some differences in the annual number of screening tests performed in the examined regions. A comparison is relatively easy to attempt, since the three of the four examined territories have similar populations and passenger car fleets, the exception being Spain, which is relatively rather large. Portugal provides the best profile over time, since an annual product of almost 1.0 million checks is constantly achieved since 1998. Greece exhibits the greatest progress, as the annual number

of tests performed has increased from 0.2 million in 1998 to 1.27 million in 2003. In Catalonia a significant increase in tests carried out is recorded as well (from 0.32 million in 2001 to 0.42 million in 2003, 24% up). Spain presents a slightly slower increase with a small fluctuation (from 1.64 million in 1998 to 2.06 million in 2003, 26% up)); this slight increase is due to the transfer of competence to the Autonomous Region of Catalonia. If these figures are related to the respective passenger car fleets, it comes that Portugal achieves a rate of 1 test per 5.5 cars. The (test) rate takes a value of 1 per 3 cars in Greece and 1 per 7 cars in Spain. It seems that the risk for a driver to be tested is relatively higher in Portugal and Greece. It can be stated that the detection risk for drinking drivers is lower in Spain and Catalonia, although the indicator for Spain does not include the tests realized by local.

There is not much information on the number of drivers convicted for drinking and driving. This is only available for Spain (73,000 sanctions in 2003) and Catalonia (17,918 sanctions in 2003 and 20,989 in 2004). Therefore, the only possibility to relate offences to the size of each passenger car fleet is to use instead the number of infringements recorded by the police, although this treatment introduces an uncertainty factor due to presumably different correspondence of positive tests to convictions in each country. In Spain 82,000 positive tests were recorded in 2003. Greece reveals the most positive tests recorded among smaller countries (45,000), whereas Portugal follows with 30,000 and Catalonia with 19,000. The indication provided by the rates calculated is that in Greece drivers are caught driving drunk (1 positive test per 84 cars) at least two times more often than in Catalonia (1 per 160 cars), Portugal (1 per 171 cars) or Spain (1 per 181 cars). It is not safe to draw any conclusion on the countries' classification with respect to the extent of the studied problem, based on the aforementioned indications, because rates do not correspond to convictions. Even if they did, they would depend on the actual number of drinking drivers on the road, on conviction limits, as well as on the effort made by the police.

4.2.2. Extent of the problem

Proportions of casualties or accidents with drinking drivers are regarded to be better indicators for the extent of the problem of drinking and driving than numbers of positive tests or convicted drivers within a certain period of time. Actually, it is regarded preferable to work with fatal accidents, since these are considered as more completely registered due to degree of severity. An element in favour of conducting research in drinking and driving is the common lower limit for all Southern countries. This is very important because it ascertains a common reference among compared sets of data. Still, it is not possible to have further analysis addressing certain types of drivers, because the amplitude calibration of BAC values is not very detailed. In the case of young drivers, for instance, this would mean that accident report forms should include a 0.2 g/l threshold in Greece. For Spain and Catalonia young / professional drivers registering levels above 0.3 g/l are recorded as positive and the actual level measured is recorded.

On the other hand, it is unfortunate that in all cases the samples collected are rather limited – based either on number of accidents, or on casualties. There are two main reasons for that. The first one has to do with the lack of potential to perform alcohol level tests in all fatal accidents –although this is the rule in all investigated countries. This may have to do with deficiencies in administrative structure, or with funding

limitations. The second regards data storage and processing methods. In the case of Greece, it is indicative that, although 75% of killed drivers are tested since 1996, BAC results are known only in about half cases, leading to stored information only in about one third of all records. Similarly, in Spain and Catalonia it appears that the BAC level is available only for a 35-40% of driver fatalities –with an increasing trend presently, it should be said. In Portugal the proportion of fatal accidents with at least one test performed exhibits high fluctuation. It reached a peak of 60% in 1997-1998, going down to 40% in 2001 and 30% in 2003.

It is regarded correct to draw a comparison among Southern countries using proportions calculated on the part of drivers or accidents for which BAC level information is available. Excluding cases for which no test was performed, or no results are kept, is the only feasible treatment of available data if one intends to obtain meaningful and realistic indicators. Considering all fatal accidents would not offer a common reference basis. Additional indicators can be calculated to describe the efficiency of the police and of the procedures used to store BAC results in drivers records. This methodology yields rates that should be treated carefully, since uncertainty is introduced to some degree due to the transfer of the calculated values from the used sample to the total population of fatal accidents or fatalities. Still, this agreement secures the production of information with the least possible inaccuracy.

Keeping in mind these comments, it appears that all investigated countries suffer an extensive drinking and driving problem. In Greece drinking drivers are present in 25% of fatal accidents or total fatalities (about 80% tested), while one third of killed drivers exhibit BAC over limit (almost 80% tested, but only 35% with available BAC). In Portugal the respective proportion of fatal accidents is about 10% (2003), after a peak in 1997 (15%). This seems somewhat low, especially if one considers that 27% of killed drivers are found to be over limit. In Catalonia and (the rest of) Spain the proportion of drinking drivers in fatal accidents cannot be obtained, but the respective proportion in all accidents (including all levels of casualties, as well as cases with property damage only) is 1.5-2% for Catalonia and 6-7% for Spain. More insight is offered by the fact that in these two territories the proportion of killed drivers over limit approaches 32% (35-40% tested), showing thus close resemblance to Greece.

It is reasonable to assume that in Spain and Catalonia the participation of drinking drivers in fatal accidents should be close to 30% as well. This interpretation is supported by EuroCare recent findings (2003), according to which in Europe “between 1% and 5% of drivers have blood alcohol levels above their country’s maximum limits, accounting for up to 20% of fatal and serious injuries, and up to 25% of driver fatalities”. The slightly higher proportion among drivers themselves is verified by Greek statistics, while the maximum values mentioned by EuroCare are exceeded because only fatal accidents are used in the present comparison (incorporating serious injuries logically lowers proportions a little). It appears that Southern countries are at the bottom of EC rankings in this context.

This conclusion is also in accordance with the proportions of drivers over limit announced for each country with respect to all screening tests –including preventative ones. The upper limit of the range defined (5%) is very close to the values reported by all Southern countries (Spain: 4%, Catalonia: 4.4%, Greece: 3.6%, Portugal 3.2%).

4.2.2.1. Discussion

The task of assembling sufficient information of time series related to the drinking and driving problem in all countries is a challenge since different data sources have to be integrated; in the Southern countries it is hampered by low sample levels and by differences in the ways statistics are recorded (this, in spite of same general limits). This leads to the searching of suitable methods and selection of proper tools to utilise available data. Generally, it appears that the contribution of drinking and driving to road traffic accidents has remained more or less stable in the examined countries. This is illustrated in all countries statistics, although it is only in Greece and Portugal that fatal accidents are dealt with alone –with a suspicion of underreporting for the latter. In absolute terms the severity of the problem has started to diminish, at a relatively slow pace though –following the trend observed in total accidents or serious casualties.

The fact that there is no notable relative improvement in drinking and driving viewed as part of the total road accidents problem, suggests that presumably Southern countries have been somewhat late realising and dealing with it, compared to SUN countries. The latter have already experienced some response to a series of organized measures to confront the problem. Another good reason why the share of drinking and driving in all serious accidents and casualties for Southern countries has not declined noticeably, although absolute values have decreased, could be the fact that all other major accident causes contributed many accidents and casualties as well. Therefore, it has been similarly easy to come up with some first measures of limiting their impact. As a result, the proportion of casualties attributed to drinking and driving has not really been reduced.

It is likely that the slow -but constant- improvement recorded in all Southern countries in the past few years can be attributed for a good part to the intensified enforcement, as it comes from data on the screening tests carried out annually. It is true that, as it was the case previously in SUN countries, this increased enforcement effort has come to follow up changes in the legal blood (and breath) alcohol limits. It is also true that the sanctions accompanying those new limits appear to be stricter. It is not simple to appoint shares of contribution to these factors. Still, it does not seem possible that a tighter legal framework would achieve much unless supported by increased enforcement.

Overall, the alleviation in question is rather small, so it is statistically not recommended to attempt to quantify shares of contribution for tests, limits and sanctions. For example, in the case of Greece, drinking drivers were present in 32.5% of fatal accidents with a complete record during 1991-1995, opposed to 27.2% in the period 1996-2001 and 22.4% in 2003. Besides, the completeness of data available is more than questionable, implying that there is some additional uncertainty in terms of statistical significance.

It is very important that, although the role of drinking alcohol in society appears rather intense in Southern countries, random breath testing has been smoothly incorporated by now, suggesting that it is viewed as a useful tool in favour of safety. This allows for more expectations in the near future, as the measures taken recently are likely to yield more visible results and new actions may be taken according to EC recommendations. It is also expected that statistics available will be more complete, making relevant findings concrete.

4.2.3. Conclusions

- The prevention of drinking and driving in the Southern countries is not really different than in the SUN countries. It is also based on a combination of legislation and enforcement. The law is aimed at showing that drinking and driving is dangerous, as well as at threatening potential drinking drivers with sanctions. Law enforcement should be practical and effective, so as to enhance detection and conviction of violators. Society should be convinced that such a driving behaviour is not acceptable, or else that blood alcohol limits are a necessity and so are practical methods of measurement.

- It can be said generally that Southern countries considerably had been lagging behind SUN countries in realising the problem of drinking and driving and organising a system with a proper structure to deal with it. Interestingly, Portugal was the first to set a reasonable BAC limit of 0.5 g/l in 1990, followed by the other territories in 1999. Spanish legislation of 1999 and Greek of 2001 establish lower limits for young and professional drivers, with that for Greece being slightly lower. Given the difficulty of sustaining a lower limit for all drivers in Portugal (see Table 4.10), the current lower limit for Greece is a shade tougher than the others.

- Portugal and Greece also have an intermediate limit, set at 0.8 g/l of blood, as well as a high limit (1.2 and 1.1 g/l respectively). In the case of Spain and Catalonia there is no upper limit established by law, but a limit of 1.0 g/l of blood is used to determine and process the most severe infractions. It can be argued that this approach gives too much discretionary power to judges, and that statistical monitoring of the higher limits is needed in order to fully evaluate what is clearly a considerable enforcement effort.

- The evolution of lower limit thresholds is rather interesting. In Spain and Catalonia a lower limit of 0.3 g/l was established for young and professional drivers when the overall limit was lowered from 0.8 to 0.5 g/l, decided in 1998 and applied in 1999. In Portugal, an experimental phase was recorded between 2001 and 2002 with a lower limit at 0.2 g/l for all drivers. That is to say that the previous threshold of 0.5 g/l was put again in force after the year of experimentation. Greece only set a stricter low limit of 0.2 g/l for young and professional drivers in 2002, although the problem of drink driving among young drivers had been extremely acute for a long time. Such developments constitute implications on the difficulties encountered often with respect to social acceptance, and the need to carefully package the toughening of the rules.

- Portugal is the stricter country as far as size of sanctions is concerned, followed by Catalonia. Greece appears to apply the mildest sanctions, although the differences with Spain and Catalonia are rather small. Furthermore, the systems of all investigated countries reveal similar design principles and variations mostly regard amount of fines or length of disqualification periods. It should be noted that in Portugal all drinking drivers are disqualified from driving for a period of at least one month. On the contrary, in Greece drivers are only prohibited from driving when caught driving with a BAC that exceeds 0.8 g/l.

- Greece exhibits tremendous progress in terms of enforcement practice. In fact, it lately appears to perform the most screening tests per passenger car, tending actually to approach EC recommendations (1 check per 3 cars, instead of 1 per 2.5 cars as a target set by EC). Portugal has a slower increase in the number of tests carried out, but it shows a satisfactory rate constantly since 1998 (in the order of 1 test per 5.5 cars). Spain and Catalonia provide a relatively lower detection risk for drivers, but the rate achieved is still satisfactory in absolute terms (1 test per 7 cars). For Spain, the exclusion of controls made by local and some regional police complicates the comparison.

- Available statistics of drivers registered as positive in preventative screening tests verify that Southern countries have a bad performance among EC members. The proportions of drink and drive related infringements range from 3.2% in Portugal up to 4.4% in Catalonia (4% in Spain and 3.6% in Greece), close to the upper limit of 5% mentioned in EuroCare findings.

- It is not absolutely safe to classify the examined countries in terms of the extent of drinking and driving, mainly because of variations in data availability and utilisation. Greece yields an unsatisfactory profile with respect to accidents and casualties suffered due to drinking and driving. Taking into account data discrepancies as much as possible, it appears that the proportion of drinking drivers in fatal accidents is very high (25% in recent years), although there are some signs of alleviation since.

- In Portugal this fraction appears to be in the order of 10%, opposed to only 3% on all fatal accidents (even those where no tests had been performed). Again, this value seems to be low, implying that results are not readily available for all tests realized –just like it is in Greece. This proportion is not isolated for fatal accidents in Spain (and Catalonia), not allowing for a direct comparison. Figures provided are substantially lower, because accidents of all severity degrees are included. Still, a reliable comparison can be performed utilising available evidence on the proportion of drinking drivers among driver fatalities. In Spain and Catalonia it appears that almost one third of killed drivers are over limit, which is also the case in Greece. Therefore, it is reasonable to assume that in these regions drinking drivers should also account for almost 30% of fatal accidents.

- Specific aspects of the investigated problem include a notable increase of occurrences during the night-time. The problem is also acute during weekends. These findings are supported by Catalonian and Spanish data and further verified by data from all Southern countries in the “Young Drivers” case study context.

- It appears that it is necessary to pursue a more complete coverage of fatal accidents by the police, by means of performing alcohol tests in all cases. The fact that in all countries only 35-40% of killed drivers have a known BAC is distracting for the effort to obtain a clear picture on the extent of the problem. As a second step, it is crucial to achieve a better procedure of keeping a full record of accidents. With regard to data availability and comparability, and considering that the current plans target fatality reductions, in Spain and Catalonia the police should store information on the realisation of alcohol tests according to the

severity of each accident –whether personal injury is involved or not and, furthermore, if fatalities exist.

- It also seems to be necessary to provide a breakdown of drinking drivers based on the severity of violation, it only exists for Spain. This would be very useful in obtaining an idea of the violators' profile for each country. As soon as this picture is illustrated, it will be less complicated to identify the proper measures to be applied in the future. There is extensive experience on this fold of the issue from SUN countries (in Britain, for instance, regulations concentrate mostly on drinking and driving with high alcohol levels).

- It can be expected that in the near future the situation is very likely to improve significantly. This can be the outcome of the incorporation of EC recommendations in the national legislation of the Southern countries. It is not safe to predict how soon this may occur because, as it has been explained previously, some measures cannot easily be socially accepted without some preparation. Such measures are the setting of a standard BAC level of 0.2 g/l for motorcyclists, or the establishment of a common minimum punishment of unconditional suspension of the driving licence for 6 months for anyone passing the limit.

4.3. Effect of Drink Drive Policies

It appears that Greek, Spanish and Catalonian drivers have already started to comply with legislation to a greater extent, probably under the threat of an increased probability to get tested and punished for drinking and driving. In all cases, violators appear to account for marginally less than 5% of all checked drivers for the first time. Interestingly, it is in Portugal that the proportion of positive drivers in preventative tests follows a slightly increasing trend, although it remains lower than in the other countries (3.2% in 2002).

Greece and Catalonia have been able to show positive trends of certain indicators associated with increased levels of enforcement against drinking and driving. However, the probability of being tested per driver is still lower than what has been recommended by the EC (between 30 and 40% of drivers to be tested annually). Greece appears to be closer to this target, with 1 alcohol test per 3.5 cars annually. Portugal is following with 1 check every 5.5 cars, while Spain and Catalonia perform 1 test per 8 cars every year. Overall, all investigated countries achieve a satisfactory enforcement that can be further intensified.

In Portugal, it appears that almost 200 persons are lost each year because of drinking and driving. This is very likely to be an underestimation, although the extent to which results of BAC tests are not stored cannot be obtained.

In Greece, according to 2003 data, almost 340 persons lost their life in accidents with at least one drinking driver. This constitutes a saving of about 230 lives compared to 1996 (estimate for 570 persons). The progress illustrates the smaller share of drinking and driving in all road traffic fatalities, along with a general improvement in the country. This implies significant effect of drink-drive policies applied lately, mostly in the shape of campaigns and intensified enforcement by the police. Apparently, there is potential for further reduction of alcohol related fatalities.

In Spain the estimate of the number of alcohol-related fatalities depends largely upon the source of data used. According to police control figures, the number could be as “low” as 200 or 250 lives lost per year. According to figures from toxicology analyses the number might exceed 1000. It is proposed that the figure probably lies somewhere in the range 500 to 1000, and it is clear that measures to reduce drink-driving have a high potential for saving lives in Spain.

For Catalonia it is estimated that alcohol related fatalities are approximately 210-225, accounting for almost 30% of the total. There is no adequate information to estimate the progress realized in this issue over time, but assuming similarly to the Greek case that this proportion is more or less constant for some years, it could be that the saving in question has reached 30-40 fatalities in the past 5-6 years. Total road accidents fatalities follow a steadily decreasing trend, implying that there is great potential to go lower than 200 drinking and driving fatalities in the near future.

5. Seat belts

5.1. Introduction

Wearing a seat belt is arguably the single most effective action that traffic participants can do to save their lives and reduce injuries on the roads.

Seat belt wearing is mandatory (through national directives) in the front and rear seats of vehicles of less than 3.5 tonnes in European countries under Council Directive 91/671/EEC. A draft Directive (OJ C 096 E of 27.03.2001) extends the obligatory use to truck and bus drivers and child restraints. Anticipating European legislation, most national traffic laws now oblige car occupants and all children above a specific age sitting anywhere in the vehicle to be secured by a seat belt (and younger children by other safety systems).

5.2. Extent of the problem

The effectiveness of safety seat belts in the reduction of the chance of injury by using the device is well known. For the front seat passengers, their use can cut the chance of severe injury by 25 % and fatal injury by 40 %. The effectiveness of the seat belts on the rear seats is some 5-10 % less but is still significant. Indeed, Japanese research points to “Front seat occupants had almost five times the risk of severe injury or death when the passengers in the rear were not belted” (Ichikawa et. al., 2002).

It takes time for legislation to take effect. Hence a first consideration has to be the extent to which vehicles have been equipped with seat belt devices. Vehicle manufacturers with an interest in promoting safety (Volvo, Renault, Honda...) have introduced models with systems that communicate an audible signal to the driver if s/he is detected as not wearing the seat belt. It is useful to monitor the penetration of these devices, which reflect manufacturers’ contributions beyond the actual legislation.

In spite of the legislation, usage levels vary widely from one country to the next. Low levels of seat belt usage, especially rear seat belts, are the cause of unnecessary, avoidable loss of life. Furthermore, the effectiveness of air-bag protection systems depends upon the position of the vehicle occupant; such investments are most effective if the basic safety accessory, the seat belt, is in place.

Large differences in the wearing rates of front seat belts have been noted (ETSC, 1996 & ETSC, 1999). In terms of the cost-effectiveness of policing operations, the ESCAPE project considers that the enforcement of seat-belt use ranks considerably higher than the enforcement of drink-driving or speeding (ESCAPE, 2002). In spite of this, “with few exceptions, the police in each country consider belt-use rates (80-95% on interurban roads, 70-85% in urban areas)) as satisfactory and the role of police in maintaining or increasing the rate as minimal”, (ESCAPE, 2002, pp 43).

5.2.1. Contribution of the topic to traffic un-safety

For Greece, the application of the SUN factor of 60% (SWOV, 2002) to the fraction of fatal accidents recorded where no seat belt had been used by front seat occupants injured in accidents yields an estimate of up to approximately 630 persons that could have been saved (with a compliance of 100%) in 2001. Adopting a somewhat lower factor of 40% with respect to the back seat car occupants is leading to a potential saving of about 80 lives that were lost in 2001. These values are obtained assuming that the proportion of passengers wearing / not wearing their seat belt is practically the same among persons for which no such information has been recorded.

For Portugal, seat belts, when correctly used may be considered extremely effective equipment for reduction of fatal injury risk. Several studies on this subject achieved the same conclusion: for collision speeds lower than 25 km/h, they have absolute effectiveness; and for collision speeds between 25 km/h and 55 km/h it is possible to reduce death risk by six times (PNPR, 2003). For children to be protected with the same level of efficiency, child restraint systems must be properly used. According to recent studies, a significant reduction of the number of killed and seriously injured persons was achieved, between 55% and 95%, associated with the correct use of child restraint systems (PNPR, 2003). According to SARTRE3, 81% of drivers stated the use of seat belts in Portuguese urban areas. When comparing this values with the SARTRE3 average for the SUN countries – 84% (Sweden, United Kingdom and Netherlands), only a small difference of 3% is observed.

For Spain, recent surveys indicate that the use of seat belts by front seat occupants on interurban roads is close to the SUNflower SUN average wearing rate of 87% (SWOV, 2002). Achieving a similar level for urban roads would require an increase in the wearing rate of around 25%; were this to be achieved, around 150 lives could be saved annually. This estimate does not consider the savings in lives and injury from improved levels of seat belt use in the rear seats of vehicles (where levels of use are currently lower than 50% for all roads) nor from improved use of child restraint systems.

If Catalonia were to achieve the SUN average wearing rate of 87% (an increase in wearing rate of 26%) then it is estimated that 72 lives could be saved (9,6% of the annual total).

5.2.2. Country-specific (fundamental) background information

The current legal situation for the Southern countries is summarized in Table 5.1; it is seen that current regulations are the same for all countries.

In Greece, the installation of seat belts on front seats, for all passenger cars, is mandatory since 1987. In the same year, the use of seat belts by the drivers and front seat passengers became mandatory. The presence of seat belts in the back seats is mandatory for cars registered since 1993.

The use of Child Restraint Systems (CRS) in Portugal became compulsory in 1994. The mandatory installation of seat belts on front seats, for all cars was implemented in 1970. The mandatory use of seat belts by the driver and all passengers on front

seats, outside urban roads began in 1977. Since 1989 the installation of seat belts on all seats, for all cars was made mandatory. The mandatory front seat belt use by all occupants in every road was implemented in 1992. The use of seat belts by all occupants in all categories of roads was finally mandatory in 1994.

The use of Child Restraint Systems (CRS) in Spain became compulsory in July of 2004. The use of belts in the rear seats of passenger cars and in urban areas became compulsory in 1992. Enforcement of the use of rear seat belts has developed progressively taking into account that the law only applies to vehicles registered from the year of introduction of the law (1992).

Person	Front	Rear
Greece		
Children 0-3 years old	Mandatory use of child seat / baby carrier	Mandatory use of child seat / baby carrier
Children 4-12 years old	Mandatory use of child seat, or seat belt facilitated by seat raiser	Mandatory use of child seat or seat belt facilitated by seat raiser, if installed in vehicle
Persons 12+ years old	Mandatory use of seat belt	Mandatory use of seat belt, if installed
Portugal		
Children 0-3 years old	Mandatory use of child seat / baby carrier	Mandatory use of child seat / baby carrier
Children 4-12 years old	Mandatory use of child seat, or seat belt facilitated by seat raiser	Mandatory use of child seat or seat belt facilitated by seat raiser, if installed in vehicle
Persons 12+ years old	Mandatory use of seat belt	Mandatory use of seat belt, if installed
Spain and Catalonia		
Children 0-3 years old	Mandatory use of child seat / baby carrier	Mandatory use of child seat / baby carrier
Children 4-12 years old	Mandatory use of child seat, or seat belt facilitated by seat raiser.	Mandatory use of child seat or seat belt facilitated by seat raiser, if installed in vehicle.
Persons 12+ years old	Mandatory use of seat belt	Mandatory use of seat belt, if installed

Table 5.1. *Summary of legal regulations relating to seat belts in Southern countries and autonomous region*

Table 5.2 presents comparative information about the extent to which the vehicle fleets of the South countries have been equipped with seat belt protection devices.

Vehicle	Seat belt	Presence rate assessed (%)			
		Greece	Portugal	Spain	Catalonia
Car	Driver seat	99%	93%	99%	n.a
	Front passenger seat	99%		99%	n.a.
	Rear seats	77%		76%	n.a.

Table 5.2. *Comparison of presence rates of seat belts by vehicle type and occupant position (SARTRE 3)*

5.3. Availability, quality and comparability of data

Data concerning seat belt usage is compared in section 6.4 comparing the safety levels and risks. The sources of data include the SARTRE project surveys, national surveys and (in the case of Child Restraint Systems) local surveys. Monitoring of the usage rates has not recently been monitored for the Catalonia region since a study concluded that the usage level recorded by all accidents with casualties provides a reasonably accurate measure of general risk exposure.

The administrations for all South countries register seat belt wearing in the recording of car accidents. For Greece, the trend in the use of seat belts in accidents with a fatality or serious injury for Greece is available for the period 1996-2003. Prior to 1985, data recorded are stored in a less disaggregate form, not allowing the calculation of proportions; but it is only since 1996 that the position of a passenger in a car is recorded as well. Since 1996 the accident data report forms also include a separate field on the use of CRS from children.

Seat belt use register in Portugal started in 1980, with the introduction of new data fields in the accident statistical bulletin. The accident severity section includes data on safety equipment used by all occupant victims, but only data for drivers is available for disaggregated analysis. No data is collected for non-injured car occupants. Since 1997, additionally to the seat belt use registration, the use of special chairs for children transport, disaggregated by front and rear position, was also included.

For Spain (and for Catalonia), accident data is available since the 1980s, recording the location of the person in the vehicle (front (driver / passenger) and back (left, central, right)); information about child restraint system usage is recorded for the years since 1993. The accident levels are discussed in Section 6.4.

Statistics are also available regarding the fines issued, see section 6.5, and information about the enforcement effort is available in some cases.

5.4. Differences in safety levels

5.4.1. Seat belt wearing

Table 5.3 presents the available information for seat belt wearing for the countries and region assessed, for all road types.

Overall, the wearing rates for front seat occupants are highest for Portugal, and lowest for Greece (for which observations regarding children are for 1996, seven years earlier than the observation for Portugal).

For rear seat occupants the wearing rates are generally lower; the available observations indicate higher wearing rates for Spain than for Portugal.

Vehicle	Seat belt	Wearing rate assessed (%, year)			
		Greece (4)	Portugal (3)	Spain (2)	Catalonia (1)
Car	Driver seat	50%	91%	70%	n.a.
	Front passenger seat	45%	87%	74%	n.a.
	Rear passenger seat	9%	10%	38%	n.a.
	Children 0-3 years old	9 – 15% (5)	66%	69%	40%
	Children 4-12 years old		33%		

Table 5.3. *Summary of observed seat belt wearing rates for different car occupants*

1 estimates based on urban observations, 2003.
2 estimates based on observations, 2003.
3 PNPR, 2003.
4 ETSC estimates, 2003.
5 estimates based on urban observations, 1996

For Spain, wearing rates are available for front and rear car occupants based upon 6500 interviews with individuals at filling stations in urban and interurban areas realized most recently in 2003 and adding to a series of observations realized in 1995, 1997, 1998 and 2002 (DGT, 2004). The wearing rates are higher for interurban roads (drivers 86%, front seat passengers 89%) compared to urban roads (drivers 60% and front seat passengers 62%), and for women compared to men drivers. The wearing rate for urban areas is approximately 10 percentage points higher than the previous measurement in 2002. The wearing rates for rear seat passengers is just over half the wearing rate of the front seat occupants. The surveys also show the difference in usage rates by different age groups; it is found that 27% of car occupants aged 18 to 24 do not wear seat belts while the percentage for the 45 to 54 age group is less than half this figure (12%). In addition, information was collected about motives for wearing / not wearing seat belts. SARTRE 3 responses (Figure 5.1) suggest a greater difference between urban and interurban wear rates than those observed and stated earlier in the paragraph.

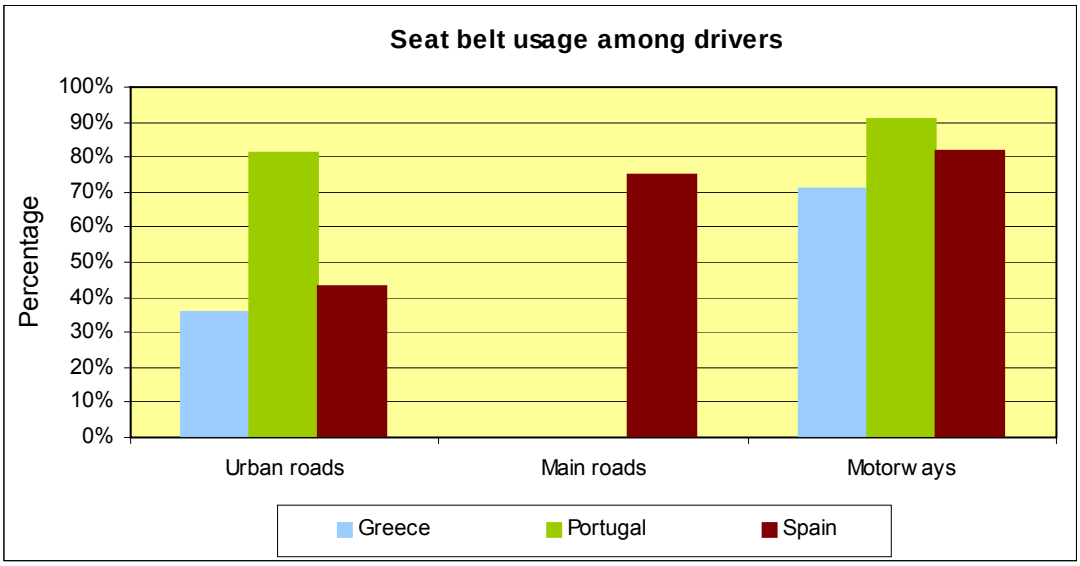


Figure 5.1. *Stated seat belt usage among drivers in Greece, Portugal and Spain (SARTRE 3).*

Greece was not among the participants for which IRTAD published wearing rates in 2002. However, the results of the SARTRE3 survey show that declared wearing rates for urban roads are around 35% compared to just 15% recorded in the SARTRE2 survey realized in 1996. Better results are also obtained for interurban roads and motorways, with the latter showing an increase from a declared compliance of 58% in 1996 to 70% in 2002. SARTRE2 also yielded findings on drivers' attitude towards seat belt wearing. It is interesting to note that a 93% of Greek drivers investigated recognized that "in most accidents seat belts reduce the risk of serious injury for drivers and passengers", while only 38% admitted feeling less comfortable when not wearing their seat belt ("as though something is missing"). The latter statement was adopted by an increased 51% in SARTRE 3.

5.4.2. Child restraint systems

In Greece, the Center for Research and Prevention of Injuries Among the Young (CEREPRI) organized a population based case-control study. The cases were 129 children aged 0-11 years injured as car passengers in a motor vehicle accident during 1996. The total population was divided in two sub-groups, based on age: 0-4 years and 5-11 years. The findings were striking:

- Among 10 children aged 0-4 seated at the front, no one was restrained, while among 41 seated back only 5 were restrained

- Among 78 children aged 5-11 (16 seated at the front and 62 back) no one was restrained**

Similar findings were yielded by a random inspection survey undertook in the same year by CEREPRI–in collaboration with the road traffic police department- a random inspection survey on the use of seat belts or child restraints among passenger car occupants in the Athens area. Within a period of 40 days, one interviewer and a policeman randomly stopped 1400 cars –excluding taxis– at 20 sites. A total of 191 children aged 0-11 years were identified. A similar grouping to the one mentioned above, yielded the following:

- Among 6 children aged 0-4 seated at the front, 1 was restrained, whereas from 55 seated in the back of the vehicle 16 were restrained

- Among 130 children aged 5-11 (2 seated at the front and 128 back) no one was restrained.

The study in which these two tasks were described concluded that 91% of children transported in passenger cars in Greece travel without proper use of car restraints. Even when consideration was restricted to children less than 5 years old, the percentage of non-use amounted to 72%. Interestingly, this is not translated into high childhood mortality.

In 2003, the Portuguese Association for Child Safety Promotion – APSI, has produced a study in 2003 which focused on the observation of child transportation. This study was conducted on several highway toll booths and the results include percentages of use for two children age groups: up to 3 years old and from 4 to 12 years old (APSI, 2002).

Age	1996	1997	1998	1999	2001	2002
0-3	34.4%	40.9%	47.4%	50.5%	63.3%	65.9%
4-12	10.6%	16.9%	19.4%	22.6%	30.0%	32.7%

Table 5.4. *CRS use in Portugal (percentages).*

In Spain, a collaborative study (RACE, DGT, Guardia Civil, 2003) investigated 1011 accidents involving children between March and September of 2002. The study found that only 37% of children in Spain travel with the correct (for age and weight) child protection system, adequately installed. Frontal collisions were the most frequent type of accident, but vehicles overturning were the cause of almost half the fatalities. Less than half of the babies of less than one year were travelling with the correct protection system appropriately fitted, and there is a need for a campaign to educate parents regarding the orientation of the baby seat. The risk of a child dying in a road accident is estimated to increase by a factor of five when the child does not use a child seat. It is interesting to compare the low level of utility of CRS detected by this national study with the SARTRE 3 response (Q16) which points to a level of CRS use for Spain of about 70%.

In Catalonia, the level of usage of seat belts is not monitored, but efforts have recently been made to survey usage of Child Restraint Systems (CRS). In 2003 SCT carried out a study in collaboration with the company PLAY S.A. Surveys comprised telephone-based interviews with 600 households and (18,120) on-street observations plus additional (unquantified) surveys. The main findings of the street observations were:

- 6 out of 10 youngsters (59.7%) travel without CRS in urban areas.
- Child seats are the most-used device (72.6% of used devices, compared with 15.6% for seat raisers and 11.8% baby carriers)
- The use of CRS decreases with more children occupying the vehicle

The main findings of the telephone and self-completion surveys were:

- 56% of respondents stated that they used a CRS for persons under 12 years of age (67% use a CRS with at least one child)
- 4.1% of responding families have never used a CRS
- Almost all children under 2 years are stated to use CRS, and 8 out of 10 children aged 2 to 5 years use CRS, but the level of use drops to near zero for children over 10 years of age
- 51% of those stating that they do not use a CRS justify the fact that the child has grown and the device is too small.

5.4.3. Seat belt use casualties

In Figure 5.2 and Figure 5.3, time series data for seat belt use in accidents by seat occupant are presented, first comparing car drivers, then comparing front and rear

seat passengers (cars). The usage rate recorded for car drivers is highest for Portugal (over 90%) is similar for Spain and Catalonia (around 80%) and is lowest for Greece (just over 40%).

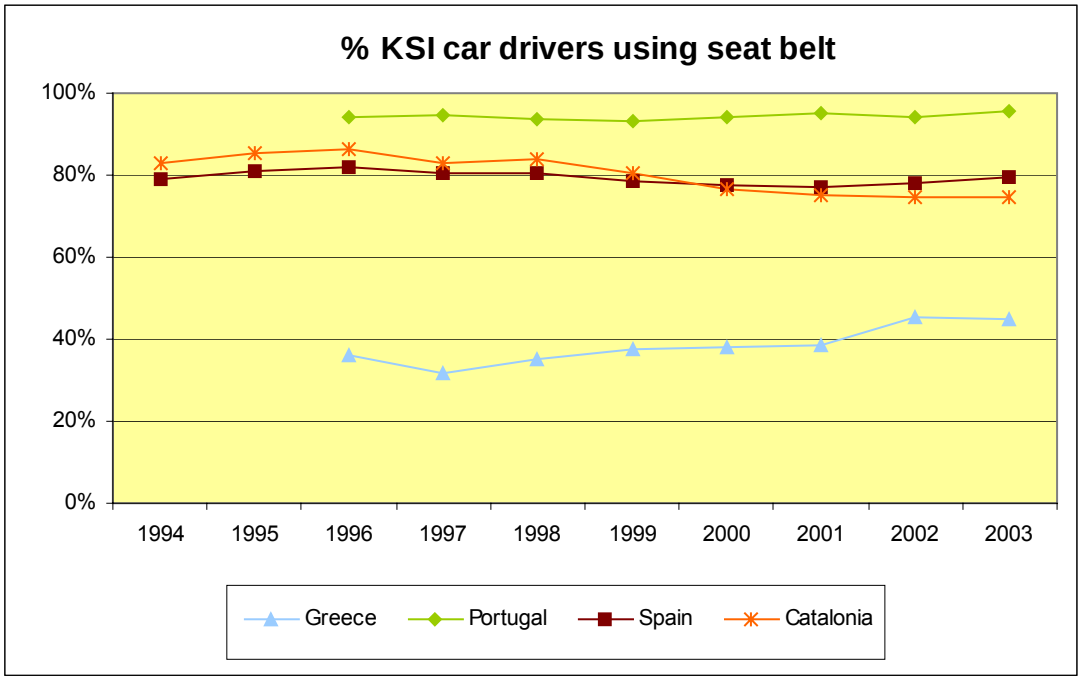
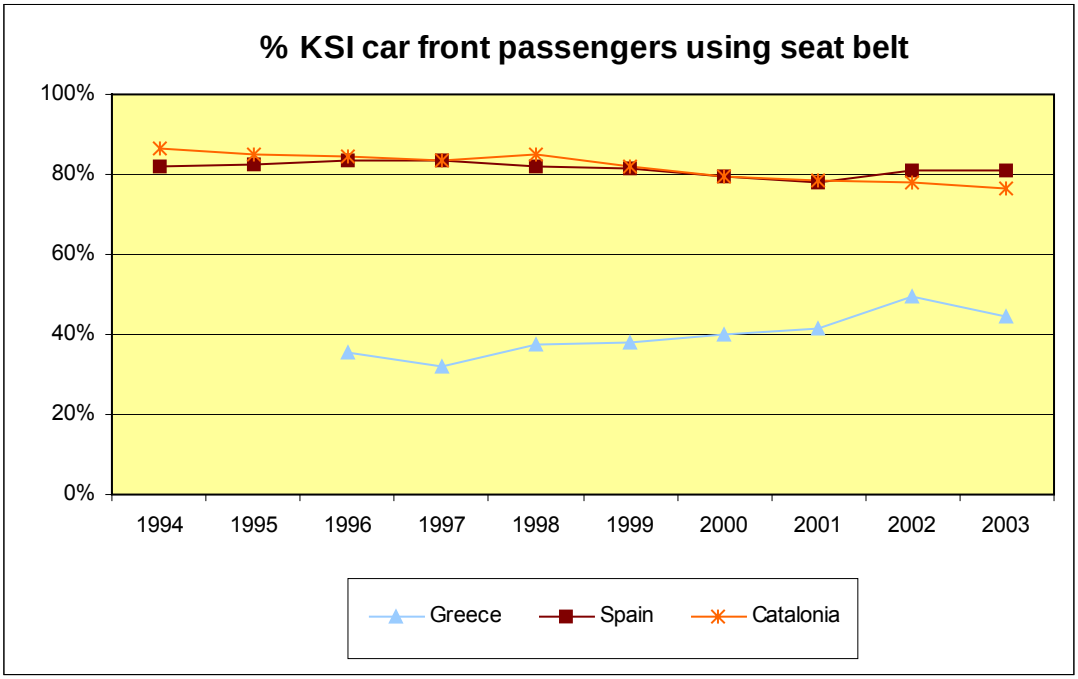


Figure 5.2. *Seat belt use among KSI car drivers in Greece, Portugal, Spain and Catalonia.*



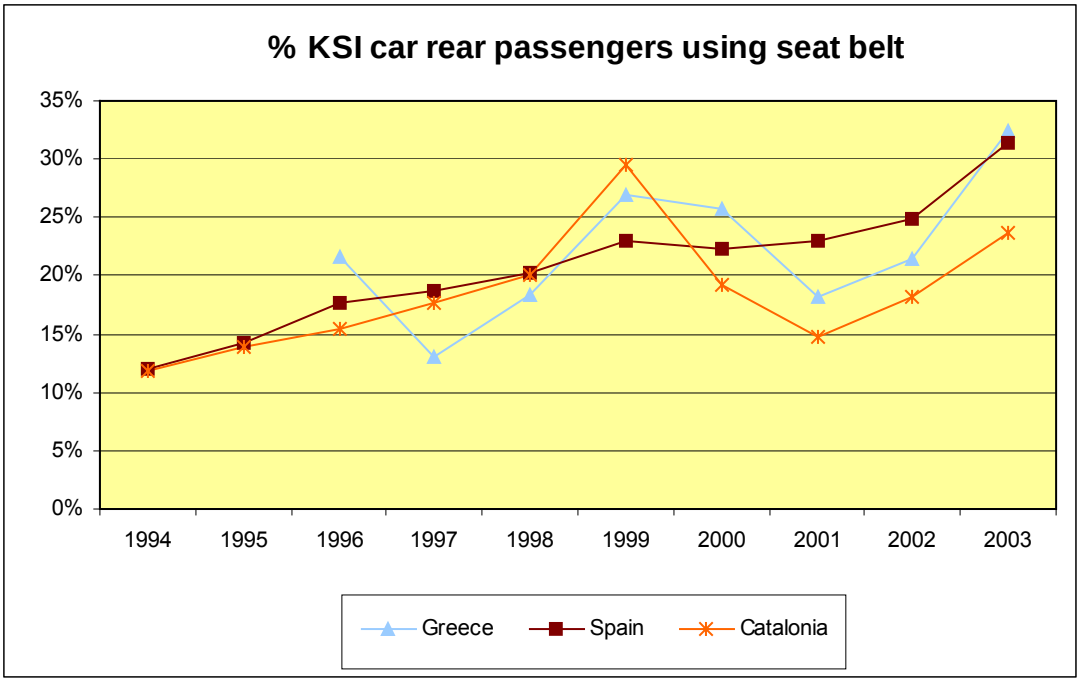


Figure 5.3. *Seat belt use among front and back KSI car passengers in Greece, Spain and Catalonia.*

In Greece, the usage of seat belts by both car drivers and front seat passengers exhibits an increase from about 30% in 1997 to more than 40% in 2003. Though this is a significant improvement, it is obvious that the situation is bad. As far as back seat occupants are concerned, the proportion of usage has also increased encouragingly from 20% to 32%, after some fluctuations around 25%. It is noted that information on seat belt usage is not available in almost 35% of cases for front seat occupants and for 45% of cases for back seat occupants.

In Portugal, the use of seat belts by drivers in fatal and serious injury accidents has remained constantly high since the late 1990s. Mention must be made to the fact that the percentage of fatal and serious injury victims without information on seat belt use is very low: about 2%. Therefore, it is possible to conclude that the presented values are reliable. It is not possible to present information on the use of seat belts by front and back seat passengers, since the database does not support this kind of disaggregated query.

For Greece, Spain and Catalonia, the recorded seat belt usage rate and front seat passengers show similar patterns to the rates for drivers presented in Figure 5.2.

By contrast, the usage rate of seat belts by killed or seriously injured rear seat occupants (for Greece, Spain and Catalonia) is lower. The data for Greece and Catalonia (smaller populations) shows more variation than that for Spain, and there is a general gradual increase from around 15 to 20% in 1996 to a present level of 25 to 30% (2003).

5.4.4. The use of Child Restraint Systems

In the following, evidence is presented on the use of Child Restraint Systems in accidents with casualties in Greece between 1999 and 2003.

It is noted that the (%) of non-use has been calculated based on the sample of casualties for which information is available. This seems to be more realistic. In addition to that, the fraction of non-use implies that users include seat belt as well as child seat. The picture obtained given the results of the data process is not satisfactory. It is obvious that most children travel without proper use of restraint means.

Age (years)	Persons injured	Persons injured (no information)	Persons injured (avail. Information)	NOT using Child Restraint System	% of non-use
0	38	13	25	14	56
1	96	46	50	20	40
2	166	74	92	44	48
3	159	100	59	32	54
4	172	79	93	48	52
5	197	116	81	42	52
6	191	92	99	59	60
7	180	101	79	43	54
8	214	103	111	64	58
9	219	98	121	77	64
10	219	115	104	66	63
11	210	88	122	81	66
12	203	102	101	63	62

Table 5.5. *Non-use of CRS in injury accidents by age of child, Greece 1999-2003*

The graphic reporting the use of CRS in Portugal presents annual averages for the period 2000 to 2003. Only a small fraction of victims were reported as using CRS (10% of killed, 4.4% of seriously injured; 5.4% of slightly injured). These values may be justified by the large percentage of bulletins without any information about the CRS use. The average percentage between 2000 and 2003 for bulletins without information is 84%, which makes the presented values not trustable. The table concerning the non-use of CRS in personal injury accidents, organized by child age refers to the year of 2003. As injured persons, all victims are considered (killed, seriously injured and slightly injured). In other words, non-use rates are very low, not because these devices are used in a large scale, but because there are many accidents in which no information about CRS is registered.

Age (years)	Persons injured	NOT using Child Restraint System	% of non-use
<=1	124	17	14
2	84	12	14
3	91	14	15
4	98	9	9
5	111	8	7
6	116	6	5
7	117	4	3
8	119	3	3
9	116	2	2
10	131	1	1
11	117	1	1
12	126	0	0

Table 5.6. *Non-use of CRS in injury accidents by age of child, Portugal 2000-2003.*

For Spain, data is available to examine the usage rates of CRS and seat belts by youngsters. It is worth noting that, for the period 1999 to 2003, for all years (up to 12 years of age) the number of cases with no data recorded is just under 25%, and the overall non-usage rate of victims is 51%.

Age (years)	Persons injured	Persons injured (no information)	Persons injured (avail. Information)	NOT using Child Restraint System	% of non-use
0	242	66	176	52	30
1	1505	308	1197	428	36
2	1108	222	886	385	43
3	1118	267	851	412	48
4	1170	297	873	510	58
5	1198	280	918	494	54
6	1251	317	934	530	57
7	1349	317	1032	595	58
8	1253	344	909	529	58
9	1273	307	966	511	53
10	1443	359	1084	589	54
11	1330	306	1024	522	51
12	1495	348	1147	534	47

Table 5.7. *Non-use of CRS in injury accidents by age of child, Spain 1999-2003*

For Catalonia, for the period 1999 to 2003, for all years (up to 12) the number of cases no data is recorded is 26%, and the overall non-usage rate of victims is 48%.

Age (years)	Persons injured	Persons injured (no information)	Persons injured (avail. Information)	NOT using Child Restraint System	% of non-use
0	8	1	7	4	57
1	230	56	174	51	29
2	169	36	133	48	36
3	163	44	119	58	49
4	157	44	113	56	50
5	180	47	133	70	53
6	179	48	131	67	51
7	192	49	143	81	57
8	171	50	121	69	57
9	193	50	143	77	54
10	235	66	169	91	54
11	190	49	141	65	46
12	187	53	134	61	46

Table 5.8. *Non-use of CRS in injury accidents by age of child, Catalonia 1999-2003*

The information about usage of child restraint systems in accidents is presented in summary form in Figure 5.4.

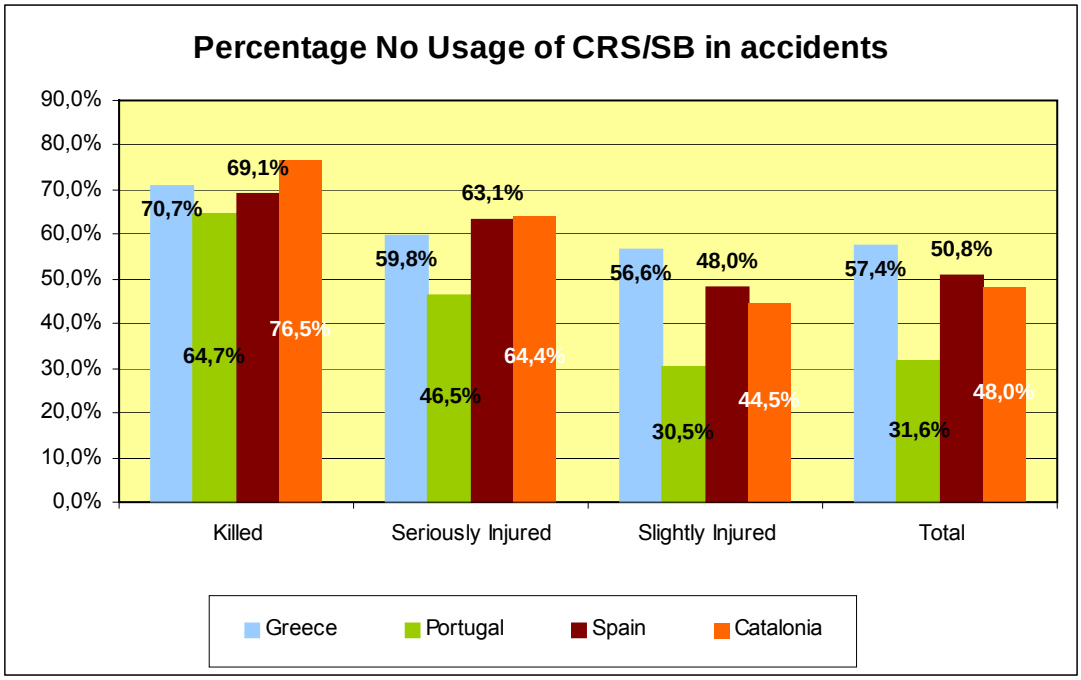


Figure 5.4. *% No Usage of CRS neither Seat Belt in accidents in Greece, Portugal, Spain and Catalonia.*

Overall, somewhere between two-thirds and three-quarters of children that are killed were not wearing the appropriate protective device. For Portugal, the small number of cases for which information is available (19%) must be taken into account.

Comparing the data for Spain and Catalonia (where 76% and 74% of accidents record the usage) with that for Greece (52% of cases recording usage), it is possible that the small variation in results by severity for Greece may be attributable to a lower recording of usage for less severe accidents.

5.5. Interventions to reduce the risk

5.5.1. Sanction systems

The fine corresponding to not wearing a seat belt in Greece is 155 Eur (fixed–fee fine). As a simplified procedure, fines can be paid on the spot. In that case, a fine is reduced by 50%. Beyond the administrative part, penal sanctions can be imposed if a case reaches the court. This can happen if the fine is not paid. There is a sole judge system handling such cases, while judgements are delivered on the day of the hearing. There are no special entities to apply sanctions. Instead, in every Court of Peace there is a distinct division for traffic offences. Prescription time for seat belt offences (automatic closing of the dossiers) is 1 year currently. In terms of responsibility for wearing a seat belt, each offender is considered responsible Specifically for children not older than 12 years old, both parents and the driver may be responsible for the use of safety equipment. Practically, the person having the child's custody by the time of the infringement is regarded responsible. As for the liability for paying the fine, it is attributed to the offender (driver or passenger, if he/she is an adult). Still, it is not clear who is charged in cases of children as offenders. Additionally, if a driver is regarded not to have taken care of the passengers safety (i.e. fastening their seat belt), he/she is charged with a fine of 60 Eur –according to Article 33 of Road Traffic Code (RTC). Moreover, the driver of a vehicle not equipped with all seat belts prescribed by RTC, is charged with a 150 Eur fine according to Article 81.

The fine for not using a seat belt in Portugal varies between 120€ and 600 €. This also applies for the wrong use of these devices. This penalty is considered a slight infraction (level 1). Children transportation without an appropriate child restraint system is also sanctioned with the same fine. This penalty is considered as serious offense (level 2). If a driver is sanctioned with more than three level two penalties in less than five years, or more than five level two or three penalties in less than five years, the court may decide to suspend the driver's license for a period of five years. After that period, the driver must do a new driving exam. If a driver changes the characteristics of a vehicle, namely the seat belts, removing them or changing its functionality, a fine varying between from 250€ and 1250€ may be applied. However, in Portugal, some very old cars, that are still circulating, do not have seat belts. This situation is not punished, since the lack of seat belts is a characteristic of origin.

The fine for not using a seat belt in Spain and Catalonia is the same, and is up to 91 Eur per offence, with the penalty notice being issued to the person found not wearing the seat belt (or the driver in the case of child restraint system infringements). A driver of a vehicle who is found circulating without seat belts installed is also liable to a fine (currently ranging from 94 to 150 Eur.).

Currently, there is no points-based licence in operation. When the points-based licence (planned for mid-2005) the proposal is that the non-compliance with belt use incurs a penalty of 2 points (of the total credit of 12 for experienced drivers, 8 for novice drivers).

	Greece	Portugal	Spain & Catalonia
Fine for non-wearing of seat belt, Eur.	155	120 – 600	Up to 91
Driving vehicle not equipped with seat belts, Eur.	150	250-1250	94 – 150

Table 5.9. *Summary of fines relating to seat belts.*

5.5.2. Enforcement

The following table summarises fundamental road traffic information for the South countries and Autonomous region related to the number of seat belt use violations recorded since 1998.

Greece	1998	1999	2000	2001	2002	2003
Accidents with casualties	24,819	24,231	23,127	19,710	16,852	15,751
Deaths	2,182	2,116	2,088	1,895	1,654	1,605
Vehicles (*1000)	4,323	4,690	5,061	5,390	5,741	5,968
Seat belt use infringements	n.a.	60,186	63,061	98,486	171,037	188,927
CRS use infringements	n.a.	97	234	444	n.a.	710
Portugal	1998	1999	2000	2001	2002	2003
Accidents with casualties	49,319	47,966	44,159	42,521	42,219	41,495
Deaths	1,865	1,750	1,629	1,466	1,469	1,356
Vehicles (*1000)	4,208 (1)	4,508 (1)	5,340	5,507	5,593	5,721
Seat belt use infringements	50,906	53,042	49,757	51,747	80,553	79,846
CRS use infringements	n.a.	n.a	n.a	n.a	n.a	n.a
Spain (2)	1998	1999	2000	2001	2002	2003
Accidents with casualties	97,570	97,811	101,729	100,393	98,433	99,987
Deaths	5,957	5,738	5,776	5,517	5,347	5,399
Vehicles (*1000)	21,306	22,411	23,284	24,250	25,066	25,000
Seat belt use infringements	174,000	191,000	186,000	181,000	165,120	177,702
CRS use infringements	n.a.	n.a	n.a	n.a	n.a	n.a
Catalonia	1998	1999	2000	2001	2002	2003
Accidents with casualties	33,212	32,987	33,762	33,297	31,249	20,618
Deaths	950	917	778	710	812	767
Vehicles (*1000)			4,000	4,400	4,534	4,545
Seat belt use infringements	n.a.	n.a.	n.a.	31,558	29,324	28,358
CRS use infringements	n.a.	n.a.	n.a.	n.a	n.a	n.a

Table 5.10. *Number of sanctions by year for non-wearing of seat belts and CRS*

1 without motorcycles.

2 data is for fines issued directly by the Agrupación General de Tráfico and corresponds to interurban roads, plus local roads, excluding the autonomous regions of Catalonia and the Basque Country.

Concerning enforcement efforts by the Greek police there has been a notable increase in the number of penalty notices issued. As it was stated in other case studies as well, it is not possible to have some idea of total checks realized. No data can be collected in terms of manhours allocated by the Road Traffic Police to seat belt use checking or some other similar index.

For Portugal the number of seat belt infringements has increased from 1998 to 2002 and stabilized on 80000. This number must be correlated with the increased number of vehicles and the greater police enforcement.

For Spain, it could be construed that the number of sanctions has increased only slighty (2%) in the period 1998-2003, but account must be taken of the transfer of competencies to the autonomous region of Catalonia in 2001; incorporating the data for Catalonia, the increase is 18% and the number of sanctions issued is around 200,000.

For Catalonia, around 30,000 controls are realized in the years since police powers were transferred to the Autonomous regional government.

5.5.3. Publicity campaigns

In Greece, quite a few publicity campaigns have been carried out regarding the promotion of seat belt use. An example of such an event exclusively aimed at seat belts is the 1998 nation-wide advertising campaign for seat belt use, under the name “Seat belt binds us to life”. This was followed by more frequent campaigns of a more general nature, dealing among other things with seat belt use, as one of the major factors related to road safety. In this framework, two successive nation-wide road safety advertising campaigns have been organized lately:

- “On the way 2001-2005” in 2001,

- “How do you drive?” in 2003.

In Portugal, several publicity campaigns have been made since 1979:

- Campaign to stress the mandatory character of the seat belt use - 1979

- Campaigns to remind the use of seat belts – 1985, 1990, 1991, 1996, 2001 and 2003.

For Spain, campaigns to promote the wearing of seat belts have been realized since 1975. In conjunction with the introduction of the law obliging seat belt use of interurban roads, a campaign was realized promoting their use of urban roads as well. Between 1989 and 2003 some 13 seat belt campaigns have been realized. Initially informative, the content changed in 1992 in line with the objective of portraying more realism with content showing the consequences of not wearing a seat belt, especially in rear seats. The campaign in 2003 was “Abrochate el cinturón, abrochate a la vida” (fasten your belt, fasten your life). Concerning the use of child retention systems targeted campaigns were realized in 1999 and 2003.

For Catalonia, the most recent publicity campaign dedicated to seat belt use ("al cotxe, tots amb cinturó – in the car, everyone seat-belted") was realized in 2003.

It is not possible to reliable compare the quality and wideness of the campaigns related to the introduction of safety belts obligation, since there is no data on their use in the period after their introduction. Campaigns are considered to be most effective when used in conjunction with enforcement to persuade vehicle occupants to activate the protection systems.

5.6. Explanation of differences and/or similarities between the countries

The general pattern of lower seat belt usage in urban areas (compared to interurban) and rear seat occupants (compared to front seat) is seen for the three countries. Observations and reported wearing levels generally match with recorded usage in accidents for Spain, Greece, and Portugal (no accident data for rear seat occupants)

The trends in the rate of seat belt usage by KSI drivers are remarkably constant over the last ten years, but with a marked difference between the highest level for Portugal (over 90% in 2003) and the lowest level for Greece (still under 50% in 2003), with Spain and Catalonia around 80%, see Figure 5.2.

The low level of usage by Greek drivers in accidents is not easily explained since the fines in Greece are higher than in the other countries, campaigns have similarly been carried out, and the number of sanctions issued has been increased. Similarly, it is not easy to explain why the level of seat belt usage by Portuguese drivers is so high – but Portugal appears to be the only country to have linked repeated sanctions of non-use with driver licence suspension (further investigation would be required to determine if this deterrence is real, i.e: if a significant number of drivers have received a suspension for this motive).

The trends in front seat usage recorded by accident data are generally positive, except for Catalonia where the rate for front seat passengers shows a slight decline (just under 80% in 2003, from a peak level of 88% in 1996, the highest level for front seat passengers in any year). Spain, Greece and Catalonia have managed to improve the rates of belt usage by rear seat occupants over the most recent years – but the levels are still low (25 to 30%).

Overall, seat belt enforcement efforts have been increased (Greece and Portugal) or at least maintained (Spain and Catalonia), and this appears to be complementary to the progressively greater legal obligations.

5.7. Conclusions and country specific recommendations

The greatest opportunity for saving lives appears to concern measures to improve the low level of seat belt usage by Greek drivers. It is generally the case that a driver sets the mode of conduct for the vehicle, and authorities have to ensure that driver seat belt usage exceeds at least 80%. Estimates presented in this report suggest that over 500 lives could be saved in Greece if seat belts were worn at the rate of

the SUN countries. It is possible that the poor comparative performance of Greek drivers revealed by this study could form part of the new national initiative appealing to Greek pride. The Portuguese approach of linking repeat offenders with a suspension of the driving licence would be a way of increasing the sanction deterrent (and possibly reducing reliance on the courts…).

The levels of driver belt usage in Portugal are impeccable – but there is little information available to measure the compliance level of the remainder of the vehicle occupants. What information is available suggests that the levels of usage by rear occupants and children are at least as low as the other countries – possibly worse. In this sense it is recommended that the information system for recording seat belt usage in Portugal is upgraded, and that the police reporting level for drivers is achieved for the other car occupants.

It is possible that the continued and detailed (urban / interurban, male / female by age category) monitoring of seat belt usage in Spain has helped to target and reduce non-usage for certain users. The identification of males in general, and younger people (aged 18 to 24), and users of urban roads as the segments of the population who do not comply with seat belt law should be new targets for police action.

Overall, it is estimated that somewhere between two-thirds and three-quarters of children in the Southern countries and region that are killed were not wearing the appropriate protective device. It is evident that the administrations have been making efforts to obtain information about this problem, but further efforts are required to ensure more complete recording (both of usage levels and numbers of sanctions). It is possible that parents experience difficulties in ensuring that a growing child is continually well-protected (moving from the baby seat to a seat-belt), and attention should be given to analysis of usage rates of children by year once the data recording is improved.

The usage rates show that there is still room for improvement with regard to rear seat and child restraint systems. A positive step in this respect (for all countries) would be to discriminatorily record how many sanction notices are issued to rear seat occupants and to those responsible for children not wearing protective devices.

It is not currently known what contribution the car stock makes to seat belt protection. On the one hand, it is of interest to know how many vehicles are roadworthy that are from before 1992 when seat belt legislation came into force, or from 1994 when it was compulsory for rear seat belts to be installed. On the other hand, an increasing number of car models are fitted with audible signals that make it difficult for the driver to avoid belting up; authorities should be aware of the contribution that improved vehicles are making.

6. Young drivers

6.1. Introduction

Traffic accidents with young car drivers have several common characeristics. In a traffic accident with young drivers there are usually more dead and severly injured participants of the same age group. Young people tend to devote more time going to social gatherings. They tend to travel together and the presence of friends can have a larger influence on the behaviour of the driver. Besides, young drivers still lack the necessary driving experiences and their vehicles tend to be older and less safe.

There does not appear, currently, to be a general agreement regarding the definition of “novice drivers”. In Spain, a novice driver is one holding a driving licence (for cars) for less than 1 year (or 2 years for alcohol limit). In Greece, the definition applies to drivers who have been holding their driving licence for less than 2 years. In both countries, the limits of alcohol are set lower for young drivers than for the rest of the drivers (see chapter 4 Drink-driving case study).

6.2. Extent of the problem

According to the existing database for Greece, during 2001 drivers holding a licence for less than three (3) years accounted for 22.7% of all passenger car drivers involved in accidents. The respective proportion for those holding a licence for less than six (6) years was 35.6%. It is interesting to observe that these values were found to be rather higher among two-wheeler drivers, namely 39.2% and 56.6%. This may be perceived as an indication that experience is a very crucial factor in motorcycle driving (see chapter 9 case study), or also that younger car drivers drive a lot –which does not seem to be the case.

During 2003 the proportion of drivers holding a license for less than 3 years was only 8.6% of all passenger car drivers. These drivers represent 20.7% of all car drivers involved in accidents in Grece this year, indicating a safety problem associated with novice drivers.

Data for Catalonia for 2003, indicates that 10.2% of the drivers have been holding a driving licence for less than 3 years. These drivers are 21.3% of all drivers involved in accidents with victims (SCT, 2004). The relation of these two groups is extremely similar to the respective one for Greece. In Catalonia, drivers aged between 15 and 24 have more than twice the probability of being involved in a fatal accident than drivers aged between 25 and 44. These figures point to the higher risk of those drivers who have limited driving experience.

In Spain for 2003, novice drivers (those with less than 3 years of driving experience) constitute 10.7% of all drivers – 11.4% if one includes licences (principally for mopeds). If we analyse the years of holding a driving permit of those drivers involved in personal injury accidents, the drivers with less than 3 years experience account for 16.7 %.

The index of accident involvement per 1000 licence holders is constant at 5 for drivers of 40 to 60 years of age. This compares with indices of 16 for drivers aged between 18 and 20, and 12 for those aged 21 to 24. The index for those aged 30 to 40 is around 7 accidents per 1000 licence holders.

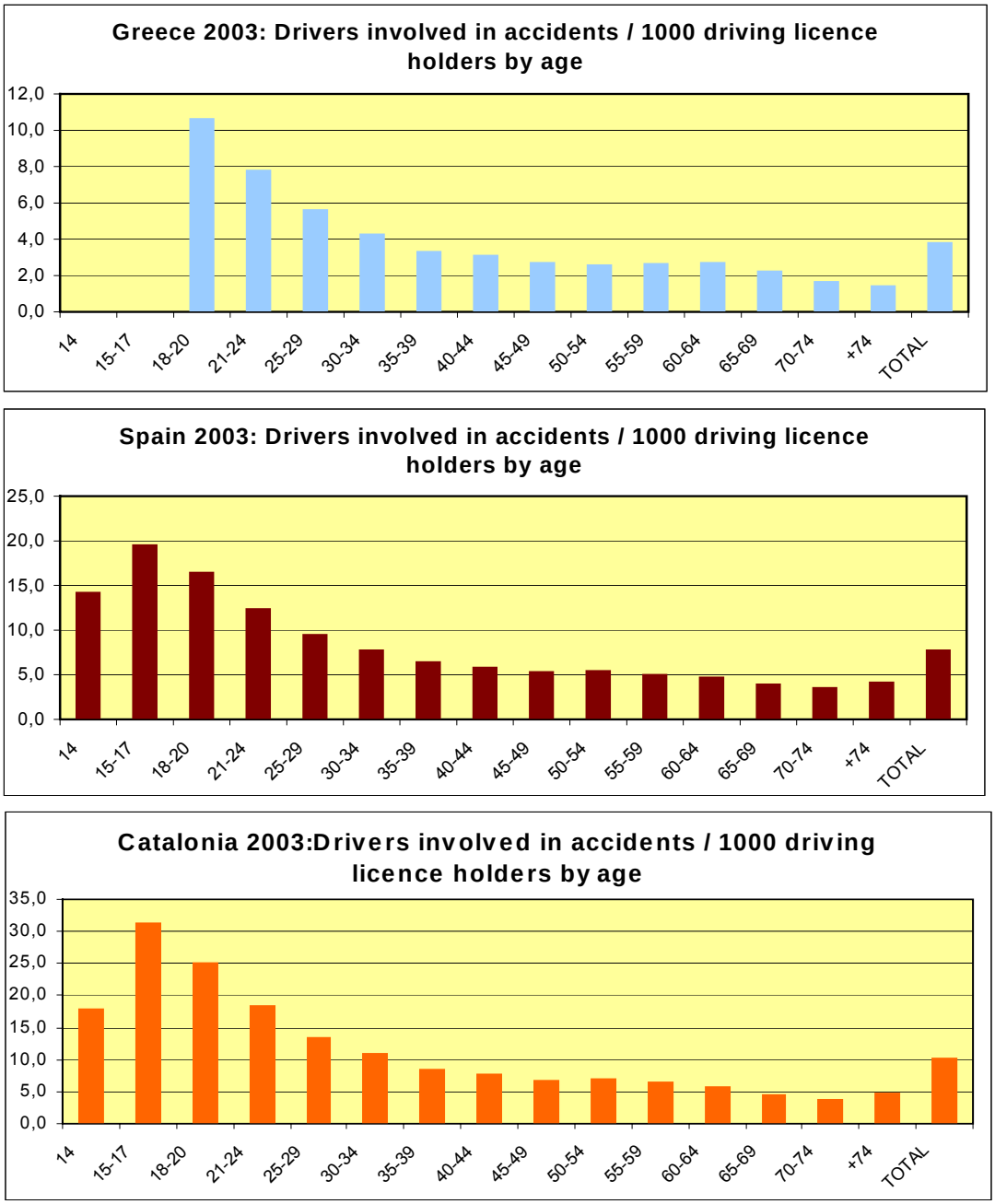


Figure 6.1. *Comparison of drivers involved in accidents / total driving licence holders by age*

Note: Greece 2003 only drivers over 18 years of age.

Figure 6.1 includes all driving licences, including mopeds and motorcycles, and this is the reason why the percentage for 15-17 age group is higher in Catalonia (where more young people drive powered two-wheelers).

For a benchmarking study examining and comparing reduced datasets (i.e. fatalities for a limited number of years) it is useful to consider the lack of driving experience in terms of a larger number of years than those defined by current legislation.

6.2.1. Legislation

In Greece, a novice driver is regarded as one holding a license for less than two years. For this category of drivers the lower blood alcohol limit is reduced compared to the regular one (namely to 0.2 g/l, instead of 0.5 g/l of alcohol in blood). Another differentiation is that insurance fees are notably increased for novice drivers with premiums progressively reducing to a minimum sum for a driver with a ten-year experience without having been responsible for causing any recorded accidents.

For Portugal, the provisional driving license period is three years. If, within this period, the driver is sanctioned with a crime or any penalty that associated with driving interdiction, the temporary character of the driver's license may be extended for a period to be established by a judge. In some cases a new driving exam may be required.

For Spain (and Catalonia), the first law to include special requirements for young drivers was the 1998 Act reducing the alcohol limit from 0.5 to 0.3 g/l for professional drivers and novice drivers (i.e those holding a driving licence for less than 2 years), operative since 1999.

The Road Traffic Act of 2004 is intended to establish the points-based driver licence for Spain (and Catalonia), introduces a lower number of points (8 instead of 12) for drivers who have not held the licence for 3 years. Currently this legislation is being presented to Parliament and the specific details may be modified before its projected introduction (end of 2005).

Legislation relating to the driving of motorized two-wheelers is covered in chapter 9 and 10.

6.2.2. Training programmes

For Greece Portugal, Spain (and Catalonia), the training of all drivers contains separate theory and practice exams. No special requirements are prescribed depending on the age of the candidate.

6.2.3. Trends in licence acquisition

In Greece there is a constantly high number of people acquiring a car driving licence since 1998. The respective figures account for more than 1% of the country's population on an annual basis. Women tend to reach similar numbers to men in this aspect. As it is expected, young people account for the majority of novice drivers. It appears that almost 2/3 of new drivers belong to the age group of 18-24 years. These conclusions are derived from the following table.

In 2004, the total number of passenger car driving holders has reached 4,804,838 (almost 44% of the population). The respective value for Powered Two Wheelers is 956,790 (8.7% of the population).

	1998	1999	2000	2001	2002	2003	2004
Male	75,969	105,689	68,123	70,605	77,712	82,347	80,530
Female	50,333	98,483	64,695	51,045	60,612	66,035	73,995
Total	126,302	204,172	132,818	121,650	138,324	148,382	154,525
18-24	84,364	133,561	83,658	80,739	91,312	96,468	97,472
(%)	66.8%	65.4%	63.0%	66.4%	66.0%	65.0%	63.1%
25-29	17,876	30,420	20,413	17,870	20,473	22,397	24,302
(%)	14.2%	14.9%	15.4%	14.7%	14.8%	15.1%	15.7%
30-59	23,303	39,341	28,098	22,299	25,771	28,758	31,989
(%)	18.5%	19.3%	21.2%	18.3%	18.6%	19.4%	20.7%

Table 6.1. *New car driver license evolution in Greece*

In 2003, there were more than 20 million driving license holders in Spain. Comparing 2003 and 1993, the increase in driver licenses is 28%. In 2003, the proportion of females holding a driving license was 39%, a notably higher proportion than in 1993 (33%). Table 6.2 shows the trend in licence acquisition by new car drivers showing a growth (except for 2001) with highest growth in 2004. Generally the number of licences acquired by women exceeds those of men, except in 2004. Whilst the number of licences acquired by persons aged 18 to 24 is around 425,000, in percentage terms there is drop from 77.3% in 1998 to 56.7% in 2004.

	1998	1999	2000	2001	2002	2003	2004
Male	267,707	277,915	277,380	265,510	291,550	313,414	395,077
Female	287,611	298,906	306,196	282,089	315,060	333,509	354,781
Total	555,318	576,821	583,576	547,599	606,610	646,293	749,858
18-24	429,128	437,216	433,222	400,605	420,061	426,362	425,351
(%)	77.3%	75.8%	74.2%	73.2%	69.2%	65.9%	56.7%
25-29	63,253	69,362	72,803	71,955	86,180	97,648	121,823
(%)	11.4%	12.0%	12.5%	13.1%	14.2%	15.1%	16.2%
30-59	61,215	68,062	75,107	72,423	96,907	119,046	197,219
(%)	11.0%	11.8%	12.9%	13.2%	16.0%	18.4%	26.3%

Table 6.2. *New car driver license evolution in Spain*

Table 6.3 shows that the overall the growth in car licence acquisition in Catalonia from 1998 to 2003 is 9.5%. This is less than the national average.

	1999	2000	2001	2002	2003	2004
New license	80,177	79,264	75,201	82,266	87,764	

Table 6.3. *New Car driver license evolution in Catalonia*

6.3. Availability, quality and comparability of data

Tha focus of the analysis is the examination of fatalities occurring in car accidents with drivers of different age groups. The source of data is the police records of accidents.

The proposal made by the SUN group is to compare accident data controlling for exposure, with exposure being defined as the kilometrage per year of the age groups involved. This is not possible for the Southern countries and region due to a lack of information about mobility.

In order to allow for exposure, the analysis for the Southern countries and autonomous region is made using the population of the respective age group. Further to discussions at the Barcelona meeting, where alternative definitions of age groups were considered, the initial analysis is to be made as follows:

$$\text{Relative index} = \frac{\dfrac{\text{Number of fatal accidents involving car drivers younger than 25 years of age}}{\text{Number of persons younger than 25 years of age in the population}}}{\dfrac{\text{Number of fatal accidents involving car drivers of 30-59 years of age}}{\text{Number of persons of 30-59 years of age in the population}}}$$

Wherever possible, the analysis is realized for the ten-year period 1993 to 2003.

In some cases, the possibility exists to examine the number of years that drivers have held the driving licence, and this may provide some additional insights although the comparison may not be possible for all countries.

The analysis of car accidents made for Spain does not include ambulances as cars (this fact explains possible differences between the presented results and statistics published elsewhere).

6.4. Differences in safety levels

6.4.1. Safety level differences

Figure 6.2 compare the trends in involvement in fatal accidents of the two age groups comparing Greece, Portugal, Spain and Catalonia. It can be seen that, for the most recent years, the rate of involvement in fatal accidents for the 30 to 59 age group is similar at around 15 per 100,000. For the younger age group, the rate of involvement is between 20 and 30 per 100,000 inhabitants (the trend for Portugal showing a marked decrease from over 40 per 100000 in the late 1990s).

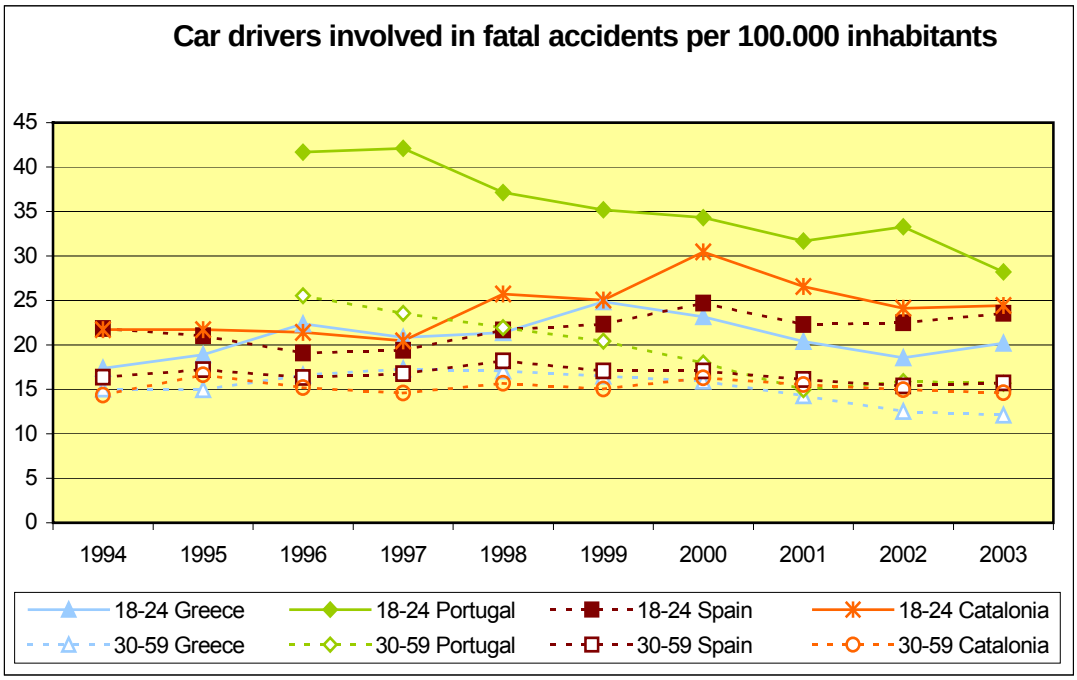


Figure 6.2. *Car drivers involved in fatal accidents per 100,000 inhabitants.*

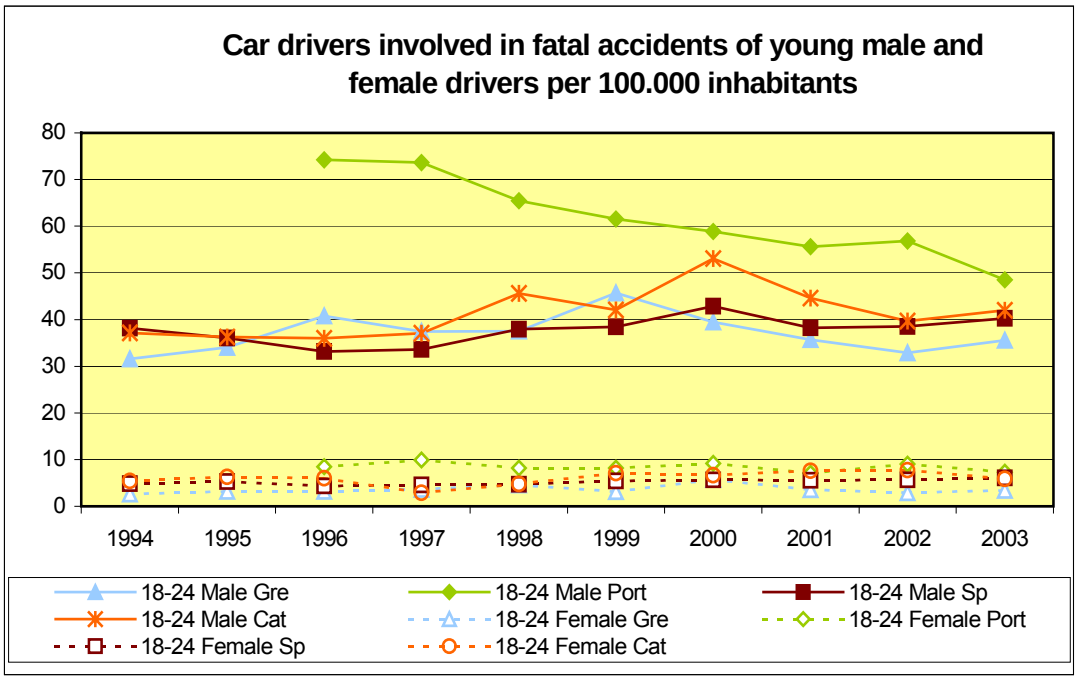


Figure 6.3. *Car drivers involved in fatal accidents by gender per 100,000 inhabitants.*

Figure 6.3 compare the trends in involvement in fatal accidents by gender of the two age groups comparing Greece, Portugal, Spain and Catalonia. It can be seen that the rate of involvement in fatal accidents is much lower for young women with rates below 10 per 100,000 in all cases. For young males, the rate of involvement over recent years is between 35 and 50 per 100,000 inhabitants (the trend for Portugal showing a marked decrease from over 70 per 100,000 in the late 1990s). In

Southern countries, young males are five times more likely to be involved in fatal accidents than young females.

6.4.2. Relative index

Figure 6.4 compares the trends in the relative risk ratio (see section 6.3) comparing Greece, Portugal, Spain and Catalonia. The ratios indicate a broad level of convergence around 1.5 for the most recent years. For Spain, (with the largest population showing the most stable trend), the relative risk ratio shows an increase from around 1.2 in the mid-90s to 1.5 in 2003. Portugal shows the highest relative risk ratio, dropping from a peak of over 2.0 to 1.8 in 2003. The relative risk ratio for Greece has increased to over 1.5 in 2003. Catalonia also shows similar trends to the national Spanish situation, but the relative risk ratio for young drivers has reduced since a peak of over 1.8 in 2000; currently over 1.6, it remains higher than the national average.

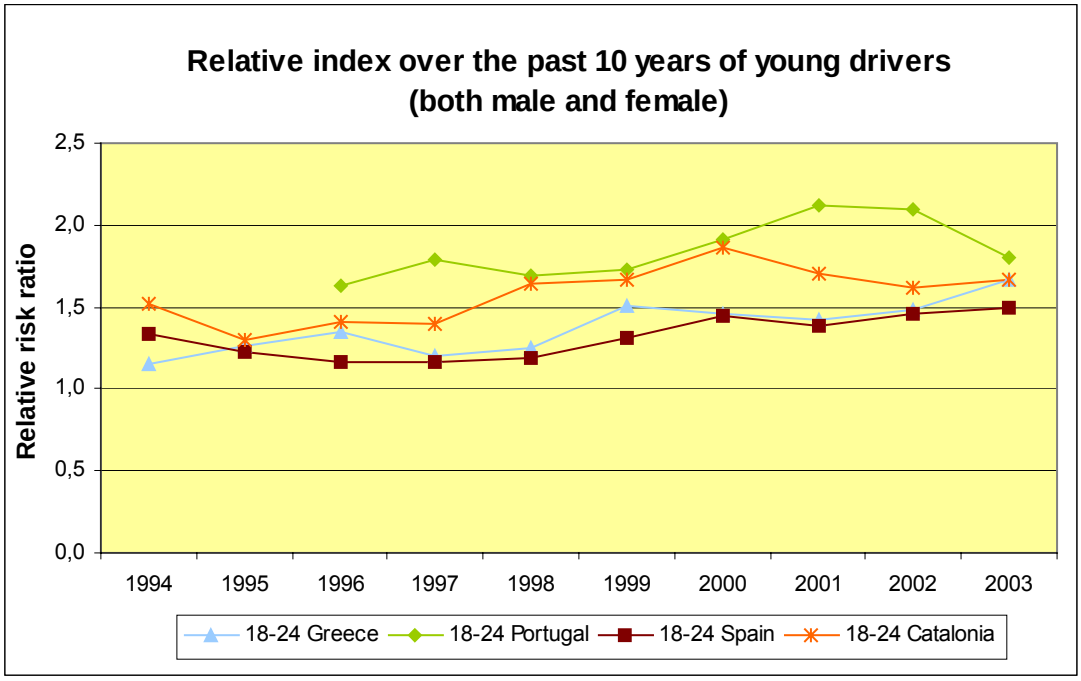


Figure 6.4. *Relative index over past 10 years.*

The relative risk ratios by gender, presented in Figure 6.5, show greater variation within the previously-presented general trends. During the early 1990s, the ratios for female drivers for Spain and, in particular, Catalonia, were higher than for male drivers; in later years, in spite of the increase in the number of women in the driver population, the ratio becomes lower for female drivers.

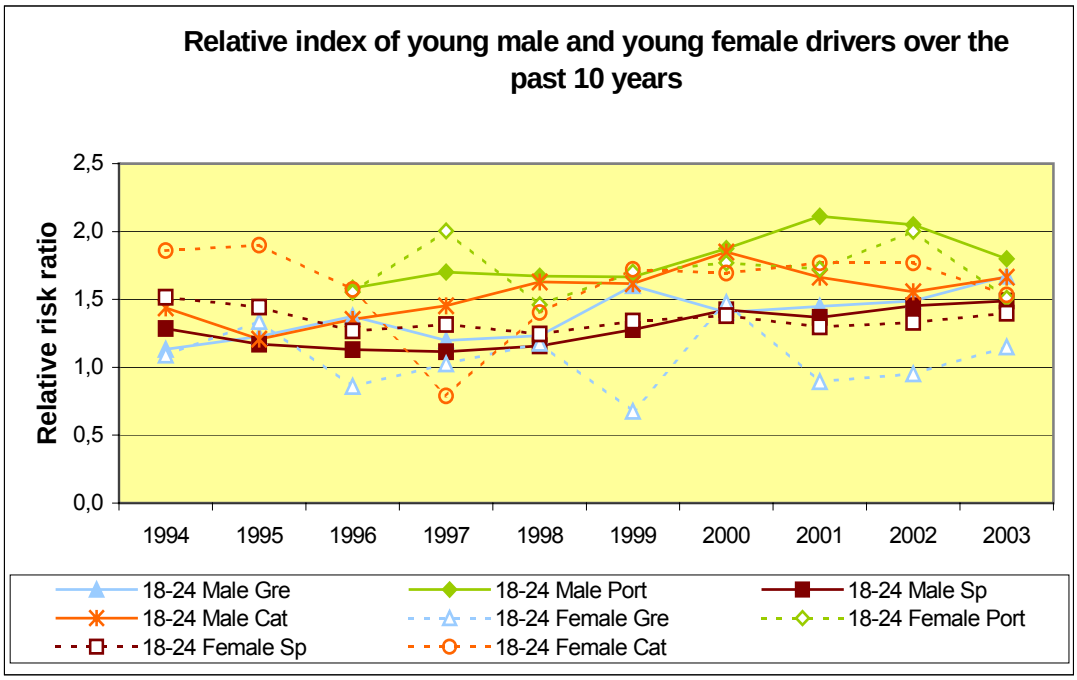


Figure 6.5. *Relative index over past 10 years by gender.*

6.4.3. Types of accidents in which young drivers are over represented

This section examines accident types based upon a recent year of data (2002 or 2003), and considers:

- weekend night accidents
- single vehicle accidents
- accidents with multiple occupancy
- accident involving drink-driving.

In Portugal, some 30% of accidents involving young drivers occur during the weekend and at night, almost double the involvement of the older reference age group. For Spain, the percentage of weekend night accidents involving young drivers is about 23%, some 10 percentage points higher than the involvement of the older age group. In Greece, some 20% of accidents involving young drivers occur at this period (weekend nights). The difference between the two age groups is lowest for weekend night accidents in Catalonia, (19% involving young drivers compared to 15% for the older age group). See *Figure 6.6*.

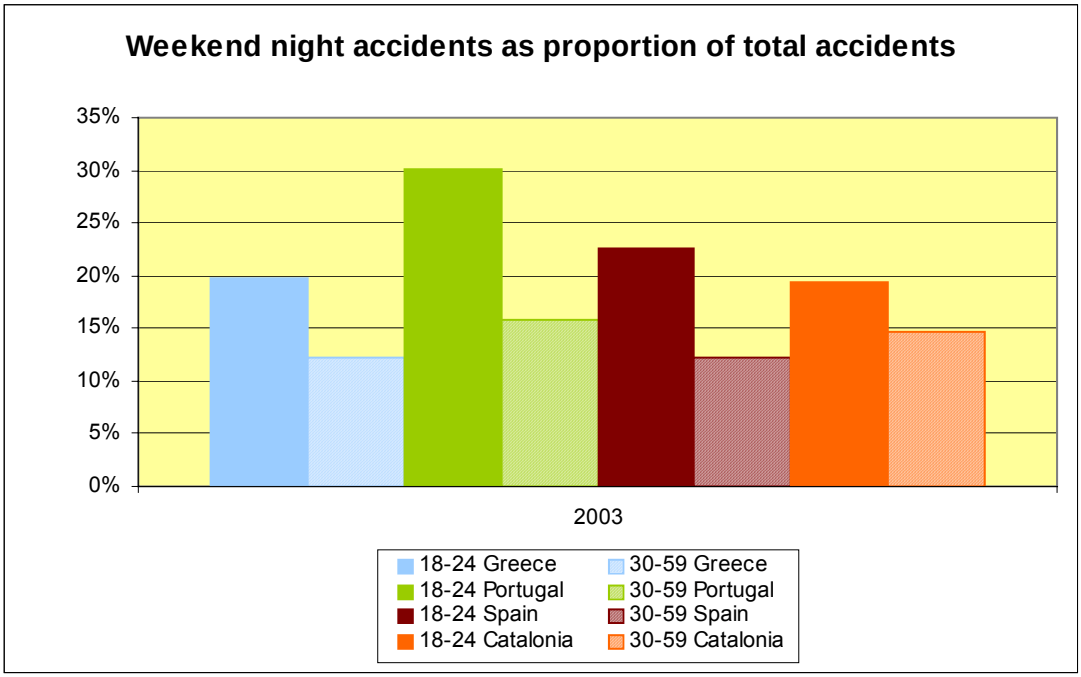


Figure 6.6. *Weekend night accidents as proportion of total accidents.*

Concerning single vehicle accidents (i.e. loss of driver control) the percentage is generally higher for the younger drivers (Figure 6.7). The percentage is highest for young Greek drivers (46%), although the percentage difference between the younger and older drivers is similarly high for Spain (being 38% compared to 26% for more experienced drivers). The difference for this type of accident is less marked for Portugal and Catalonia.

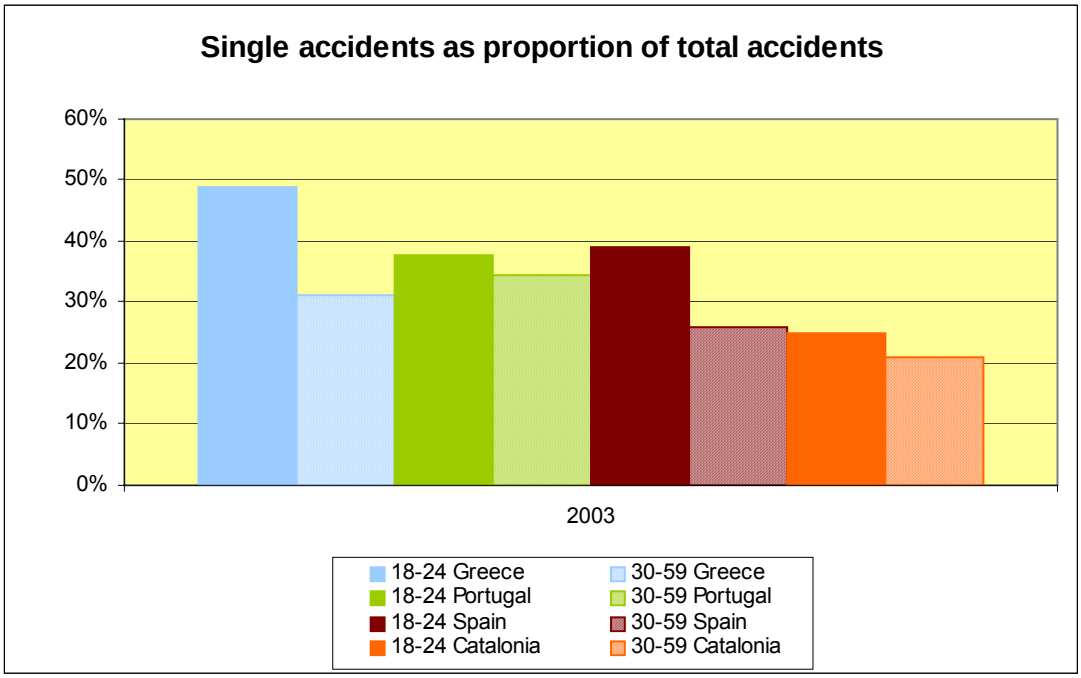


Figure 6.7. *Single vehicle (loss of control) accidents as proportion of total accidents.*

In Spain, passengers (or occupants other than the driver) are present in a higher proportion of accidents involving young drivers (50%) than is the case for more experienced drivers (37%). A slightly higher percentage difference is observed for Catalonia (46% compared to 31%) but with lower overall percentages for this type of accident. For Greece, the percentage difference (10% points) is slightly lower than for Spain, but it is clear that younger drivers are involved in more accidents of this type than the older drivers.

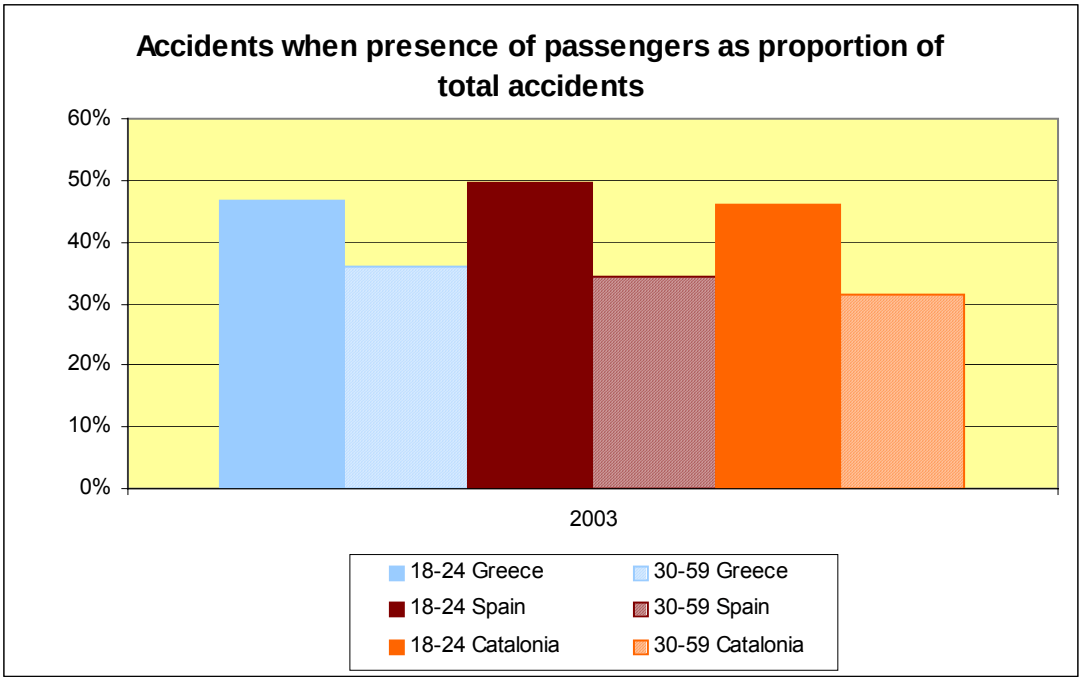


Figure 6.8. *Accidents with multiple-occupancy as proportion of total accidents, Greece, Spain and Catalonia.*

In Greece and Spain, the percentage of accidents with suspicion of drink-driving is similar for young drivers (18-24) as for the older group of drivers (30-59). In Catalonia, the percentage for young drivers is slightly lower. (the percentages for Spain and Catalonia are lower than for Greece for reasons that are explained in chapter 4).

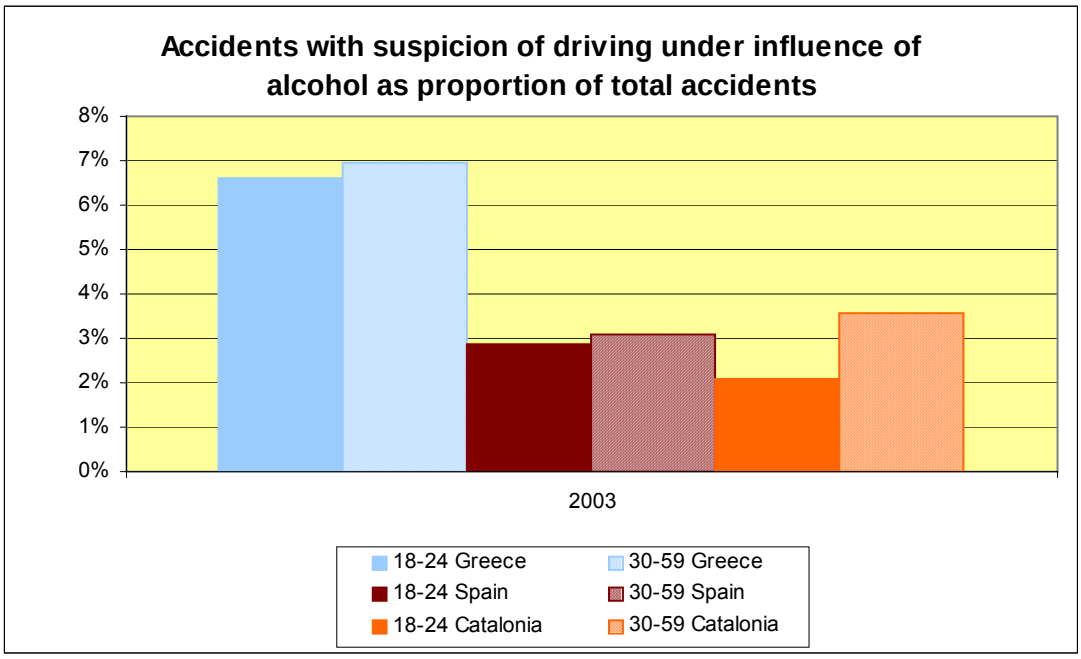


Figure 6.9. *Accidents with suspicion of driving under the influence of alcohol as proportion of total accidents, Greece, Spain and Catalonia.*

6.5. Interventions to reduce the risk

In Europe, Lynam & Twisk (Lynam & Twisk 1995) point to a reduction in collision rate achieved in Denmark following the improvement of training (integrating theory and practice), and the application of a probationary period has shown positive results in Germany (4-6 % collision reduction for males, 0-2% for women). Other research (Mayhew and Simpson, 1996) concludes that community-driver education was not associated with reliable or significant decreases in crash involvement. Other research conducted by the IIHS points to higher risks of young drivers with passengers (Williams, 2001).

Improved training would be one means for reducing the number of single accidents – and the figures suggest that such an intervention could have greatest effect in Greece and Spain. However, other factors such as the relative difficulty of the driving task (the quality of the road network) may also be important.

The points-based driving licence has already been introduced in Greece some years ago. According to the latest revision of December 2002 (effective since 1-1-2003), the threshold for the suspension of a driver's licence remains at 25 points, while the length of the suspension is 6 months in the first instance, and 12 months for repetitions. Regaining the licence requires attending 50% of the minimum courses defined and passing a writing test, as well as a driving test. Specifically for drivers holding a licence for less than 3 years, for each traffic code violation 3 more points are added (apart from the prescribed ones).

The points-based driving licence will be introduced in Spain (including Catalonia) during 2005. This measure is expected to lead to the suspension of any driver's licence if the driver accumulates a deficit of 12 or more points. The length of the

suspension is 6 months in the first instance, and 12 months for repetitions, and is subject to successfully passing a re-training programme. The points-based driving licence is configured to dissuade novice drivers from committing infringements in so far as those drivers holding a licence for less than 3 years are subject to a lower limit of 8 points (above which suspension is invoked).

6.6. Explanation of differences and/or similarities between the countries

In Southern countries, young males are more than five times more likely to be involved in fatal accidents than young females.

The relative risk ratio for all the countries for the most recent years is between 1.5 and 2.0, indicating that this is a common problem, of similar magnitude.

The types of accident in which young drivers of Southern countries are over represented are single accidents (especially Greece and Spain), accidents at weekends (particularly Portugal) and accidents with several passengers present (particularly Catalonia, Spain and Greece). For certain cases, (drink-driving and multiple occupancy accidents) data for Portugal was not available.

In Catalonia, the relative risk ratio for young drivers has reduced since a peak of over 1.8 in 2000 to around 1.6. The reduction coincides with the implementation of the Road Safety Plan 2002-2004; since this plan did not explicitly include any measures orientated to reducing the risk of novice drivers, it is suggested that the improvement may be related to a differential impact of the general improvement of controls on drink-driving (see report in chapter 4), and to the efforts done in education. However, the improvement is not seen for Spain in spite of a corresponding increase in the numbers of alcohol controls at the national level, and the temporal emphasis given to nights and weekends (see Figure 4.5).

In spite of the efforts, for all Southern countries the need to maintain and possibly increase the number of controls at weekends is evident, and if more controls were realized at weekends this would potentially be of greatest benefit in Portugal.

The reduction in accident risk for young male drivers in Portugal is quite striking (Figure 6.3). Further investigation (for example, of driver licences) could help identify factors that have contributed to this improvement; it is likely that several factors have influenced positively the situation (enforcement, training, roads infrastructure, etc.).

The application of lower limits for controlling drink-driving by young people (applied in Greece and Spain) may be one of the factors that explain why the problem of drink-driving is the less noticeable of the particular types of accident in which young driver presence is analysed.

6.7. Conclusions and country specific recommendations

The problem of young drivers is one that affects all the studied Southern countries and regions. The extent of the problem has been quantified in terms of a comparison of the relative accident level per total population for drivers of less than

25 years of age (compared to the 30 to 59 age group). It is a problem particularly associated with the driver behaviour of young males. In terms of accidents per population, it is found that young males are five times more likely to be involved in fatal accidents than young females (up to 25 years of age).

The relative risk ratio for all the countries for the most recent year (2003) is between 1.5 and 2.0, indicating that this is a common problem, of similar magnitude. The trends show an improvement for Portugal (from over 2.0 in 2001) and a slight worsening for Greece and Spain (from 1.2 in 1997).

Mobility data (motorized kilometres travelled) per age group is not available for any of the Southern countries, and this limits the comparison (specially in terms of the comparison with SUN countries).

Data regarding the accidents per 1000 licence holders has been analysed for different age groups for Spain, and this shows how accident involvement progressively drops as one passes from the 18 to 20 (index of 16), 21 to 24, 30 to 40, and 40 to 60 (index of 5) age groups. In terms of accidents per licence holder the youngest age group is three times more likely to be involved in road accidents than the older age group. A similar analysis has been performed for Greece. Including also both passenger car and PTW drivers, this yields an index of 11 for the age group 18-20, dropping progressively to a value of 5 for drivers aged 25-34 and 3 for the 40-60 age group.

It is interesting that the situation appears to be similar in the two countries. Ratios are slightly higher for Spain. This may have to do with greater mobility in Spain overall, or some underreporting in Greece. It is recommended that the other countries establish databases to enable similar analyses of accident involvement in terms of the age of licence holders; this would improve the case study comparison.

Considering the data for 2003, the types of accident in which young drivers of Southern countries are over represented are single accidents (especially Greece and Spain), accidents at weekends (particularly Portugal) and accidents with several passengers present (particularly Catalonia, Spain and Greece). For certain cases, (drink-driving and multiple occupancy accidents) data should be made available for Portugal to improve the benchmarking.

The analysis of accident involvement by number of years holding a licence would provide further insights concerning the finding that young and older drivers in Spain and Greece show similar levels of involvement in drink-driving accidents, a result that may be related to the tighter thresholds for younger drivers. The introduction of devices that prevent vehicle engine ignition when alcohol breath is detected should be adopted generally.

The problem of dangerous driving by young drivers during the weekend nights is particularly severe in Southern countries due to the good climate and the extension of late night activities and cultural events. If the efforts to improve enforcement are to have a full impact, greater effort should be made to control licences of venues, and to use GIS (Geographic Information System) tools to match venue locations with black spot identification by time of day, day of the week and accident type; this could help to further target police controls.

7. Speed management

7.1. Introduction

Excessive speed is one of, if not the most frequent, cause of accidents worldwide. “Excessive speed is the road traffic infringement that is, at the same time, most widespread and least subject to control” (Securiteroutiere, 2004).

Extent of the problem

Research has identified excessive speed as a key element of increased risk:

- The risk of having an accident with personal injury is doubled for every increase of 5 km/h of speed from 60 km/h upwards (Australian Transport Council)

- If a vehicle hits a pedestrian, the probability that the pedestrian dies increases drastically as the speed of impact increases (Ashton & Mackay, 1979).

Evidence also exists that indicates that reducing speed results in less collisions of lower severity (Finch et al., 1994, MASTER project, 1999).

Speed management has to deal with the mix of vehicles that use roads of varying types.

7.2. Speed Limit Situation

Concerning motorways, the speed limits for passenger cars are the same, and the variations that apply to other vehicle classes are generally small. The variation in speed limits for different vehicle classes is greatest for Greece. Concerning high speed roads, the speed limit for passenger cars is higher for Greece (110 kph) than for the other countries (100 kph). Other interurban roads and urban roads show similar speed limits for the different territories.

Table 7.1 describes the specific situations that apply to Greece, Portugal Spain and Catalonia, for motorways, high speed roads, other (interurban) roads, and roads in urban areas, respectively. For Spain and Catalonia, motorways include motorways and autovias.

Category of vehicle	Speed Limit Per Category of Road (km/h)			
	Motorways	High speed roads	Other roads	Urban areas
Greece	120	110	90	50
Portugal	120	100	90	50
Spain	120	100	90	50
Catalonia	120	100	90	50

Table 7.1. *Passenger cars speed limits in Greece, Portugal, Spain and Catalonia*

7.2.1. Greece

Speed Limit Legislation

New laws concerning speed limits as part of road traffic rules and road safety issues are generally issued in the Greek parliament. The Ministry of Transportation & Communications (MTC) is responsible on behalf of the Greek government for issuing a relevant law, raising public awareness and providing information. The previous law of 1992 has determined the present Road Traffic Code (RTC). There have been, of course, some modifications on this Code, especially after the new law 2696/1999 was put into force on March 23rd 1999. According to Article 20 of the current RTC, there are several speed limits applied, depending on the type of road and vehicle as follows.

Category of vehicle	Speed limit per category of road (km/h)			
	Motorways	High speed roads	Other roads	Urban areas
Passenger vehicles	120	110	90	50
Passenger with light trailer	90	90	80	
Passenger with trailer	80	80	80	
Buses	90	90	80	
Buses with light trailer	80	80	80	
Double deck buses				
Articulated buses	70	70	70	
School buses	60	60	60	
Trucks with max. load 3,5 ton.	90	90	80	
Trucks with max. load 3,5 ton. with light trailer	80	80	80	
Trucks with max. load above 3,5 ton.				
Trucks with max. load 3,5 ton. with trailer	70	70	70	
Trucks with max. load above 3,5 ton. with light trailer or trailer				
Double truck				
Motorcycles above 125cc	120	110	90	
Motorcycles up to 125cc	70	70	70	
Motorcycles with basket	60	60	60	

Table 7.2. *Speed limits per road type and vehicle class in Greece*

In addition to these general rules, that mostly differentiate limits among vehicle classes outside built-up areas, there are some specific speed limits for application on special cases. As far as trucks transporting passengers are concerned, maximum speed is limited to 40 km/h in urban areas and to 50 km/h outside built-up areas. A limit of 40 km/h is also the case regarding mopeds, agricultural vehicles (tractors, etc) and vehicles used in the construction sector (cement mixers, road rollers, etc). Speed limits included in Table 7.2 concerning trucks can be lowered by

MTC decisions for vehicles transferring dangerous carriage. Revised limits are determined taking into consideration the nature of the carriage and the technical standards of each vehicle.

It should be mentioned that in some cases a speed limit may be site – specific. For instance, there are no general rules with respect to weather conditions, such as rain, snow, fog or frost. Still, there are particular spots along motorways or high-speed roads where electronic speed limit signs are utilized, indicating each approaching vehicle's actual speed – in case it exceeds the suggested limit – until it is adequately reduced. Other cases, where drivers have to reduce speed, include mostly traffic calming zones in built-up areas. School vicinities or a vehicle's stop for passengers to get on/off can serve as typical examples.

Sanction Regime

Speeding, in a similar way to all other traffic violations in Greece, is not regarded to be a felony, even when causing a death. Rather, it is treated as a misdemeanour. More general offences applicable to speeding include unintentional homicide, bodily harm or damage to property. The nature of the applicable sanctions is multiple. Four types of sanctions exist, namely financial penalties, administrative penalties, imprisonment (under certain conditions) and addition of points in the driver's record. Sanctions imposed are classified as follows:

- For drivers violating a speed limit up to 20 km/h: fine of €30,
- For drivers violating a speed limit more than 20 km/h: fine of €60,
- For drivers violating a speed limit more than 40 km/h, or driving on motorways at more than 140 km/h, on high speed roads at more than 130 km/h, or on other road at more than 120 km /h: fine of at least €147, suspension of driving licence for 30 days and removal of licence plates for 30 days as well.

The last and more severe case calls for arrest and immediate trial on the next morning (manifest procedure).

An interesting addition to this classification is that drivers travelling at a speed lower than a minimum speed limit – if such a limit exists for a road – are also punished by having to pay a €60 fine. Fines are halved if paid on the spot or within 14 days. Prescription time is generally 1 year: automatic dossier closing is applied 12 months after verification of violation. In severe offences this period may come up to 5 years.

Speeding can be treated as a violation with imprisonment liability in case it is related to a severe, possibly deadly, accident. In such a case, the financial penalty reaches €300, while all major administrative penalties are also applied (driving licence suspension, licence plates – vehicle characteristics detainment, vehicle confiscation conditionally). Imprisonment can be of 1 to 24 months, whereas fines get in accordance with the penal code and may differ eventually.

Speeding also falls into the category of traffic violations recorded in terms of the point system, since it is treated as a safety related violation. There are four classes of severity (3, 5, 7, 9 points). A record is kept by a department of the MTC. When driver ads up 25 points, his/her licence is suspended. To get it back, the violator

should attend 50% of the classes (theoretical and practical) prescribed for the category of the licence and retake the related tests.

7.2.2. Portugal

Speed Limit Legislation

Present mandatory general speed limits in Portugal, shown in Table 7.3, are set by law in the Road Code, and are defined according to four circulation regimes and several types of vehicles.

Category of vehicle	Speed limit per category of road (km/h)			
	Motorways	High speed roads	Other roads	Urban areas
Passenger vehicles	120	100	90	50
Passenger with light trailer	100	80	70	50
Passenger with trailer				
Buses	100	90	80	50
Buses with light trailer	90	90	70	50
Articulated buses	100	90	80	50
Double deck buses				
School buses				
Trucks with max. load 3.5 ton.	90	80	80	50
Trucks with max. load 3.5 ton. with light trailer				
Trucks with max. load 3.5 ton. with trailer	80	70	70	40
Trucks with max. load above 3.5 ton.	90	80	80	50
Trucks with max. load above 3.5 ton. with light trailer or trailer				
Double truck				
Motorcycles above 50 cc	120	100	90	50
Motorcycles up to 50 cc	-	-	60	40
Motorcycles with basket	100	80	70	50

Table 7.3. *Speed limits per road type and vehicle class in Portugal*

The speed limit for urban roads is, in the majority of the presented cases, 50 km/h, but it must be mentioned that, for arterial roads, the speed limit may be equivalent to the limits set for higher speed roads.

Sanction Regime

The sanction regime, which is presently applied in Portugal for violations of speed limits, has recently been changed, following a revision of the Road Code, within the scope of the National Road Safety Plan, increasing the severity of the sanctions:

- If the vehicle is a car or a motorcycle, the sanctions are:

- From 60 to 300 € if the speed limit is exceeded to 20 km/h in urban areas, and to 30 km/h in rural areas (Level two penalty).
- From 120 to 600 € if the speed limit is exceeded from 20 to 40 km/h in urban areas and from 30 to 60 km/h in rural areas (Level two penalty).
- From 300 to 1500 € if the speed limit is exceeded from 40 to 60 km/h in urban areas and from 60 to 80 km/h in rural areas (Level three penalty).
- From 500 to 2500 € if the speed limit is exceeded more than 60 km/h in urban areas and in more than 80 km/h in rural areas (Level three penalty).

- For all other types of vehicles:
  - From 60 to 300 € if the speed limit is exceeded up to 10 km/h in urban areas, and to 20 km/h in rural areas (Level two penalty).
  - From 120 to 600 € if the speed limit is exceeded from 10 to 20 km/h in urban areas and from 20 to 40 km/h in rural areas (Level two penalty).
  - From 300 to 1500 € if the speed limit is exceeded from 20 to 40 km/h in urban areas and from 40 to 60 km/h in rural areas (Level three penalty).
  - From 500 to 2500 € if the speed limit is exceeded more than 40 km/h in urban areas and more than 60 km/h in rural areas (Level three penalty).

A minimum speed limit of 50 km/h was also established for motorways. Drivers circulating at lower speeds are punished with sanctions of 60 to 300 €.

Additionally to the fine, there is also a driving inhibition that may go from one moth to one year for level two penalties and from two months to two years for level three penalties.

If a driver is sanctioned with more than three level two penalties in less than five years, or more than five level two or three penalties in less than five years, the court may decide to suspend the driver's licence for a period of five years. After that period, the driver must do a new driving exam.

7.2.3. Spain

Speed Limit Legislation

Speed limits vary according to the type of road and vehicle. The limits are established by the Reglamento General de Circulación (General Code of Circulation) primarily by the Road Safety Law of 1990, which came into effect in 1992, and with modifications introduced by the new Reglamento General de Circulación of 2003, which came into effect in 2004. Limits currently valid in Spain are presented in Table 7.4 (common with Catalonia).

Sanction Regime

Excessive vehicle speed is not a criminal offence. The levels of sanctions for Spain are presented in Table 7.5 comparatively with the other members of the group. These are stipulated in the "Relación Codificada de Infracciones" document (DGT,

2004) which provides an up-to-date guide for coordinating sanctions applied by different Spanish administrations. The sanctions depend upon the degree to which the speed limit is exceeded, upon the road type (i.e. the existing limit) and upon the vehicle type (vehicles over 3.5T unladen weight and those with more than 9 passengers being subject to higher fines). According to degree of over-speeding, the sanctions are considered to be “serious” or “very serious”.

Sanctions that are made using mobile equipment (when the vehicle is intercepted) are applied directly to the driver of the vehicle. Sanctions made using fixed cameras are applied to the owner of the vehicle based upon the national databases relating vehicle plate numbers with registered owners. A period of 30 days is then available to the vehicle owner to communicate the details of the driver responsible for the infringement.

7.2.4. Catalonia

Speed Limit Legislation

The legislation in Catalonia is the national legislation of Spain, so the situation for both cases can be summarized in the following Table 7.4.

Category of vehicle	Speed limit per category of road (km/h)			
	Motorways	High speed roads	Other roads	Urban roads
Passenger vehicles	120	100	90	50
Passenger with light trailer	100	80	70	50
Buses	100	90	80	50
Buses with light trailer	80	80		50
Articulated buses	80	80	70	50
Double deck buses				
School buses	90	90	80	50
Trucks with max. load 3.5 ton.	90	80	70	50
Trucks with max. load 3.5 ton. with light trailer	90	80	70	50
Trucks with max. load 3.5 ton. with trailer				
Trucks with max. load above 3.5 ton.				
Trucks with max. load 3.5+ ton. with trailer				
Double truck	80	80	70	50
Trucks carrying dangerous goods	110	90	80	40
Motorcycles above 50 cc	120	100	90	50
Motorcycles up to 50 cc	-	45	45	45
Motorcycles with basket				
Mopeds				

Table 7.4. *Speed limits per road type and vehicle class in Spain and Catalonia*

Sanction Regime

The levels of sanctions for Catalonia are compared with the other countries in Table 7.5. Catalonia is progressing with the deployment of speed cameras, as described in the following section, and this raises additional issues regarding the sanctions/ enforcement framework. Current legislation allocates the responsibility for a speeding offence to the driver (rather than the owner of the vehicle); this means that the potential for converting the large number of infringements generated by the automated speed control into sanctions is considerably less than in those countries where the vehicle owner is deemed responsible (e.g. the UK). Nevertheless, the intelligence provided by automatic recognition of number plates can help to identify dangerous drivers and repeating offences.

Although it is not a requirement to inform the driver that s/he is approaching a controlled speed section of road, for publicity purposes to maximise the dissuasory effect, the information about the location of the fixed and mobile speed camera sites was available in the papers when they were first released, is publicly available via the web and all the fixed controlled spots are announced in the road with a sign.

Greece (3)	Violations of speed limit					
	up to 20 km/h		from 20 up to 40 km/h		more than 40 km/h (1)	
All vehicle classes	30 €		60 €		At least 147 €. Up to 300 € (2)	

Portugal	Violations of speed limit					
	up to 20 km/h	up to 30 km/h	from 20 up to 40 km/h	Ffrom 30 up to 60 km/h	more than 40 km/h	More than 60 km/h
Cars and motorcycles	-	60-300€	-	120-600€	-	240-1200€
Lorries, buses, mopeds, industrial vehicle and tractors	60-300€	-	120-600€	-	240-1200 €	-

Spain & Catalonia	Violations of speed limit					
	up to 20 km/h	up to 30 km/h	from 20 up to 40 km/h	from 30 up to 60 km/h	more than 40 km/h	More than 60 km/h
Cars, PTWs, other			140€	200€	200-300€	300-520€
Lorries, buses			150€	220€	220-300€	300-600€

Table 7.5. *Speed sanction regimes of the Southern territories*

1 or above 120 kph on other type roads
2 in addition, driving licence suspension for 30 days
3 Speeding also falls into the category of traffic violations recorded in terms of the point system, with severities of points deductions ranging from 3 to 9 points.
4 in addition, driving licence suspension for up to 3 months.

7.3. Extent of the problem

Portugal, Spain and Catalonia have put into practice some form of speed-monitoring programme concerning the average values are obtained for certain road types.

Additional information is available by means of surveys, with the most coming from the SARTRE project. This survey has been carried out three times across Europe so far. It represents a well-organized effort to extract results from a large number of countries, keeping in mind the necessity to follow procedures yielding a uniform sampling. The SARTRE 2 survey was carried out in 1996-1997 and published in 1998. SARTRE 3 followed in 2003, providing the opportunity to observe any progress on drivers' attitude.

The main body of results presented concerns accidents based on police records where police judgement is the basis for attributing excessive speed as a causal factor in the accident.

7.3.1. Greece

There is not much evidence on the actual behaviour of Greek drivers in terms of speeding for various types of road facilities. Information available is rather limited, either from recorded speed measurements, or from relevant interview surveys.

According to the SARTRE 2 project, Greek drivers interviewed admitted they exceeded speed limits in different proportions per type of roadway: 38% on motorways, 22% on "main" roads (i.e. high-speed roads for the most part), 19% on "country" roads (rural mainly) and 7% in urban areas. Compared to respective values for other countries, the first value is considered rather high, whereas responses on main and country roads are slightly above average. Furthermore, the proportion of positive responses for urban areas is slightly lower than average. Overall, it seems that Greek drivers tend to behave more independently of constraints as facilities become more comfortable and well equipped.

Another point of interest is laying on the replies recorded in terms of estimated likelihood to be speed-checked on a typical journey, compared to whether a driver had been fined/punished for breaking a speed limit in the previous 3 years. A 13.6% of questioned drivers demonstrated a high perception of risk to be checked, while only 5.9% appeared having been fined because of speeding. From a certain point of view this may be regarded as a situation with a positive effect on road safety.

In terms of SARTRE 3, responses were slightly different. A 19.5% of asked drivers admitted exceeding speed limit on motorways (often, very often or always), compared to 14.5% for roads that connect towns, 16.5% for country roads and 7% for roads in built-up areas. The reduction is notable for motorways and less significant for intercity and country roads. No deviation has been recorded with respect to urban areas.

In the absence of a central agency or department pointed out to keep and publish traffic law implementation statistics, the amount of sanctions is annually reported by the Traffic Police since 1998. Nevertheless, records kept are not considered to be

absolutely accurate, nor exactly corresponding to a period of 1 year. In some cases only part of the real records are reported, raising an issue of need for changes.

7.3.2. Portugal

Drivers' speeds in Portuguese roads are presently evaluated, every two years since 1999, through systematic surveys, carried out by LNEC for the General Directorate for Traffic (DGV). These surveys are based on a sample of speed measurement locations, selected in stretches of roads which were considered representative of eight different classes of roads covering the whole network (three classes of rural roads, including motorways; two classes of near-urban roads, including through roads; and three classes of urban roads). Furthermore, for each road, two categories of vehicles are considered (light and heavy), as well as lighting conditions (day and night), pavement conditions (dry and wet) and days of the week (weekends and work days). For the measurements, automatic devices are used, which measure spot speeds during 96-hour periods. The data is subject to statistical analysis in order to produce representative values such as means, standard deviations and percentiles.

Year	Type of vehicle	Inter-urban roads through small villages		Single carriageway express roads		Single carriageway inter-urban roads	
		Average	Standard deviation	Average	Standard deviation	Average	Standard deviation
2000	Cars	67	19	103	24	97	25
	Trucks	62	14	79	15	78	15
2002	Cars	61	15	97	23	91	21
	Trucks	56	14	86	19	81	18

Table 7.6. *Speed Portuguese data (kph)*

From the evaluations carried out, over the last five years, some general conclusions can be drawn:

- Speed limit in inter-urban roads through small villages is 50 km/h, the average speed being always above this value;

- For single carriageway express roads, the speed limit is 100 km/h for cars and 80 km/h for most trucks. Average analysis reveals that in 2000, cars were above the limit, but not trucks; in 2002 an inverted situation was verified;

- For single carriageway inter-urban roads, the speed limit is 90 km/h for cars and 80 km/h for most trucks. In 2000, cars were highly above, and a major reduction was verified in 2002. Trucks had no representative change.

According to the conclusions of the SARTRE3 Project, Portuguese drivers think that the percentage of other drivers that speed is of 56.1%. The situation is slightly different, which reveals a misjudgement. According to the enforcement statistics, only for urban roads – level 1 and 3, a lower percentage of infringements was observed:

Observed speed infringement	%
Motorways	65
Single carriageway express roads	65
Single carriageway inter-urban roads	56
Inter-urban roads through small villages	78
Urban roads (Level 1)	35
Urban roads (Level 2)	69
Urban roads (Level 3)	47

Table 7.7. *Observed speed limit infringements in Portugal (2002)*

Table 7.8 shows a comparison between conclusions of the SARTRE 3 project on speed and some observed values for speed infringements in Portugal. There is a large difference in what Portuguese drivers state and what is observed. In motorways, for instance, the percentage of drivers who admit they speed often, very often or always, is only 32.5%, but in fact, the real number is 64%. The critical case is observed in urban roads, where only 10% of drivers declare that they speed often, very often or always, when the real number is 70%. The justification for this misjudgement can be the fact that drivers do not realize the real speed at which they are driving, because most of them are speeding.

	Drivers reporting they exceed the speed limit	Motorways (%)	Main rural roads (%)	Other rural roads (%)	Urban roads (%)
SARTRE 3	Rarely	36.3	51.3	59.2	70.1
	Sometimes	31.2	29.5	25.5	19.1
	Often, very often or always	32.5	19.1	15.3	10.8
Observed values	Over the limit	64	65	50	70
	Over the limit by 30 km/h	10	15	10	10

Table 7.8. *Comparison between speed conclusions from SARTRE 3 and observed values in Portugal (2002)*

7.3.3. Spain

In Spain, the reporting of accidents in urban areas is realized by the local police and the accidents for the Autonomous regions of Catalonia and the Basque Country are received from the police of these Autonomous regions; the rest of the accidents are recorded directly by the Guardia Civil under the responsibility of the DGT.

In Spain, there exists a monitoring of average speeds for higher-speed roads, and some city-based initiatives for managing speed on ring roads and urban arterials. The map of speeds for 2003 indicates that the average speed on state roads (over the period from 1997 to 2003) was 99.3 kph, and by road type the speeds were:

- Motorway (autovía and untolled motorway) 118.2 km/h
- Tolled motorway 126.7 km/h
- Other roads of the state network 87.3 km/h

This does not, however, constitute an active speed monitoring programme since the individual speeds of vehicles are not recorded, and sites for measurements are not related to accident prevention.

According to the conclusions of the SARTRE3 Project (surveys realized in Spain in 2002/2003), 73% of respondents consider that other drivers exceed the speed limit but only 17% accept that they, themselves, drive faster than others.

	Drivers reporting they exceed the speed limit	Motorways (%)	Main rural roads (%)	Other rural roads (%)	Urban roads (%)
SARTRE 3	Never or rarely	30	45	58	67
	Sometimes	33	33	29	22
	Often, very often or always	**37**	**21**	**13**	**11**

Table 7.9. *Speed conclusions from SARTRE 3 for Spain*

The same survey found that 17% of citizens' thought they would be subject to a speed control. This figure is almost the same as the percentage, 16%, who report to have received a sanction for speeding in the last 3 years.

7.3.4. Catalonia

Catalonia has a speed monitoring programme since 2004. The severity of the problem of excessive speed as a cause of accidents (as recorded in accident records) has justified the installation of a speed management action based on automated "fixed" camera equipment as well as mobile measures undertaken during these last two years. The equipment used at fixed camera locations is able to measure the individual speeds of vehicles; this not only automates the speed limit enforcement, but it also provides data to monitor speeds across the road network. It is anticipated that, in the absence of similar information for the other Southern territories, the monitored speeds could be compared with indicators for the Central and SUN countries. However, evidence (Dept. of Transport, 2004) suggests that a period of at least three years is needed in order to analyse the impacts of speed camera implementations in terms of accident levels, i.e. only a partial comparison may be possible.

7.4. Country differences in safety level

7.4.1. Risk Situation with Regard to Speed

Excessive speed is the objective of a new study that was not investigated in terms of the original SUNflower project. The perception of the current status with respect to risk due to speeding may vary significantly from one context to another. Keeping in mind the necessity to handle this topic in a uniform way, specific indicators should be formed to allow some well-documented risk calculation process, applicable to all participants.

According to discussions in meetings during this project, it would be reasonable to accept as meaningful indicators expressions of the number of accidents with casualties recorded over total traffic on a yearly basis, per type of roadway. In a

more ideal case, it would be useful to have such fractions separately per each speed limit prescribed in each country's road traffic regulations. Such indicators may not be easy to obtain, because total vehicle kilometers (vkm) travelled are usually not available. In the absence of mobility data, risk cannot be directly related to exposure. Instead, it is possible to compare the number of accidents or casualties per road type and level of severity across all Southern territories.

Table 7.10 illustrates the distribution of road accidents with fatalities due to excessive speeding across major road classes in the three countries and the autonomous region of the South group. Taking into account the lower provision of motorways in Greece, the figures indicate a low share of fatalities on Portuguese motorways, partly offset by the higher share on high-speed roads. The high share of speeding fatalities on urban roads in Greece is also noted.

Road Type	Greece		Portugal		Spain		Catalonia	
	Fatal Accidents	(%) of total	Fatal Accidents	(%) of total	Fatal Accidents	(%) of total	Fatal Accidents	(%) of total
Motorways	15	6.6	37	7.5	164	14.4	34	14.9
High-speed roads	68	30.1	44	8.9	203	17.9	33	14.5
Rural roads	48	21.2	219	44.2	590	52.0	115	50.4
Urban-area roads	95	42.0	196	39.5	178	15.7	46	20.2

Table 7.10. *Distribution of accidents with fatalities due to speeding per road type for the South countries (2003)*

7.4.1.1. Greece

As far as total number of vkm per type of road facility is concerned, no data are available for the country so far. Furthermore, even at the higher level of total vkm travelled regardless of road type, a figure is available only for year 2000. At least, a distinct classification of the number of accidents with casualties recorded annually per type of roadway and severity of bodily harm is generally available. In the following tables these figures are presented for the period from 1996 to 2003.

Year	Accidents on motorways with:				Accidents on high speed roads with:			
	Fatalities	Severe injuries	Slight injuries	Total	Fatalities	Severe injuries	Slight injuries	Total
1996	20	12	52	84	119	104	355	578
1997	26	15	46	87	140	148	382	670
1998	19	11	47	77	142	190	417	749
1999	25	24	53	102	148	185	382	715
2000	14	22	45	81	136	138	328	602
2001	17	10	41	68	107	106	263	476
2002	14	6	25	45	72	72	148	292
2003	15	8	13	36	68	58	119	245

Table 7.11. *Number of accidents due to excessive speeding with casualties on Motorways and High-Speed Roads in Greece*

It is noted that figures for high-speed roads have been calculated indirectly, due to the roadway classes available in Road Accident Data Report forms. High-speed roads are not to be found in the database where all related data are gathered. Instead, there are the options of "Modern National Road" and "Older National Road". In addition to that, motorways are identified as part of modern National Roads. Values for high-speed roads are obtained by adding the respective values for modern and older National Roads and subtracting the value for motorways.

Year	Accidents on rural roads with:				Accidents on urban area roads with:			
	Fatalities	Severe injuries	Slight injuries	Total	Fatalities	Severe injuries	Slight injuries	Total
1996	73	64	289	426	130	139	883	1152
1997	86	126	334	546	148	219	1090	1457
1998	121	159	392	672	172	295	1329	1796
1999	91	149	342	582	172	286	1471	1929
2000	95	117	238	450	129	242	1125	1496
2001	84	100	190	374	122	178	867	1167
2002	50	44	120	214	85	111	454	650
2003	48	51	96	195	95	105	399	599

Table 7.12. *Number of accidents due to excessive speeding with casualties on Rural and Urban Roads in Greece*

It is interesting to observe the increase of all levels of accidents from 1996 to 1998. In 1999 the situation stabilized and a significant reduction is recorded since 2000.

Year	Total number of accidents with:			
	Fatalities	Severe injuries	Slight injuries	Total
1996	347	321	1583	2251
1997	406	513	1863	2782
1998	466	664	2200	3330
1999	452	649	2269	3370
2000	389	527	1747	2663
2001	339	399	1367	2105
2002	224	236	753	1,213
2003	228	226	631	1,085

Table 7.13. *Total number of accidents due to excessive speeding with casualties on various roads in Greece*

7.4.1.2. Portugal

The following tables present figures for the period from 1996 to 2003, concerning number of accidents per type of road: motorways, high speed roads (classified in

Portugal as IP and IC); and per type of environment: urban roads and rural roads. The total number of accidents with fatalities, severe injuries and slight injuries is also presented.

Accidents in high-speed roads for 1996 are not presented due to a lack of information in the accident database.

Year	Accidents on motorways with:				Accidents on high speed roads with:			
	Fatalities	Severe injuries	Slight injuries	Total	Fatalities	Severe injuries	Slight injuries	Total
1996	49	160	761	970	n.a.	n.a.	n.a.	n.a.
1997	35	155	808	998	61	125	671	857
1998	43	155	851	1,049	54	116	712	882
1999	50	144	792	986	67	109	747	923
2000	42	125	845	1,012	33	88	604	725
2001	52	93	865	1,010	56	100	692	848
2002	49	100	930	1,079	55	62	877	994
2003	37	67	922	1,026	44	83	819	946

Table 7.14. *Number of accidents due to excessive speeding with casualties on Motorways and High-Speed Roads in Portugal*

Year	Accidents on rural roads with:				Accidents on urban area roads with:			
	Fatalities	Severe injuries	Slight injuries	Total	Fatalities	Severe injuries	Slight injuries	Total
1996	490	1,318	6,271	8,079	412	1,939	8,847	11,198
1997	422	1,163	5,896	7,481	348	1,715	8,801	10,864
1998	394	964	6,025	7,383	306	1,442	8,778	10,526
1999	351	739	4,361	5,451	284	1,227	7,506	9,017
2000	246	569	3,550	4,365	198	881	5,448	6,527
2001	219	533	3,800	4,552	224	775	5,345	6,344
2002	213	395	4,141	4,749	205	587	5,004	5,796
2003	219	436	3,617	4,272	196	631	5,111	5,938

Table 7.15. *Number of accidents due to excessive speeding with casualties on Rural and Urban Roads in Portugal*

Year	Total number of accidents with:			
	Fatalities	Severe injuries	Slight injuries	Total
1996	951	3,457	15,879	20,287
1997	805	3,033	15,505	19,343
1998	743	2,561	15,654	18,958
1999	685	2,110	12,659	15,454
2000	486	1,575	9,996	12,057
2001	495	1,401	10,010	11,906
2002	467	1,082	10,075	11,624
2003	452	1,134	9,650	11,236

Table 7.16. *Total number of accidents due to excessive speeding with casualties on various roads in Portugal*

7.4.1.3. Spain

The following tables present the number of accidents due to excessive speed by road type and accident severity. For Spain, the category motorways includes both motorways and those high speed roads called autovias (a road, failing to comply with all the requirements established for motorways, which has two separate carriageways for each traffic directions, and restricted access to adjacent premises. It must avoid level crossings, trains and trams included; as well as to be level crossed by any kind of road, path or way, according to Article 62 of the Law on Traffic, Motor Vehicles and Road Safety)

Concerning Table 7.17, it is highlighted that for motorways the number of accidents due to speeding has increased by 45% in the period 1998-2003. This increase is similar to the increase in the total of veh-km for state roads or the same period, which showed an increase of 43%. On high speed roads the total number of accidents has reduced by 8% during the reported period.

Year	Accidents on motorways with:				Accidents on high speed roads with:			
	Fatalities	Severe injuries	Slight injuries	Total	Fatalities	Severe injuries	Slight injuries	Total
1998	149	589	936	1,674	223	928	1,118	2,269
1999	197	720	1,342	2,259	241	855	1,267	2,363
2000	209	657	1,451	2,317	265	703	1,307	2,275
2001	186	609	1,272	2,067	211	660	1,307	2,205
2002	196	615	1,544	2,355	264	657	1,193	2,114
2003	164	648	1,617	2,429	203	721	1,173	2,097

Table 7.17. *Number of accidents due to excessive speeding with casualties on Motorways and High-Speed Roads in Spain*

Table 7.18 shows the figures for the remaining road types, rural roads show a 7% increase whilst urban roads show a notable 16% reduction in accidents due to speeding.

Year	Accidents on rural roads with:				Accidents on urban area roads with:			
	Fatalities	Severe injuries	Slight injuries	Total	Fatalities	Severe injuries	Slight injuries	Total
1998	570	2,498	3,137	6,205	218	1,285	2,978	4,481
1999	532	2,639	3,662	6,833	190	1,285	3,381	4,856
2000	545	2,244	3,896	6,685	212	1,179	3,575	4,966
2001	546	2,048	3,662	6,244	182	1,025	2,978	4,197
2002	525	2,176	3,512	6,213	187	973	3,091	4,251
2003	590	2,292	3,766	6,648	178	791	2,794	3,763

Table 7.18. *Number of accidents due to excessive speeding with casualties on Rural and Urban Roads in Spain*

For all roads, the number of speed-related accidents has increased by 2% between 1998 and 2003 whilst the level of traffic (veh-km) has increased by more than 20%.

Year	Total number of accidents with:			
	Fatalities	Severe injuries	Slight injuries	Total
1998	1,160	5,300	8,169	14,629
1999	1,160	5,499	9,652	16,311
2000	1,231	4,783	10,229	16,243
2001	1,125	4,342	9,219	14,713
2002	1,172	4,421	9,340	14,933
2003	1,135	4,452	9,350	14,937

Table 7.19. *Total number of accidents due to excessive speeding with casualties on various roads in Spain*

7.4.1.4. Catalonia

This section presents the trends in speed-related accidents by road type and accident severity. The road type definitions are the same as for Spain.

On motorways between 1998 and 2003 the number of accidents attributed to speeding has reduced by 9%, although the number of fatal accidents has increased by 48%. A similar pattern is observed for high speed roads, with the total dropping by 31% but the fatal accidents increasing by 18% (see Table 7.20).

Year	Accidents on motorways with:				Accidents on high speed roads with:			
	Fatalities	Severe injuries	Slight injuries	Total	Fatalities	Severe injuries	Slight injuries	Total
1998	23	89	121	233	28	166	187	381
1999	21	80	174	275	39	119	217	375
2000	32	88	210	330	49	99	221	369
2001	33	74	175	282	30	95	242	367
2002	34	89	144	267	53	102	168	323
2003	34	60	117	211	33	92	138	263

Table 7.20. *Number of accidents due to excessive speeding with casualties on Motorways and High-Speed Roads in Catalonia*

For other rural roads the total of speed-related accidents has fallen by 25% but the fatal accidents have increased by 14% (see Table 7.21). In urban areas, a completely positive result is seen, with the total dropping by 7%, and reductions of 8% and 31% in fatal and serious-injury accidents, respectively.

Year	Accidents on rural roads with:				Accidents on urban area roads with:			
	Fatalities	Severe injuries	Slight injuries	Total	Fatalities	Severe injuries	Slight injuries	Total
1998	101	482	716	1,299	50	413	1,025	1,488
1999	111	421	814	1,346	38	429	1,141	1,608
2000	121	431	894	1,446	47	316	1,136	1,499
2001	73	330	644	1,047	26	274	1,024	1,324
2002	93	405	554	1,052	41	314	1,256	1,611
2003	115	396	459	970	46	287	1,050	1,383

Table 7.21. *Number of accidents due to excessive speeding with casualties on Rural and Urban Roads in Catalonia*

For all roads, (Table 7.22) the total of speed-related accidents between 1998 and 2003 has dropped by 17% whilst the number of fatal accidents has increased by 13%.

Year	Total number of accidents with:			
	Fatalities	Severe injuries	Slight injuries	Total
1998	202	1,150	2,049	3,401
1999	209	1,049	2,346	3,604
2000	249	934	2,461	3,644
2001	162	773	2,085	3,020
2002	221	910	2,122	3,253
2003	228	835	1,764	2,827

Table 7.22. *Total number of accidents due to excessive speeding with casualties on various roads in Catalonia*

7.4.2. Severity Situation with Regard to Speed

Some preliminary remarks can be placed at that point, in a similar way to the previous section regarding risk situation. Again, it is important to secure the use of uniform expressions for all participating countries. Indicators formed should be intuitive and totally applicable, to yield a well-founded severity concept.

In the present context it is regarded meaningful to produce expressions of recorded casualties. An interesting indicator lays on the fraction of deaths over the summation of severe and slight injuries per year and type of roadway. Once again, it would suit this case study's character and requirements to have the aforementioned proportions separately for each speed limit prescribed by every country's regulations. This kind of information is difficult to collect, since the recording of casualties is not so detailed usually.

Figure 7.1 presents the trend in recorded fatalities due to excessive speeding for the three countries and the autonomous region of the South group, as it evolved from 1998 to 2003. It appears that Greece and Portugal have achieved significant progress, while figures are rather constant for Spain and Catalonia.

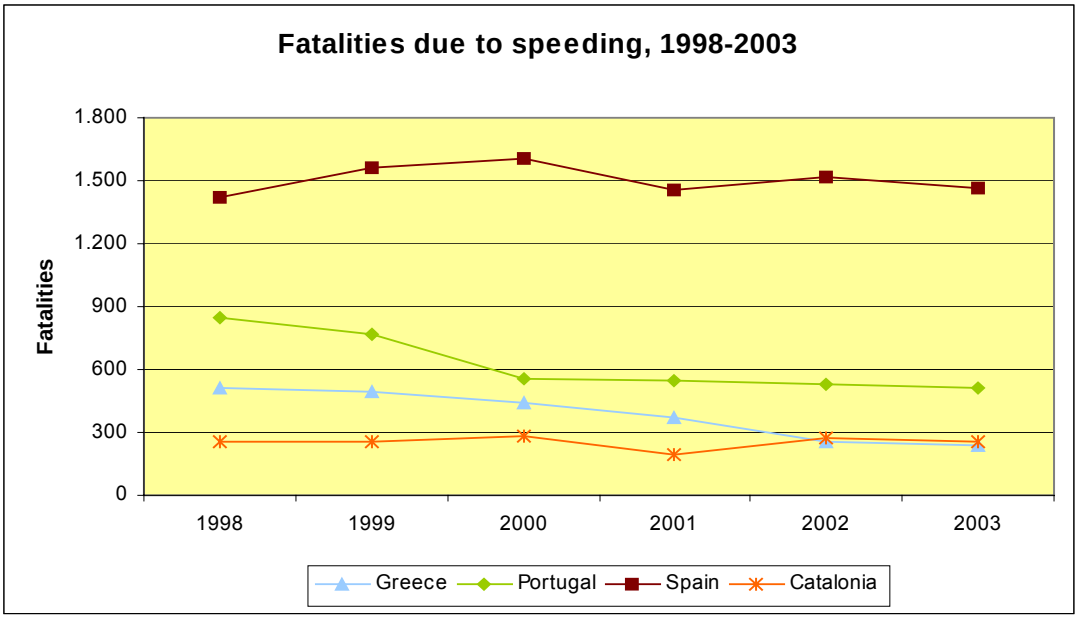


Figure 7.1. *Evolution of fatalities due to excessive speeding in the South countries*

This is further illustrated in Figure 7.2. The share of excessive speed in road accident fatalities has declined considerably (especially) for Greece and Portugal. For Spain, the share of speed-related fatalities has remained more-or-less constant. For Catalonia the share of speed-related accidents shows an increase, with levels in recent years above 30%, similar to Portugal. For Spain and Catalonia, these figures show that in spite of the campaigns and enforcement, the problem of speeding does not show the same level of improvement as the overall accident figures.

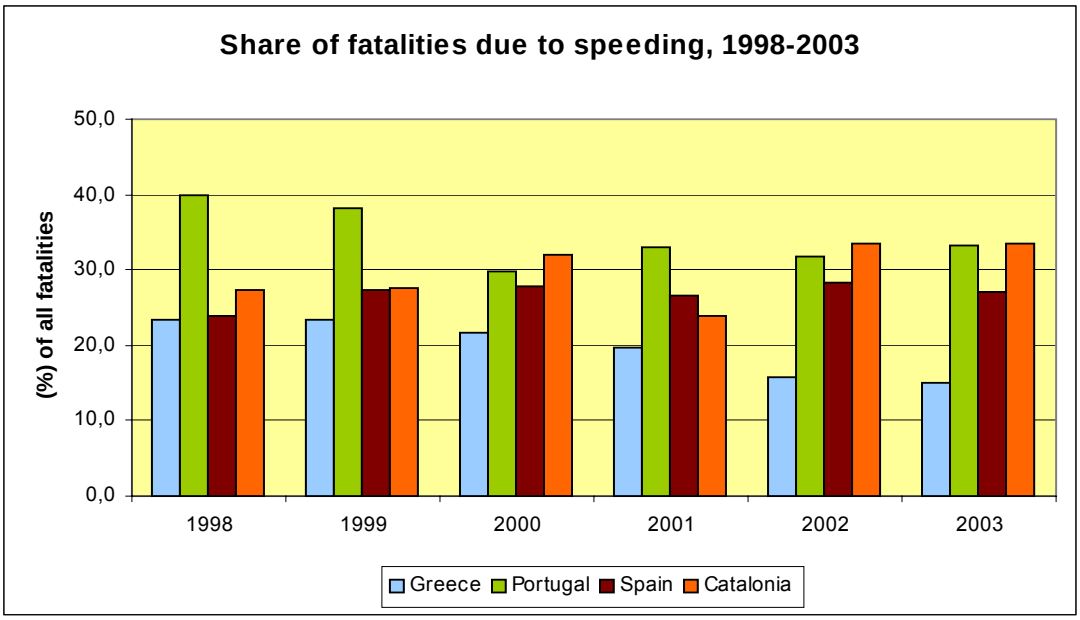


Figure 7.2. *Proportion of fatalities due to excessive speeding over all fatalities in the South countries*

Figure 7.3 depicts the evolution of the ratio of speed-related fatalities over speed-related injuries (including severe and slight ones). The values presented include all road types. Interestingly, Greece exhibits higher ratios, implying that fatalities occur comparatively more often. At least in part, this may be attributable to some underreporting of accidents involving only injuries. This (proportionately) weighted (across major road classes) ratio is impressively constant for Portugal and Spain, while it fluctuates slightly in the case of Catalonia. Greece yields some increase over time.

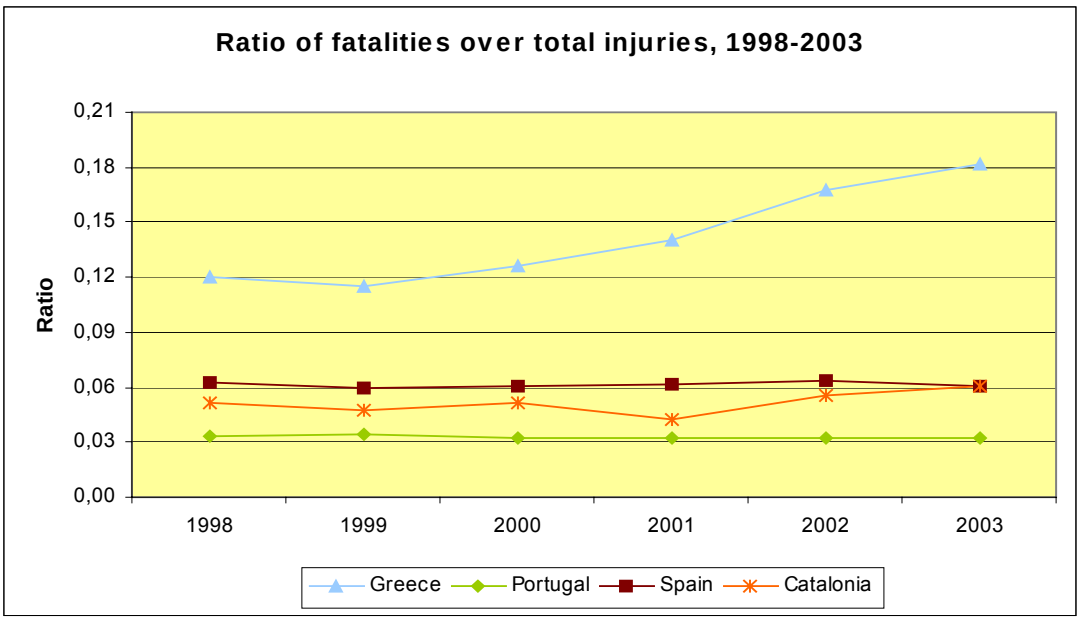


Figure 7.3. *Ratio of fatalities over total injuries due to speeding for the South Countries*

Table 7.23 offers more insight, since it includes an analysis of this ratio separately for each major class of roads. It consists of two parts; first, it contains these values for the latest available year (2003); then, these values may be compared with the following rows, depicting average proportions for the period 1998-2003. In all cases, practically, the share of fatalities declines with the speed limit associated with each road type. Motorways are not complying with this finding, except from the case of Greece, where the proportion in question reached for this type of roads a period-high 0.30 in 2003.

Road Type	Ratio of fatalities over total injuries (2003)				Ratio of fatalities over total injuries (1998-2003)			
	Greece	Portugal	Spain	Catalonia	Greece	Portugal	Spain	Catalonia
Motorways	0.30	0.029	0.050	0.105	0.192	0.034	0.064	0.078
High-speed roads	0.22	0.043	0.075	0.083	0.179	0.048	0.087	0.083
Rural roads	0.22	0.040	0.069	0.088	0.165	0.042	0.066	0.066
Urban-area roads	0.14	0.026	0.041	0.022	0.090	0.026	0.037	0.020

Table 7.23. *Distribution of accidents with fatalities due to speeding per road type for the South countries*

7.4.2.1. Greece

The indicator determined in the introductory comments is available for all major road types. In the following tables all relevant figures are presented. The proportion of fatalities over injuries per speed limit cannot be calculated in a reliable manner, because speed limit is not recorded in accidents and many hypotheses have to be made.

Year	Casualties on motorways:				Casualties on high speed roads:			
	Fatalities	Severe injuries	Slight injuries	Fatalities /Injuries	Fatalities	Severe injuries	Slight injuries	Fatalities /Injuries
1996	23	18	120	0.17	140	162	647	0.17
1997	30	25	81	0.28	168	213	783	0.17
1998	20	21	91	0.18	157	276	783	0.15
1999	28	36	103	0.20	170	267	755	0.17
2000	14	25	88	0.12	163	205	637	0.19
2001	17	18	86	0.16	129	146	525	0.19
2002	15	10	40	0.30	82	102	302	0.20
2003	15	17	33	0.30	73	78	247	0.22

Table 7.24. *Casualties due to excessive speeding and proportion of (Fatalities / Total Injuries) on Motorways and High Speed Roads in Greece*

Data for motorways exhibit greater fluctuation compared to data for high-speed roads. This may be attributed in part to the smaller population of the casualties' samples for motorways.

Year	Casualties on other rural roads:				Casualties on urban area roads:			
	Fatalities	Severe injuries	Slight injuries	Fatalities /Injuries	Fatalities	Severe injuries	Slight injuries	Fatalities /Injuries
1996	78	87	459	0.14	143	188	1,246	0.10
1997	97	168	606	0.13	156	268	1,508	0.09
1998	134	215	656	0.15	189	355	1,823	0.09
1999	101	198	580	0.13	179	331	1,996	0.08
2000	108	162	487	0.17	141	291	1,584	0.08
2001	87	128	328	0.19	127	222	1,164	0.09
2002	55	61	207	0.21	101	134	657	0.13
2003	53	66	177	0.22	98	134	558	0.14

Table 7.25. *Casualties due to excessive speeding and proportion of (Fatalities / Total Injuries) on Rural and Urban Area Roads in Greece*

It is observed that the proportion of fatalities over the summation of all types of injuries becomes smaller as the road type becomes of inferior category. Values obtained are pretty high for motorways, slightly lower for high-speed roads, intermediate for rural (country) roads and significantly lower for roads in built-up areas. This is a rather expected outcome from a speed point of view, because generally travelling speed is a lot higher on motorways and high-speed roads. The figures calculated verify that, if a road traffic accident is to occur, speed becomes a crucial factor determining the extent of the participants' bodily harm.

As it has already been demonstrated in the risk section, the situation has started to improve markedly since 1999.

Year	Casualties in all roads				% of all Casualties		
	Fatalities	Severe injuries	Slight injuries	Fatalities /Injuries	Fatalities	Severe injuries	Slight injuries
1996	389	457	2,476	0.13	18.0	13.7	8.4
1997	457	679	2,998	0.12	21.7	15.8	10.3
1998	512	879	3,376	0.12	23.5	18.6	11.6
1999	494	838	3,464	0.11	23.3	18.4	12.3
2000	442	694	2,816	0.13	21.7	16.5	10.6
2001	369	521	2,115	0.14	19.6	16.1	9.2
2002	256	310	1,216	0.17	15.7	11.9	6.1
2003	241	301	1,024	0.18	15.0	12.8	5.6

Table 7.26. *Total casualties due to excessive speeding and proportion of (Fatalities / Total Injuries) on all road types in Greece*

Interestingly, the share of fatalities among all casualties increases over time, indicating that severe and slight injuries decrease even faster.

7.4.2.2. Portugal

The following tables present figures for the period from 1996 to 2003, concerning casualties per type of road: motorways, high-speed roads (classified in Portugal as IP and IC); and per type of environment: urban roads and rural roads. The total number of fatalities, severe injuries and slight injuries is also presented.

Casualties in high-speed roads for 1996 are not presented due to a lack of information in the accident database.

Year	Casualties on motorways:				Casualties on high speed roads:			
	Fatalities	Severe injuries	Slight injuries	Fatalities /Injuries	Fatalities	Severe injuries	Slight injuries	Fatalities /Injuries
1996	68	222	1,238	0.047	n.a.	n.a.	n.a.	n.a.
1997	43	217	1,324	0.028	81	169	1,068	0.065
1998	60	198	1,370	0.038	75	152	1,165	0.057
1999	57	223	1,432	0.034	72	163	1,260	0.051
2000	51	177	1,391	0.033	46	128	1,001	0.041
2001	57	151	1,385	0.037	70	165	1,140	0.054
2002	55	148	1,538	0.033	67	104	1,408	0.044
2003	45	112	1,459	0.029	62	130	1,326	0.043

Table 7.27. *Casualties due to excessive speeding and proportion of (Fatalities / Total Injuries) on Motorways and High Speed Roads in Portugal*

High-speed roads in Portugal may be considered more dangerous than motorways, since the average ratio Fatalities/injuries for motorways in 2003 was 0.029 and for high-speed roads is 0.043 (almost 50% higher).

Year	Casualties on other rural roads:				Casualties on urban area roads:			
	Fatalities	Severe injuries	Slight injuries	Fatalities /Injuries	Fatalities	Severe injuries	Slight injuries	Fatalities /Injuries
1996	567	1,761	9,554	0.050	438	2,394	11,872	0.031
1997	484	1,509	8,996	0.046	380	2,000	11,799	0.028
1998	456	1,221	9,073	0.044	334	1,678	11,771	0.025
1999	396	1,028	7,176	0.048	311	1,526	10,704	0.025
2000	289	833	5,768	0.044	215	1,091	7,887	0.024
2001	251	801	5,929	0.037	242	951	7,575	0.028
2002	257	608	6527	0.036	221	742	6907	0.029
2003	257	628	5823	0.040	212	775	7226	0.026

Table 7.28. *Casualties due to excessive speeding and proportion of (Fatalities / Total Injuries) on Rural and Urban Area Roads in Portugal*

Rural roads in Portugal may be considered more dangerous than urban roads, since the average ratio fatalities/injuries for rural roads in 2003 was 0.040 and for urban roads is 0.026 (53% higher).

Year	Casualties in all roads				% of all Casualties		
	Fatalities	Severe injuries	Slight injuries	Fatalities /Injuries	Fatalities	Severe injuries	Slight injuries
1996	1,073	4,377	22,714	0.040	-	-	-
1997	907	3,726	22,119	0.035	40.0	39.9	38.7
1998	850	3,097	22,214	0.034	40.0	37.9	36.8
1999	764	2,777	19,312	0.035	38.3	36.1	32.5
2000	555	2,101	15,046	0.032	29.8	30.4	27.5
2001	550	1,903	14,889	0.033	32.9	32.8	29.1
2002	533	1,498	14,972	0.032	31.8	31.4	28.9
2003	514	1,515	14,508	0.032	33.2	32.5	28.7

Table 7.29. *Total casualties due to excessive speeding and proportion of (Fatalities / Total Injuries) on all road types in Portugal*

7.4.2.3. Spain

This section reports the number of injured persons by road type and accident severity for those accidents related to speeding. In general, numbers of fatalities increase up to the year 2000 , and decrease thereafter.

On motorways the total of persons injured has increased by 43%, in proportion to the increase in veh-km on this type of road, whilst the number of fatalities has increased by 4%.

On high speed roads the total of persons injured has dropped by 10%.

Year	Casualties on motorways:				Casualties on high speed roads:			
	Fatalities	Severe injuries	Slight injuries	Fatalities /Injuries	Fatalities	Severe injuries	Slight injuries	Fatalities /Injuries
1998	202	862	2,036	0.07	289	1,374	2,516	0.07
1999	256	1,051	2,896	0.06	358	1,307	2,681	0.09
2000	278	971	3,051	0.07	371	1,119	2,608	0.10
2001	241	890	2,737	0.07	279	995	2,608	0.08
2002	264	871	3,144	0.07	352	1,023	2,360	0.10
2003	210	906	3,333	0.05	264	1,093	2,419	0.08

Table 7.30. *Casualties due to excessive speeding and proportion of (Fatalities / Total Injuries) on Motorways and High Speed Roads in Spain*

For other rural roads, a similar trend is seen to the previously reported road types.. For roads in urban areas the persons killed in speed-related accidents has increased by 31% during the reported period, although the total number of injured persons has dropped by 2%.

Year	Casualties on other rural roads:				Casualties on urban area roads:			
	Fatalities	Severe injuries	Slight injuries	Fatalities /Injuries	Fatalities	Severe injuries	Slight injuries	Fatalities /Injuries
1998	733	3,542	6,704	0.07	201	1,311	4,460	0.03
1999	697	3,769	7,828	0.06	255	1,573	5,402	0.04
2000	691	3,255	8,035	0.06	266	1,462	5,810	0.04
2001	719	2,972	7,828	0.07	221	1,253	4,460	0.04
2002	677	3,021	7,221	0.07	227	1,177	5,155	0.04
2003	766	3,240	7,785	0.07	228	983	4,627	0.04

Table 7.31. *Casualties due to excessive speeding and proportion of (Fatalities / Total Injuries) on Rural and Urban Area Roads in Spain*

The total number of injured persons in speed-related accidents has increased by 7% whilst the mobility (veh-km) has increased by more than 20% in the same period. The number of KSI due to speeding over the total KSI has increased from 20% to 25%. This suggests that either there is no improvement (persons killed almost the same) or the reductions are less than the average.

Year	Casualties in all roads				% of all Casualties		
	Fatalities	Severe injuries	Slight injuries	Fatalities /Injuries	Fatalities	Severe injuries	Slight injuries
1998	1,425	7,089	15,716	0.06	23.9	20.5	14.7
1999	1,566	7,700	18,807	0.06	27.3	24.2	16.9
2000	1,606	6,807	19,504	0.06	27.8	24.5	16.0
2001	1,460	6,110	17,633	0.06	26.5	23.0	14.3
2002	1,520	6,092	17,880	0.06	28.4	23.3	14.8
2003	1,468	6,222	18,164	0.06	27.2	23.7	14.6

Table 7.32. *Total casualties due to excessive speeding and proportion of (Fatalities / Total Injuries) on all road types in Spain*

7.4.2.4. Catalonia

Table 7.33 to Table 7.35 show the speed-related casualties evolution in Catalonia. On Motorways the total number as decreased by 15% but fatalities has increased by 11% as well as the ratio of fatalities over injures has raised by 34%.

On high speed roads, all levels of casualties have improved. As a result, the number of victims has dropped down by 33%

Year	Casualties on motorways:				Casualties on high speed roads:			
	Fatalities	Severe injuries	Slight injuries	Fatalities /Injuries	Fatalities	Severe injuries	Slight injuries	Fatalities /Injuries
1998	36	143	318	0.08	40	231	411	0.06
1999	27	126	360	0.06	52	192	420	0.08
2000	40	128	450	0.07	57	178	441	0.09
2001	40	142	416	0.07	32	132	459	0.05
2002	48	127	372	0.10	65	156	354	0.13
2003	40	107	275	0.10	35	120	303	0.08

Table 7.33. *Casualties due to excessive speeding and proportion of (Fatalities / Total Injuries) on Motorways and High Speed Roads in Catalonia*

On other rural roads the fatalities over injuries ratio has risen from 0.06 to 0.09 as a result of the growth of fatalities and the reduction of injuries. On urban areas KSI casualties is 35% lower in 2003 than in 1998.

Year	Casualties on other rural roads:				Casualties on urban area roads:			
	Fatalities	Severe injuries	Slight injuries	Fatalities /Injuries	Fatalities	Severe injuries	Slight injuries	Fatalities /Injuries
1998	132	681	1,476	0.06	51	409	1,402	0.03
1999	138	625	1,556	0.06	35	410	1,586	0.02
2000	145	625	1,712	0.06	44	302	1,685	0.02
2001	99	449	1,291	0.06	25	249	1,516	0.01
2002	122	549	1,223	0.07	38	305	1,873	0.02
2003	141	551	1,049	0.09	40	259	1,591	0.02

Table 7.34. *Casualties due to excessive speeding and proportion of (Fatalities / Total Injuries) on Rural and Urban Area Roads in Catalonia*

Although the total number of casualties has cut down from 5,330 to 4,511 the improvement is lower than in other areas because the speed-related KSI over all KSI has increased from 20% to 28%.

Year	Casualties in all roads				% of all Casualties		
	Fatalities	Severe injuries	Slight injuries	Fatalities /Injuries	Fatalities	Severe injuries	Slight injuries
1998	259	1,464	3,607	0.05	27.3	19.5	14.6
1999	252	1,353	3,922	0.05	27.5	23.1	15.0
2000	286	1,233	4,288	0.05	32.1	29.0	15.4
2001	196	972	3,682	0.04	24.1	24.3	13.2
2002	273	1,137	3,822	0.06	33.6	29.2	14.8
2003	256	1,037	3,218	0.06	33.4	27.2	13.0

Table 7.35. *Total casualties due to excessive speeding and proportion of (Fatalities / Total Injuries) on all road types in Catalonia*

7.5. Interventions to reduce the risk

7.5.1. Greece

Enforcement Level / Framework

Speeding is addressed through specific RTC articles. Therefore, the Road Traffic Division of the Police (or Coast Guard in ports) is responsible for its enforcement throughout the Greek State. Law enforcement in this context ranges from local to regional and national level. Generally it is regional police departments – located in the capital city of each region – that deal with speeding within their territory of responsibility. It is reminded that traffic police is depending on the Ministry of Public Order (MPO). Local entities are also involved in rules establishment – mainly Municipal Police under the respective Municipal Council.

Radars are the most common speed checking devices in Greece. Sometimes laser instruments and photographic or video instruments (automated speed cameras) are used. The presence of checking equipment is generally indicated. It is interesting that drivers must be warned that they are speed-checked. The evaluation of the devices includes an initial approbation by the MTC. Preliminary testing is not compulsory, but certifications are valid during a limited period of time. Preventive systems may be used on trucks and buses mostly. It is noted that the ministerial decision necessary for their application has not been issued yet.

In the same fashion with other traffic violations, a sole judge system is applied. Effort is put so that administrative procedures are simplified. There is a 14 days appeal period. If the violator does not protest the verification during this period, the violation is considered valid. If the fine is paid within the 14 days, the case is taken off the court loop, except from severe cases. In any case, tickets not paid within 14 days reach local courts and are dealt with on a case basis.

Enforcement Effect - Practice

A preliminary distinction between law enforcement and sanctions application can yield interesting conclusions. As mentioned already, the law is enforced by police agencies, while courts are mainly involved in the process of sanctioning. Distinguishing these two parts of the procedure advances understanding of Greek drivers' behaviour with respect to speeding.

Greek police have significantly increased the number of speed checks performed on a yearly basis. It is not possible to have an estimate of total checks realized. No data are available in terms of man-hours allocated by the Road Traffic Police to speed checking. Some indication is provided by the number of sanctions imposed for speeding offences. The following Table 7.36 summarises general road traffic information for Greece along with the number of speed limit breaches recorded.

Greece	1998	1999	2000	2001	2002	2003
Accidents with casualties	24,819	24,231	23,127	19,710	16,852	15,751
Deaths	2,182	2,116	2,088	1,895	1,634	1,605
Vehicles (*1000)	4,323	4,690	5,061	5,390	5,741	5,968
Speed limit infringements	n.a.	117,639	175,075	316,451	418,421	447,249

Table 7.36. *Speed limit breaches - general road traffic information about Greece*

Since no information is available on the extent of speed checking, it is impossible to calculate indicators on the extent of speed limit violation such as the proportion of checked drivers who exceed speed limits per type of road, etc. Therefore, it is difficult to demonstrate in a quantitative way whether any progress is to be reported or not in Greece. Some insight is provided by the notable reduction of casualties in accidents attributed to excessive speeding. It is also important that the number of tickets issued from the police went four times up in just four years (1999-2003). Again, it is not safe to determine the part of improvement to be attributed to police enforcement. Other factors may have been crucial as well (new road facilities construction and existing roads renovation, vehicle fleet renewal, etc).

As for applying sanctions, it is noted that for traffic violations in Greece overall there is no definite period of time between verifications of violations and adjudication of sanctions. For cases that reach the court, first hearing usually takes place within 3-6 months. Prescription time for average cases is only 1 year, but it very often takes about 2 years before sanctions are definite and payable. In addition to that, even when sanctions are definite it is not so certain that they will actually be paid. With respect to all traffic violations (including speeding), it is estimated that 50% of all sanctions are never paid. It can be stressed that this is very likely to act as a counter measure against intensified enforcement, limiting greatly any positive effects.

7.5.2. Portugal

Enforcement Level / Framework

In Portugal speed enforcement actions are taken either by the urban police body – Polícia de Segurança Pública (PSP), inside the major cities, or by the police body

which operates at the Country level (main routes and all other rural networks, as well as streets in small towns and villages) – Guarda Nacional Republicana (GNR), in some cases through its special traffic branch (Brigada de Trânsito). Both entities are under the Ministry for Internal Affairs.

Speed surveillance is equally accomplished by both entities, through:

- Manually operated radar with driver identification;
- Automatic radar without driver identification;
- Speed cameras;
- Unidentified vehicle equipped with video and radar;
- Tachographs (trucks only).

The evaluation of the devices includes an initial approbation. Preliminary testing is not compulsory, but an inspection takes place once a year. Preventive systems are not particularly spread. Some roads have signals that turn red when drivers exceed the speed limit.

The National Road Safety Plan, set forth in 2003 under the Ministry for Internal affairs, establishes a general speed reduction of 5 km/h (15 km/h for urban areas), until 2010.

To achieve this target it is necessary to endow enforcement entities with an integrated automatic system for speed infringements detection, control and processing. This will allow drivers to have perception on the probability of control in case of infringement. New detection technologies are foreseen in order to assess vehicles database and infringements management.

As a benefit of the implementation of this procedure, it is expected to triple the number of controlled vehicles, as well as to achieve a reduction on average speed and therefore a reduction on the number of accidents with victims.

Enforcement Effect – Practice

The speed enforcement procedure begins with the infringement detection. If the equipment used by the authorities allows for the identification of the driver, he is informed on the spot about the infringement and directly receives a document reporting the occurrence and the fine. If the equipment used does not allow the identification of the driver, only the vehicle is identified. A notification is sent to the owner of the vehicle, reporting the occurrence and requesting the driver's identification. It also establishes deadlines for sanction payment.

Table 7.37 presents general road traffic information and also some information about speed limit violations. Registered offences almost doubled from 1998 to 1999.

Portugal	1998	1999	2000	2001	2002
Accidents with casualties	49,319	47,966	44,159	42,521	42,219
Deaths	2,126	1,995	1,860	1,671	1,675
Vehicles (*1000)	4,208 (1)	4,508 (1)	5,340	5,507	5,593
Speed limit infringements	64,097	124,627	140,762	106,545	145,730

Table 7.37. *Speed limit breaches and general road traffic information about Portugal*

1 without motorcycles

The main problem reported in terms of speed checking regards the habit of Portuguese drivers to warn each other (by signalling) about the presence of police patrols. The main concern with respect to the application of sanctions imposed is lying on the evidence of the offence

7.5.3. Spain

Enforcement Level / Framework

Enforcement and reporting of speed limit violations in urban areas is realized by the local police except in smaller towns (less than 5000 inhabitants) where the state police operate. Interurban areas are enforced by the state police under the responsibility of DGT, except for in the Autonomous regions of Catalonia & Basque Country who realise their own enforcement with their own police force.

The comparability of speed controls is somewhat influenced by the organisation of police activity in the territories (for example, the speed control data for Spain excludes the controls realized by local police on, say, the Ring Roads of Barcelona).

Radars are commonly used as means of speed checking by mobile or fixed controlling patrols, for detecting infringements and issuing penalty notices. Only recently has radar equipment been used to count the volume of traffic and to produce proportions of speeding vehicles but there is not yet a systematic recording of the controls by location or road type.

Automated control devices are under experiment and it is planned that by July of 2005 the DGT will have installed and put into operation 48 of the 125 speed cameras that it plans to install during 2005 (500 by the end of 2007). The location of controls will be displayed at the roadside and via the web.

Preventive systems are not especially widespread. On some through-roads (especially for smaller urban areas), variable signs are installed triggered by a radar device and illuminated when (the driver of) the approaching vehicle exceeds the speed limit. In some cases the trigger is used to activate a red traffic signal.

Enforcement Effect – Practice

Spain is the only Southern country with available information on the number of speed controls carried out (except from urban areas). It appears that the proportion of violators is almost constant since 1998, in the range 3-3.5%. The number of controls has remained rather stable at 15 million vehicles, with a small decline

during 2001 and 2002 (about 13.5 million checks annually). This trend coincides with a steady increase in the number of vehicles in the country. This explains some reduction of the achieved ratio of controls realized over registered vehicles.

Interestingly, the proportion of sanctions imposed for speeding offences as part of all road safety related sanctions declines over time. This percentage was 8.6% in 1993, to become 6.2% in 1997 and 4.4% in 2001. It is not certain that this trend of decrease has some practical interpretation.

Spain	1998	1999	2000	2001	2002	2003
Accidents with casualties	97,570	97,811	101,729	100,393	98,433	99,987
Deaths	5,957	5,738	5,776	5,517	5,347	5,399
Vehicles (*1000)	21,306	22,411	23,284	24,250	25,066	25,169
Speeding penalty notices	512,000	527,000	510,000	492,000	458,821	517,687
Controls (nº of vehicles, *1000)	15,149	15,536	14,866	13,493	13,357	16,044
Speeding penalty notices / controls	3.38%	3.39%	3.43%	3.65%	3.44%	3.23%

Table 7.38. *Speed limit breaches - general road traffic information about Spain (1998-2003)*

Note: control data concerns those controls realized by the Guardia Civil (primarily interurban roads).

7.5.4. Catalonia

Enforcement Level / Framework

The entity responsible for the traffic enforcement on interurban areas is the police of the Autonomous region of Catalonia.

Fixed speed traps as well as mobile equipment are used as speed checking devices in the Catalan network. During 2004, speed cameras were installed at 24 locations across Catalonia. A study analysing the risk of having an accident due to speeding was done to choose the locations of the speed traps. Most of the sites are roads with 120kph speed limits (but only one of the 14 locations is on a toll motorway), the remaining 10 are located on high-speed and “other (interurban)” roads. These are in addition to 14 speed camera sites installed on the main ring road of Barcelona in 2002, where an 80 kph speed limit is maintained. Although it is not a requirement to inform the driver that s/he is approaching a controlled speed section of road, for publicity purposes to maximise the dissuasory effect, the information about the location of the fixed and mobile speed camera sites is publicly available via the web and on the road, just before the location of the camera.

Figure 7.4. *Fixed speed camera locations in Catalonia, (SCT, 2004)*

Enforcement Effect - Practice

There has been a significant increase in the number of speeding penalty notices issued annually since 2000.

Catalonia	1998	1999	2000	2001	2002	2003
Accidents with casualties	23,988	23,651	23,438	22,992	21,465	20,618
Deaths	950	917	892	814	812	767
Vehicles (*1000)	3,730	3,895	4,000	4,400	4,534	4,545
Speeding penalty notices	n.a.	n.a.	39,157	75,764	120,172	

Table 7.39. *Speed limit breaches - general road traffic information about Catalonia*

Studies are underway (on-going) to evaluate the impact of the fixed camera system. The analysis compares the first 3 month period of operation (3-12-04 to 28-02-05) with the same period of the previous year and compares the road sections considered to be within the influence of the camera installations with the rest of the interurban roads of Catalonia. The percentage reduction of fatalities and seriously injured persons was reduced by 73% for the camera-controlled sections compared with a 18% reduction in general. The reduction in average speed is 9.6 kph, down from 96.5 to 86.9 kph. During the 3 month period a total of 63422 sanctions were issued. Infringements as a percentage of the total traffic volume dropped from 1.2% to 0.7%, (SCT, 2005).

7.6. Explanation of differences and/or similarities between the countries/regions

Common problems encountered during speed checking include a difficulty to stop some vehicles, because of weather or traffic conditions, cases of 2 vehicles exceeding a speed limit at the same time, as well as errors due to climatic or electric perturbations. Main concerns with respect to the application of sanctions imposed include the fact that almost all offenders appeal the report that goes with the sanction. It is also observed that many punished drivers do not pay the corresponding fines.

The profile of the examined territories is quite similar in terms of speed limits legislation. The speed limits for cars, motorcycles and small trucks (vans, etc) are the same as far as motorways, country and urban roads are concerned. Greece has adopted a slightly higher limit on high-speed roads (110 km/h instead of 100 km/h for all other regions). Speed limits are also almost identical with respect to buses. Greece has a slightly lower limit on motorways (90 km/h instead of 100 km/h for all other regions). The variation in speed limits for different vehicle classes seems to be greatest for Greece.

The classification of violations according to their extent follows a rather different logic in Portugal and Greece than in Spain and Catalonia. In the former case, the categories of the offences are based on how much a limit is exceeded (e.g. 20 km/h), while in the latter one the definition is based on the proportion of exceeding a limit (e.g. 50%). Also, in Portugal there is a more detailed differentiation depending on the road type. Overall, Portugal exhibits a better-organized classification that takes more factors into account. Greece follows with a moderately distinct classification. Spain and Catalonia appear to have somehow oversimplified rules, although it may be argued that such a structure is in favour of simplicity and efficiency in enforcement.

This impression of loose austerity is maintained in terms of sanctions for Spain and Catalonia. The fines prescribed are relatively low, although in Greece they appear to be even lower, indicating that speeding has not been treated with caution so far, maybe because the society is not well prepared to accept stricter regulations. Portugal shows a better understanding of the importance of a strict framework dealing with speeding. Fines are a lot higher and many cases are discriminated based on vehicle and road type.

The extent of the problem appears to be significant in all territories. Starting from the impression drivers have about speeding, SARTRE 3 survey offers recent results on a sample of drivers asked in all territories. In all cases drivers tend to admit speeding only in small proportions. Typical values would be in the range of 20% on motorways, with the impressive exception of Spain, where drivers are more honest (46%). Spain exhibits a similarly higher value with respect to high-speed roads (33%), while Portugal follows with 24% and Greece lags behind with a poor 15%, which explains the unreliability of drivers impression. Responses were almost identical on country roads (close to 15%). Finally, in urban areas the proportions were rather low (11% for Portugal, 7% for Greece and 4% for Spain).

Portugal and Spain (including Catalonia) provides data on actual speed observed; Portugal separately for cars and trucks, Spain for all vehicle classes, and both on various road types. In terms of a well-organized recording system that goes to reasonable detail, there is also information on the proportion of drivers breaking a limit. The comparison with the responses of SARTRE 3 verifies that drivers tend to underestimate their travelling speed. Violators are almost 65% on motorways, 56% on lower-speed interurban roads and 35-70% on urban area roads, depending on the level (there are three levels). This great discrepancy implies a moderate perception of actual speed, partly because of driving in high-speed environments generally. It can also be perceived as a tendency to avoid admitting an illegal (and potentially dangerous) behaviour.

In terms of accidents and casualties related to speeding, all participants include excessive speed as a main causal factor in accident reports that provide stored data. In Portugal it appears that almost 33% of fatalities are attributed to excessive speed. The respective proportion in Catalonia is also very high, 32%. Surprisingly, in Greece it appears to be in the order of 20% (15% lately), suggesting that there may be some underreporting of speeding as cause of fatal accidents.

Greece presents a more reasonable dataset as far as the ratio of speed-related fatalities over total injuries is concerned. This ratio takes a value of 0.12-0.13 for the summation of casualties across all road types. The other members of the Southern group exhibit pretty lower values, ranging from 0.035 (Portugal) to 0.06-0.07 (Spain & Catalonia). Generally, the value of this ratio becomes lower on roads with lower speed limits. Motorways and high-speed roads yield almost double values than urban area roads.

Portugal exhibits the greatest progress achieved in terms of absolute figures. Although the relative contribution of speeding to the total number of accidents or casualties has not really decreased, the country suffers constantly fewer speed-related road traffic victims. The situation is rather encouraging in Greece, where great progress is recorded since 1999, after a peak had been reached in reported casualties. In Spain and Catalonia the situation seems to be more or less stable in the last 5 years. Interestingly, 2001 appears to be the best among these years.

In all Southern group territories there are some factors that influence policies dealing with excessive speed somewhat adversely. It is regarded that the procedures related to speed management are affected both at law enforcement and sanctions application level. It is true that the use of automatic speed checking equipment is rather limited. Instead, radars are used commonly. This practice results to a possibility to realise a rather small number of checks annually, leading eventually to a smaller deterrent effect. There is evidence from Northern Europe countries illustrating the effectiveness of modern devices in this context. Generally the presence of speed checking equipment is indicated. Still, the effectiveness of the fact that in Greece drivers have to be warned they are speed-checked is rather questionable.

The structure of the system dealing with excessive speed sanctioning (in all countries) includes some procedures that also restrict efficiency overall. Speeding offences are generally not sanctioned as easily as in other countries, affecting the level of deterrence on drivers. It is observed that, on the long run, the legal system does not cope with the number of violations. Many offences may remain

unsanctioned due to the relatively short prescription period of 1 year. Moreover, the simplicity of rules is not adequately encompassed in the system, although it is recognized as a major principle in terms of efficiency. This is illustrated in the rather high number of different speed limits (especially in the case of Greece), although that is somewhat justified by the diversity in traffic composition.

The simplification of the procedures is also related to the issue of tickets by controlling forces. Notices are pre-printed and tickets can be issued on the spot, which is undeniably in favour of simplicity. Still, it will demand a more extended use of cameras as checking equipment in the future to have tickets automatically generated. This is the case in most Northern Europe countries when an offender is caught on camera.

Application of fixed-fee fines that can be paid on the spot is also promoting simplicity, especially since judicial systems cannot easily cope with the quantity of cases to be sanctioned. Courts generally intervene when the fine is contested or the offence is too serious just to be paid on the spot. It appears that Spain and Greece have established some simplified or specialized procedures to help judicial courts with their work.

7.7. Conclusions and country specific recommendations

Before an analysis at country level is presented, it is considered useful to make two general remarks with respect to all countries.

It is worth mentioning that the collected data do not take the quality of road infrastructure really into account. Generally, it can be accepted that speeding may be more frequent but less dangerous on motorways and well-maintained roads, while speed may not be that high in smaller roads but nevertheless have more severe consequences.

Another conclusion that should be mentioned is that the density of the traffic is not taken into consideration. The fact that conditions on roads become more and more congested can be translated to safety enhancement, since the global speed is reduced. On the other hand, it can be claimed that there is some danger because the possibilities of accidents increase almost proportionally with the number of vehicles.

Portugal has achieved the greatest progress among all territories of the Southern group. Between 1996 and 2001 figures demonstrate an impressive decrease of 50% in fatalities due to speeding. The respective proportions for seriously and slightly injured persons are 57% and 35%, showing overall that the strict legal framework and the intensification of the regulations' enforcement prove to be highly effective. Interestingly it is at the higher degrees of severity where the reductions are higher. This may have to do with a more direct relation of speed as a causal factor with severe rather than slight bodily harm. The ratio of fatalities over all injuries due to speeding across all road types is in the order of 0.035, which appears to be very low. In fact, it is a little higher on high-speed roads (0.05) and lower in urban areas (0.025).

The proportion of fatalities due to speeding as part of all road accident fatalities was 40% in 1998, to decrease even to 30% in 2000, before recovering slightly to 33% in 2003. a similar picture is obtained with respect to severe injuries, with the share of speeding reaching 38% in 1998 and gradually reducing to 31.4% in 2002. As for slight injuries, the situation is even slightly better (decrease of contribution from 37% in 1998 to 29% in 2002). These fractions remain rather high, though.

In Greece, from 1996 to 1998, fatalities, severe and slight injuries increased by 32%, 92% and 36% respectively. It is likely that this occurred due to a large growth new vehicle registrations that improved the stock of vehicles circulating in the country, combined with a moderate enforcement of existing regulations, and congestion due to major roadworks. In the following period from 1998 to 2003 the situation concerning the negative impact of speeding improved drastically. The total reductions mount up to 53% for fatalities, 66% for severe injuries and 70% for slight injuries. This may be attributed to the provision of major completed roads to traffic, as well as to the intensified enforcement of speed limits at all levels. The ratio of fatalities over all injuries due to speeding across all road types is in the order of 0.12-0.13, which appears to be reasonable. In fact, it is a little higher on high-speed roads (0.18-0.19) and lower in urban areas (0.09-0.10).

The proportion of fatalities due to speeding as part of all road accident fatalities was 20% in 2001. The respective value for severe injuries was 16%, compared to 9% for slight injuries. These fractions are somewhat lower than expected, indicating that there may be some underreporting of speeding as a cause of accidents. Still, if one accepts that this is systematic on data across years, it is interesting to observe that these proportions exhibit a trend identical to this of absolute numbers for all levels of casualties. In particular, the participation of speeding in fatalities evolved from 18% in 1996 to 23.5% in 1998, before going back to 15% in 2003. In the same fashion, severe injuries moved from 13.7% in 1996 up to 18.6% in 1998 and back to 12.8% in 2003. Finally, slight injuries were 8.4% in 1996 and 11.6% in 1998, to go down to 5.6% in 2003.

Spain reveals a picture of limited changes in absolute terms. During the period 1998-2003 the number of casualties in accidents caused by excessive speed has remained practically constant. In fact, fatalities and slight injuries reveal a slight increase (4% and 16% respectively). This does not necessarily imply that the situation is unsatisfactory. It may well be the case that the police had already by 1998 achieved high enforcement levels –illustrated by some 15 million-vehicle checks performed annually. The ratio of fatalities over all injuries due to speeding across all road types is in the order of 0.06, which appears to be rather low. In fact, it is a little higher on high-speed roads (0.08-0.09) and lower in urban areas (0.04).

The share of speeding in all road traffic accidents fatalities appears somewhat larger (27% in 2003, instead of 24% in 1998). A similar pattern is the feature of severe injuries (from 20.5% to 23.7% in the same period). Slight injuries due to speeding represent constantly close to 15% of all slight injuries.

Catalonia tends to resemble to the rest of Spain a lot, with respect to those examined indicators which are comparable across all countries. Annual fatalities suffered are almost the same between 1998 and 2003, whereas injuries generally have decreased in absolute terms by 35%. The ratio of fatalities over all injuries due to speeding across all road types is in the order of 0.06, which appears to be rather

low. In fact, it is a little higher on high-speed roads (0.10), lower on rural roads (0.07-0.08) and much lower in urban areas (0.02, by far the lowest among all investigated countries/regions). The share of speeding in all fatalities has increased noticeably from 27.3% to 33.4%, possibly due to changes in police reporting procedures.

Catalonia has recently deployed speed cameras with an automated fining procedure. This is the first territory-wide deployment of this measure in the Southern countries studied. Initial results from this application appear very promising.

8. Pedestrians

8.1. Introduction

Pedestrians are recognized as “vulnerable” road users, basically due to their sharing, in many instances, the same facilities with motorized vehicles, which present huge differences as regards not only the level of protection of their occupants, but also their motion, especially in terms of mass and speed. This “vulnerability” is reflected in the accident records of many countries showing high frequency values, especially for certain groups of users (as the younger and the older) and for the most critical consequences (serious injuries and deaths).

Although pedestrian accidents are mostly expected in urban road networks, where walking accounts for a considerable share of the overall trips, their incidence in non urban roads is also a problem, namely as regards their severity, related to the higher speeds of the vehicles. Among these, night accidents involving pedestrians are sometimes also pointed out as relevant.

In the following chapters, after an assessment of the extent of the problem and of the availability of data related to this specific case in each Southern country, general and detailed characterisations are made on the pedestrian safety levels in those same countries. Measures already taken to improve that situation are also presented. Thereafter some explanations are given on some of the similarities and differences encountered. Finally some conclusions are drawn, and country specific recommendations presented.

8.2. Extent of the problem

In Portugal, pedestrian accidents show particularly adverse fatality rates, compared to other EU countries. In fact, whereas the fatality rate for car and truck occupants is 140% the average rate for the EU (15 countries – 2002), this ratio rises to 210% in the case of pedestrians. In absolute terms, however, the number of pedestrians killed in road accidents has fallen considerably since 1990 (691 in 1990 to 240 in 2003). The actual number is still high though, as it accounts for 14.3% of the total fatalities in road accidents in Portugal (see Figure 8.1).

In view of this situation, pedestrian safety was considered one of the priority operational objectives within the framework and scope of the National Road Safety Plan, issued in 2003 (PNPR, 2003). The importance given to the improvement of this situation is also shown by the fact that, although the overall target of the said Plan is a 50% reduction, until 2010, of fatalities and serious injuries in road accidents, that targeted reduction is raised to 60% in the case of pedestrians.

In Greece pedestrian accidents also reveal notably high fatality rates (see Figure 8.1). In absolute terms, the number of pedestrians killed in road accidents had only marginally decreased between 1990 and 1998 (from 444 to 417). In fact, the number of annual pedestrian fatalities had remained practically constant until 1998. It is only since 1999 that a visible decrease has been recorded (from 417 fatalities in 1998 to

249 in 2003). According to the latest available values for 2003, the situation has also slightly improved in relative terms, as pedestrians account for 15% of total road accident fatalities. It should be noted that the share of pedestrians used to be quite higher in the past (22% in 1998).

In Spain, killed pedestrians accounted for 13% of the 30-day fatalities in 2002. The trend in pedestrian fatalities (per million population) is steadily downwards from 1998 onwards. In absolute terms, the number of pedestrians killed in road accidents since 1994 had a small decrease (from 1008 in 1994 to 787 in 2003).

For Spain (and Catalonia), the Reglamento General de Circulación (General Traffic Code) Articles 121 to 125, of 1992, contains a section setting out the codes of behaviour to which pedestrians must comply. These include the definition of certain ways where pedestrians are not allowed to cross (i.e. motorways) or where pedestrians crossing is controlled by a traffic signal (prohibition to cross on red). Infringements by pedestrians are usually not considered to be of a serious nature (and thus incur a fine of up to 91 Eur.).

Pedestrian fatalities are a slightly higher proportion of total fatalities in Catalonia (14.6%) than in Spain as a whole, but still lower than in Greece and Portugal (see Table 8.1). The proportion of young pedestrian fatalities is the highest for Catalonia (2.2%). The Catalan trend shows no improvement in the reductions achieved up to 2000. In absolute terms, the number of pedestrians killed in road accidents since 1994 had a small decrease (from 179 in 1994 to 118 in 2003).

2003	Under age 25	Age 25-64	Over 64	Total
Greece				
Number	24	77	148	249
Percentage	1.5%	4.8%	9.2%	15.5%
Portugal				
Number	28	92	120	240
Percentage	1.8%	6.0%	7.8%	15.5%
Spain				
Number	93	319	305	717
Percentage	1.7%	5.9%	5.6%	13.3%
Catalonia				
Number	17	36	59	112
Percentage	2.2%	4.7%	7.7%	14.6%

Table 8.1. Pedestrian fatalities as percentage of all fatalities (2003).

Note: Unknown age victims are excluded

8.3. Availability, quality and comparability of data

From road accident statistics it is possible to obtain a satisfactory level of information on pedestrian accident circumstances, and on some of the past trends (since 1988 for Portugal and Greece, and since 1994 for Spain and Catalonia).

Moreover, detailed data is available, associated to factors such as age groups, location (urban and rural) and time period (month, day of week, hour and time of day – daytime and night time).

For Portugal, Greece and Spain some exposure data related to pedestrians (e. g. total distance walked per year) is available for a specific year (DGET, 2004). However, there is no possibility to obtain from previous surveys or studies more detailed and useful exposure indicators for pedestrian accidents risk assessment, such as those referring to the number and type of roads crossed per trip and to the average distances walked on streets and roads. For Catalonia, a study is underway that should provide exposure data for pedestrians for 2004, but no data is yet available.

In Table 8.2, pedestrian fatality risk in Portugal, Greece and Spain and in the Sun countries is shown (source: Statistical pocketbook 2003). Portugal reveals a much higher value than those obtained for the SUN countries (e.g. three times the risk found for Sweden), whereas the distance walked per population is of the same magnitude. Greece and Spain also show higher risk levels than the SUN countries.

2000	Distance walked 1000 million person km	Deaths per 1000 million person kms	Population million	Person km per population
Greece	4.1	91.5	10.9	376
Portugal	3.5	109.7	9.9	354
Spain	14.7	61.1	40.4	364
Sweden	3.0	24.3	8.9	337
Britain	20.0	42.9	58.1	344
Netherlands	4.3	24.7	15.9	270

Table 8.2. *Pedestrian fatality risk related to distance walked (2000).*

There are other useful indicators concerning the typology of pedestrian accidents, such as the following, included in a case study presented in 2003 by CETE (Centre d' Etudes Techniques de l'Equipment du Sud-Ouest):

- the ratio between the number of accidents involving pedestrians and the total number of road accidents (accident rate);
- the ratio between killed pedestrians and pedestrian accidents (severity rate);
- the ratio between pedestrian accidents and the population.

Specifically for Greece, for data regarding the period from 1992 to 1997, the rate of pedestrian accidents was estimated at 2.4 per 1 billion inhabitants, which is regarded as an average value. Especially for this indicator, a useful comment was produced: "due to the fact that each inhabitant is a road user, at least as a pedestrian, this rate can be used as a comparable variable over the EU countries, the population being considered as the exposure factor with regard to pedestrian accidents". Of course, this also depends on other variables, which may affect the number of kilometres that pedestrians walk on average, such as weather conditions. This may explain why it is expected that in countries like Greece pedestrians exposure should be greater than in North European countries. The average proportion of accidents involving pedestrians was then calculated to be equal to

18.3% of all road accidents. This was considered a rather high value; the same applies to the fatality rate of pedestrian accidents that was found to be 10.9 fatalities per 100 accidents.

The provision of facilities dedicated to pedestrians (or to their special protection) allows for total or partial segregation with respect to motorized traffic; this can influence the level of accident risk exposure. Having said that, none of the Southern countries and region are currently able to access geographic information databases or other tools that could provide measures of the extent to which such facilities have been deployed. Furthermore, no data is available to indicate the number of kilometres of urban roads that are subject to 30 km/h speed limits (rather than the standard 50 km/h limit).

8.4. Differences in safety levels

8.4.1. General trends

In Figure 8.1, trends for pedestrian fatality rates (fatalities per million population - FMP) are shown, for a 15 year period (1988-2003). It should be stressed that there is an overall decrease tendency for the rates of the three countries and the autonomous region, converging to their present values, which fall in the interval between 20 and 30 FMP. However, past values and trends show some differences. In the case of Portugal, extremely high rates in the 80s (around 80 FMP), started to fall since the beginning of the 90s, until now, in a more or less steadily decrease rate, achieving near a 70% reduction in the whole period. In the case of Greece the fatality rates, although smaller than those of Portugal, were still high (around 40 FMP) and remained almost constant for a long period (1988 to 1999), their reduction having started only since the end of the 90s. Some similarity can be observed in the other two cases, Spain and Catalonia, both presenting, in 1994, lower values (20 to 30 FMP) than the former two, which remained almost constant until 1999, and showing a small decrease tendency since then.

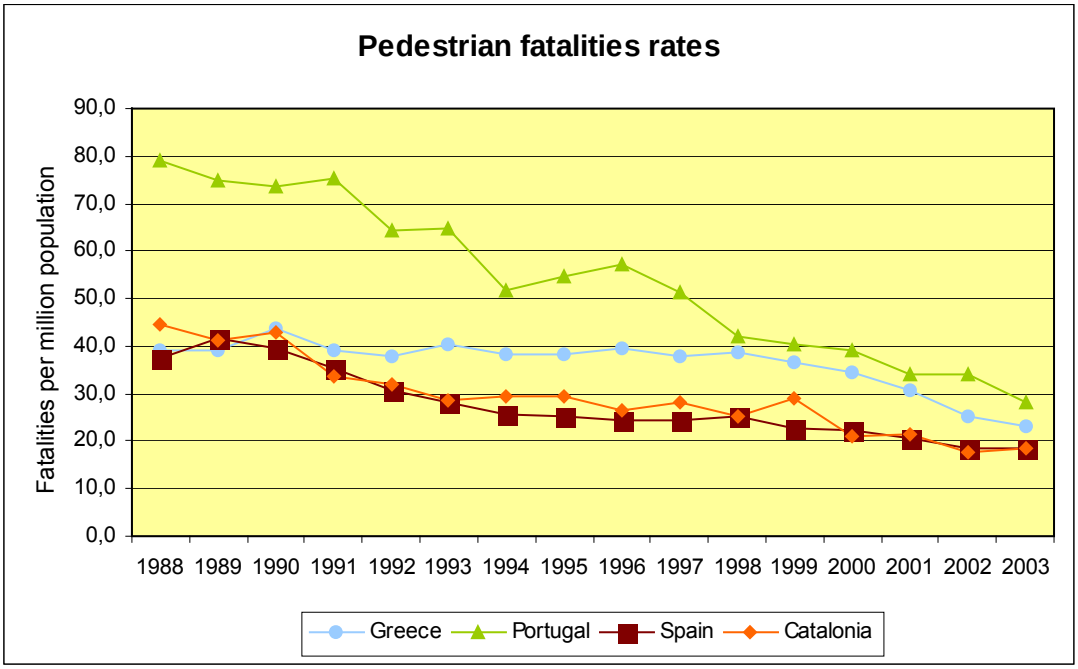


Figure 8.1. *Pedestrian fatality rates.*

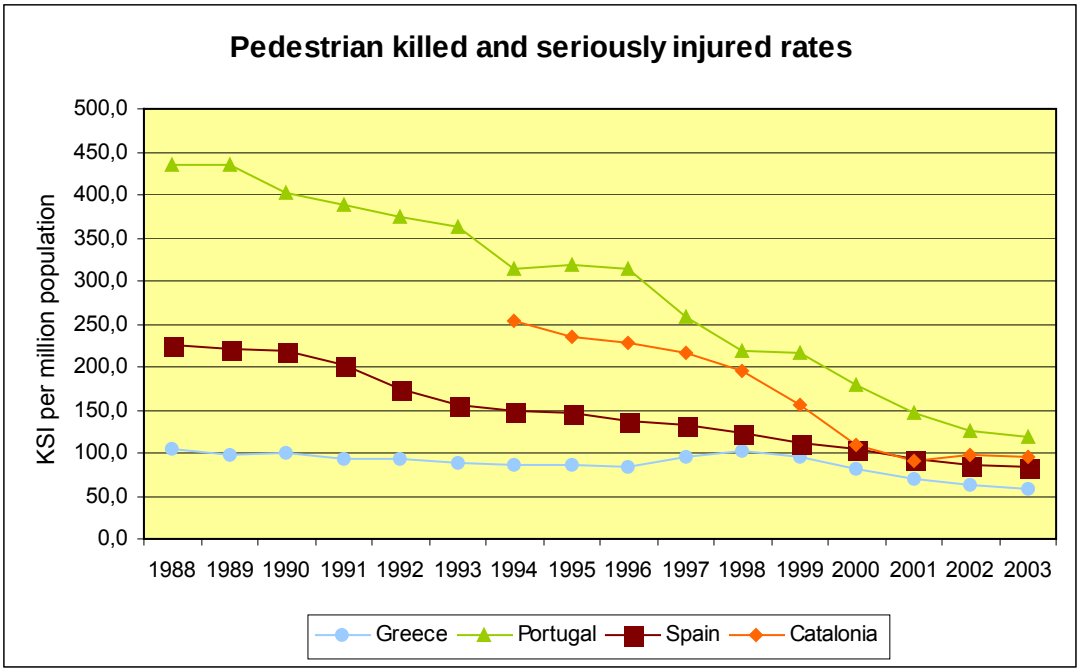


Figure 8.2. *Pedestrian killed and seriously injured rates.*

Rates for killed and seriously injured pedestrians (KSI - see Figure 8.2), show similar trends as those related just to killed pedestrians, stated above. However, in the case of Greece, notice should be taken to the fact that, contrarily to the former case, the rates are, for the whole period under consideration, below those of the other countries and autonomous region, and almost constant until 2000. In this

case, there is a possible influence of under-reporting as far as seriously injured pedestrians are concerned. Differences in trends between Catalonia and the whole of Spain are more evident than in the case of killed pedestrians, until 2000, with higher rates for Catalonia, converging since then.

In the three countries and autonomous region, the rates for total pedestrian casualties (CMP) (see Figure 8.3), show different patterns in the trends, over time, when compared to fatality and KSI rates. In fact, for Greece, Spain and Catalonia (after 1993) these rates present very slow decreases and almost constant yearly values. On the contrary, Portugal presents, since the beginning of the 90s, a more pronounced decrease rate. Presently the highest rates are observed for Portugal (around 800 CMP) and the lowest for Greece and Spain (around 300 CMP), with Catalonia in between (around 600 CMP). In the case of these rates, under-reporting may also be an issue to consider. The lack of adequate exposure data on pedestrian trips, for the three countries and the autonomous region, is also a disadvantage, as it could provide better indicators for comparison purposes.

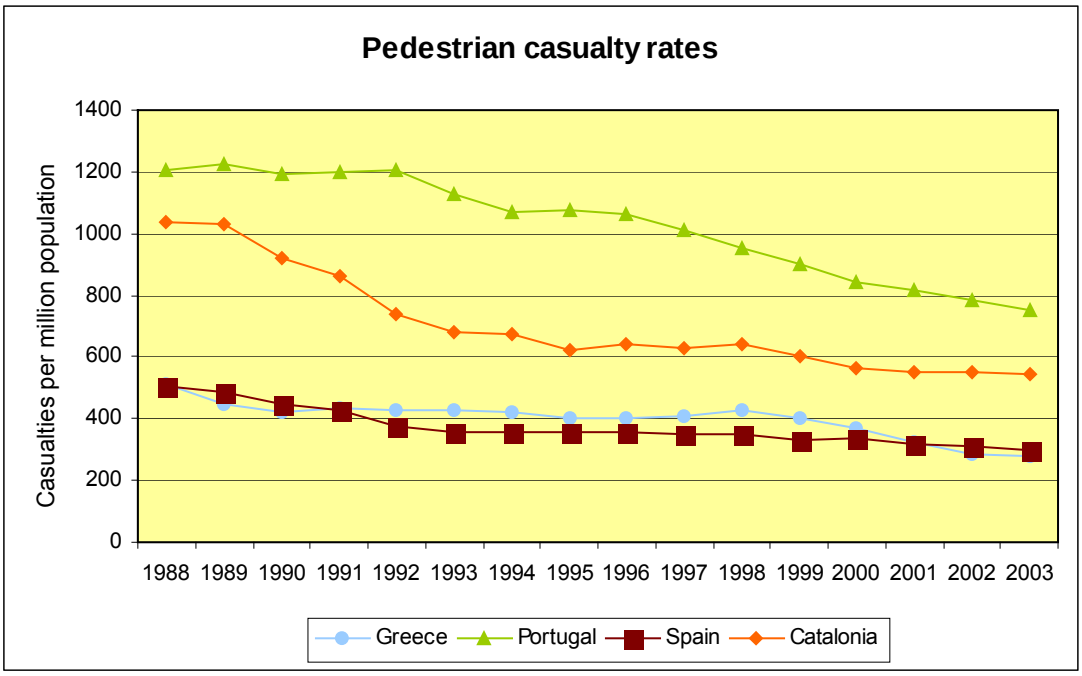


Figure 8.3. *Pedestrian casualty rates.*

8.4.2. Further analysis

Besides the indications given by absolute values and general trends, presented in the previous section, a more detailed comparative analysis is possible with available disaggregated data, namely as regards: vehicle types involved in fatal collisions with pedestrians; the age group of the victims; the geographic location of pedestrian accidents (road category); and the variation over time of pedestrian accident occurrence (weekday/weekend, day time/night time, hour of day). Furthermore, some insights can be obtained on the perception and attitudes of drivers, relating their driving behaviour to pedestrian risk, through their response to enquiries, such as SARTRE.

As regards collisions, data from Portugal, Greece, Spain and Catalonia (see collision matrices –Table 8.3), show that the main type of vehicles involved in pedestrian deaths are passenger cars. In the case of Portugal their percentage in terms of all pedestrian deaths is the highest (80%), followed by Spain and Catalonia (65% and 60%), while Greece presents the lowest (54%), as other types of vehicles have also a significant involvement, as lorries (25%) and motorcycles (13%). These latter values are more similar to those exhibited by the SUN countries, especially the Netherlands.

Pedestrians deaths in collision with:								
2003	Pass. Car	Lorry	Bus	Motorcycle	Moped / cycle	Train / Tram	Other	Total
Greece								
Number	139	63	6	33	2	0	14	257
% of all deaths	8.7%	3.9%	0.4%	2.1%	0.1%	0.0%	0.9%	16.0%
% of all pedestrian deaths	54%	25%	2%	13%	1%	0%	5%	100%
Portugal								
Number	73	6	1	0	2	0	9	91
% of all deaths	8.5%	0.7%	0.1%	0.0%	0.3%	0.0%	1.1%	10.6%
% of all pedestrian deaths	80%	6%	1%	0%	3%	0%	10%	100%
Spain								
Number	513	47	24	22	23	2	156	787
% of all deaths	9.5%	0.9%	0.4%	0.4%	0.4%	0.0%	2.9%	14.6%
% of all pedestrian deaths	65%	6%	3%	3%	3%	0%	20%	100%
Catalonia								
Number	71	8	4	5	5	0	25	118
% of all deaths	9.3%	1.0%	0.5%	0.7%	0.7%	0.0%	3.3%	15.4%
% of all pedestrian deaths	60%	7%	3%	4%	4%	0%	21%	100%

Table 8.3. *Collision matrices involving pedestrians.*

Regarding the percent distribution of pedestrian fatalities by age groups, there is evidence of the high incidence on the age group over 60, reaching more than 50% in the cases of Greece, Catalonia and Portugal (Greece more than 60%), and a little less than 50% in the case of Spain. In all other age groups the percentages for the three countries and the autonomous region are generally below 10%, except in the cases of Catalonia, with a higher percentage in the 20-29 age group, and Portugal and Spain in the 40-49 and 50-59 age groups. Apart from explanations due to local circumstances, these differences in rather small absolute numbers, may also be related to annual random fluctuations in the particular year under consideration.

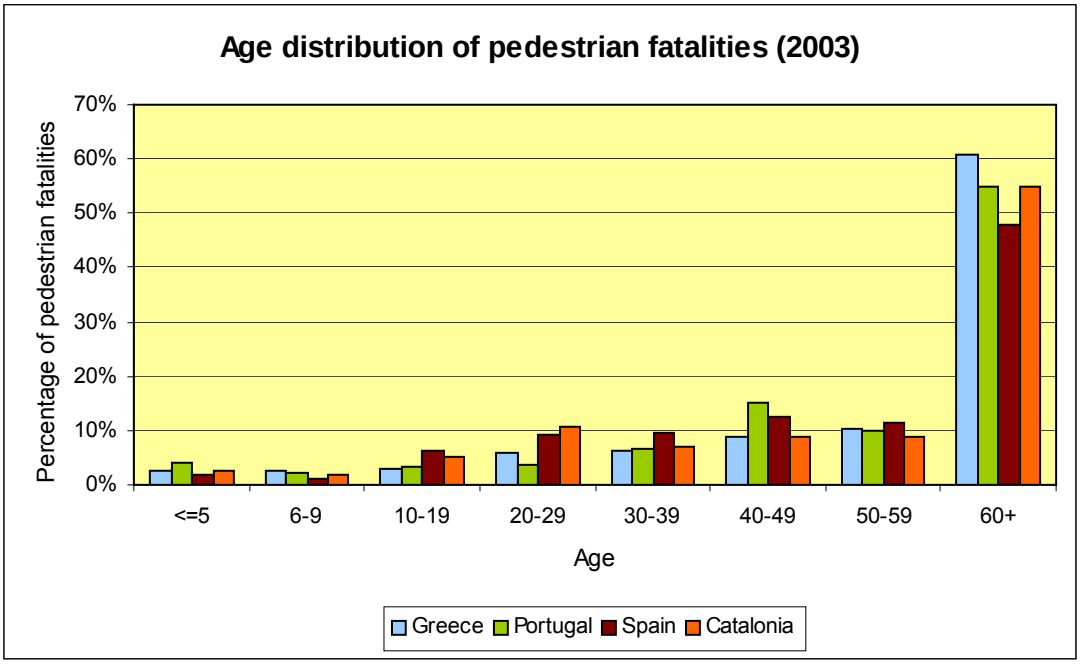


Figure 8.4. *Age distribution of fatally injured pedestrians.*

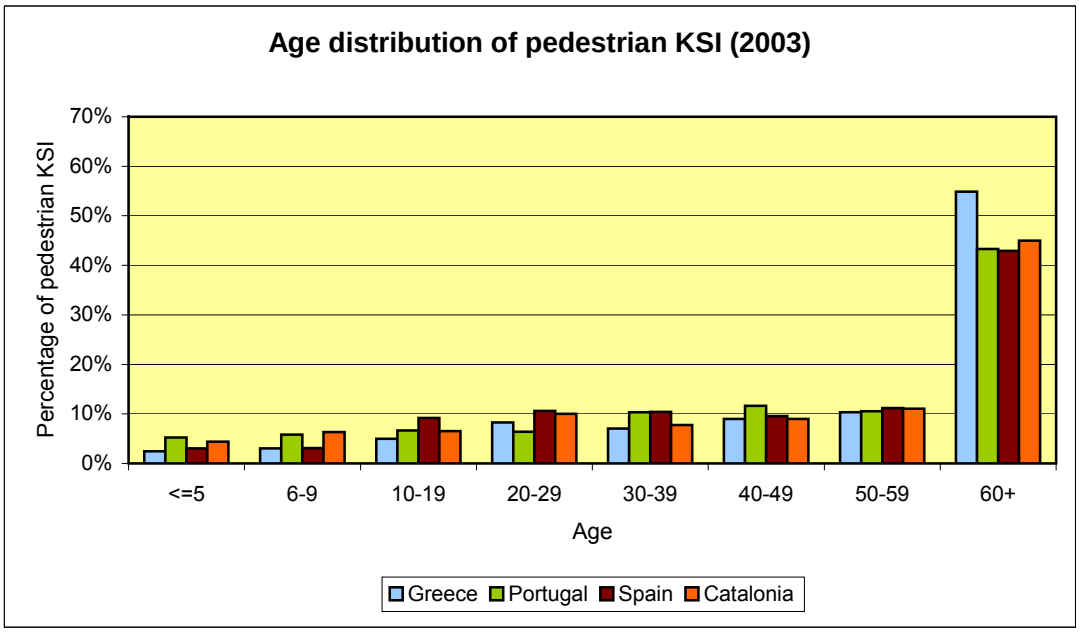


Figure 8.5. *Age distribution of killed and seriously injured pedestrians.*

When considering killed and seriously injured (KSI) pedestrians (Figure 8.5), the general pattern is similar to the previous one, although the percentage of KSI pedestrians aged over 60 (between 45% and 55%) is lower than in the case of fatalities, and more uniformly distributed by the other age groups, showing an increase in the lower age groups (under 5 and 6-9). This tendency is reinforced when the percentage of all casualties are taken into account (Figure 8.6). In this latter case, the age group over 60 shows percentages between 32% and 35%

(except for Greece with 44%), while in the other groups, the percentages are increased, although slightly for age groups under 5 and 6-9 years old.

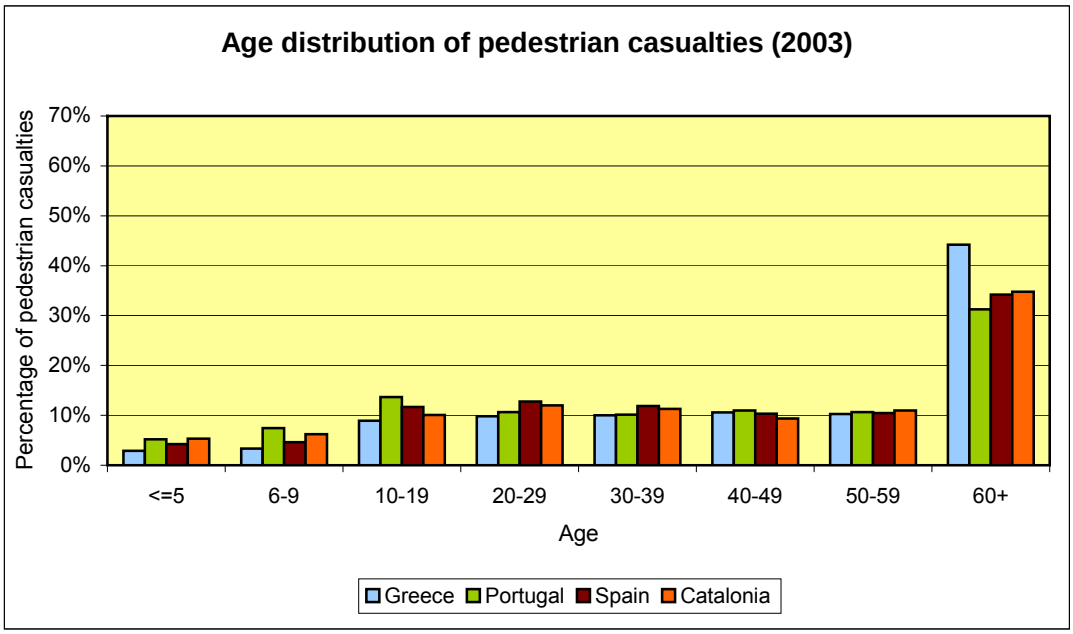


Figure 8.6. Age distribution of pedestrian casualties.

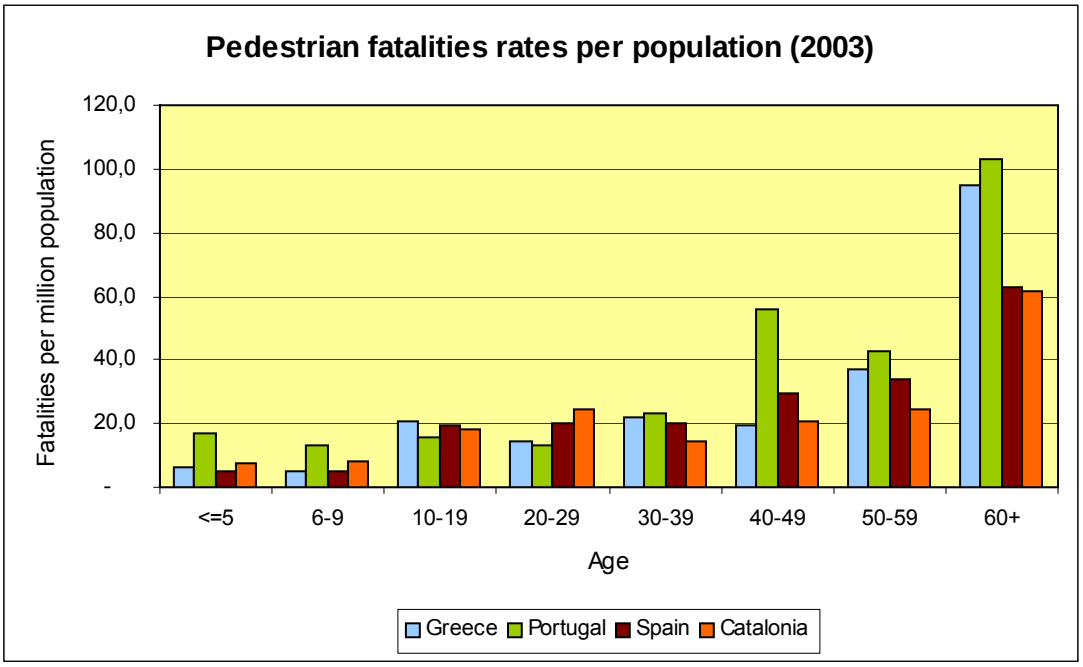


Figure 8.7. *Age distribution of pedestrian fatality rates per million population.*

When exposure, in terms of population, is taken into account, a more clear distinction is reached between age groups for the three countries and the autonomous region. As far as fatality rates are concerned (Figure 8.7), there is evidence of higher rates for Portugal and also for Greece in most of the age groups, but especially in the groups over 40 years old and in the youngest (less than 9 years

old), with Spain and Catalonia presenting higher rates in the group from 20 to 29 years old.

When adding seriously injured pedestrians (KSI –Figure 8.8), the main differences are clearly related to the higher rates exhibited by Portugal in almost all the age groups, only shared with Catalonia for groups 6-9 and 20-29 years old. In these rates there is a tendency for two peaks, one in lower age groups (from 6 to 19 years old) and another in the other extreme, corresponding to the eldest pedestrians, with ages over 60 years. Here mention should also be made to the comparatively low rates shown by Greece in most of the age groups, which are not in accordance with the values Greece presents for the other rates and percentages. This fact was already mentioned above, related to Figure 8.2.

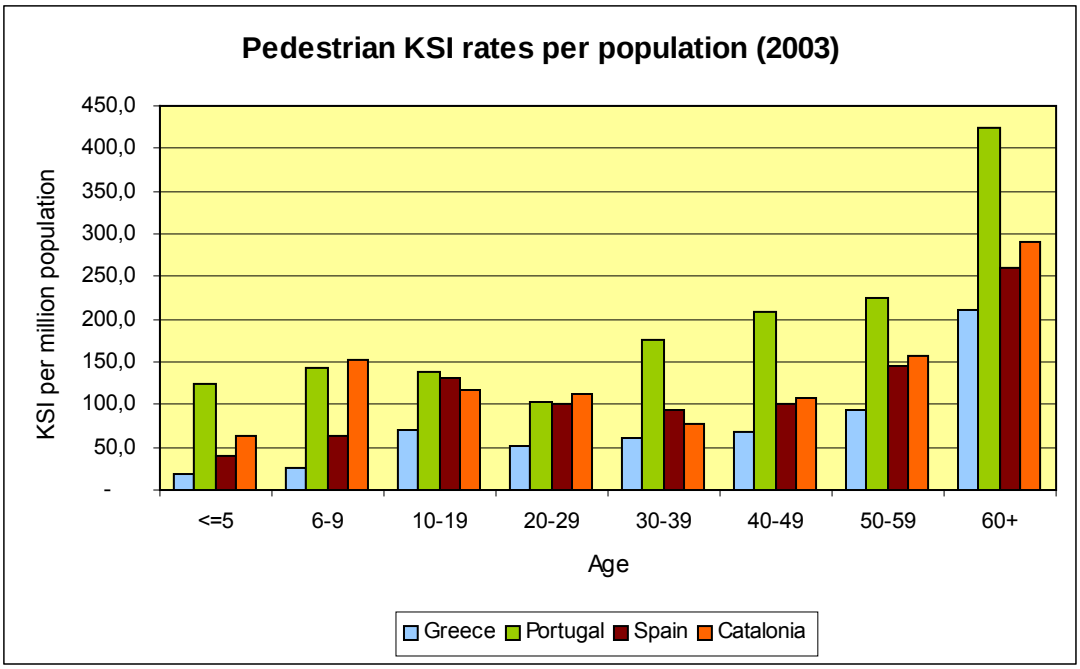


Figure 8.8. *Age distribution of killed and seriously injured pedestrian rates per million population.*

As shown in Figure 8.9, accidents resulting in killed pedestrians are located mainly in urban road environments for the case of Portugal (67%), Catalonia (68%) and Greece (72%). Only in the case of Spain a higher percentage of these fatalities are reported as having occurred in rural road networks (54%). However if all pedestrian casualties are considered (Figure 8.10), there is a much higher incidence in urban environments (over 80%) for all the three countries and the autonomous region, which can be explained by a larger amount of pedestrian exposure (more accidents in urban areas) associated with lower speeds than in rural roads (more serious accidents outside urban areas).

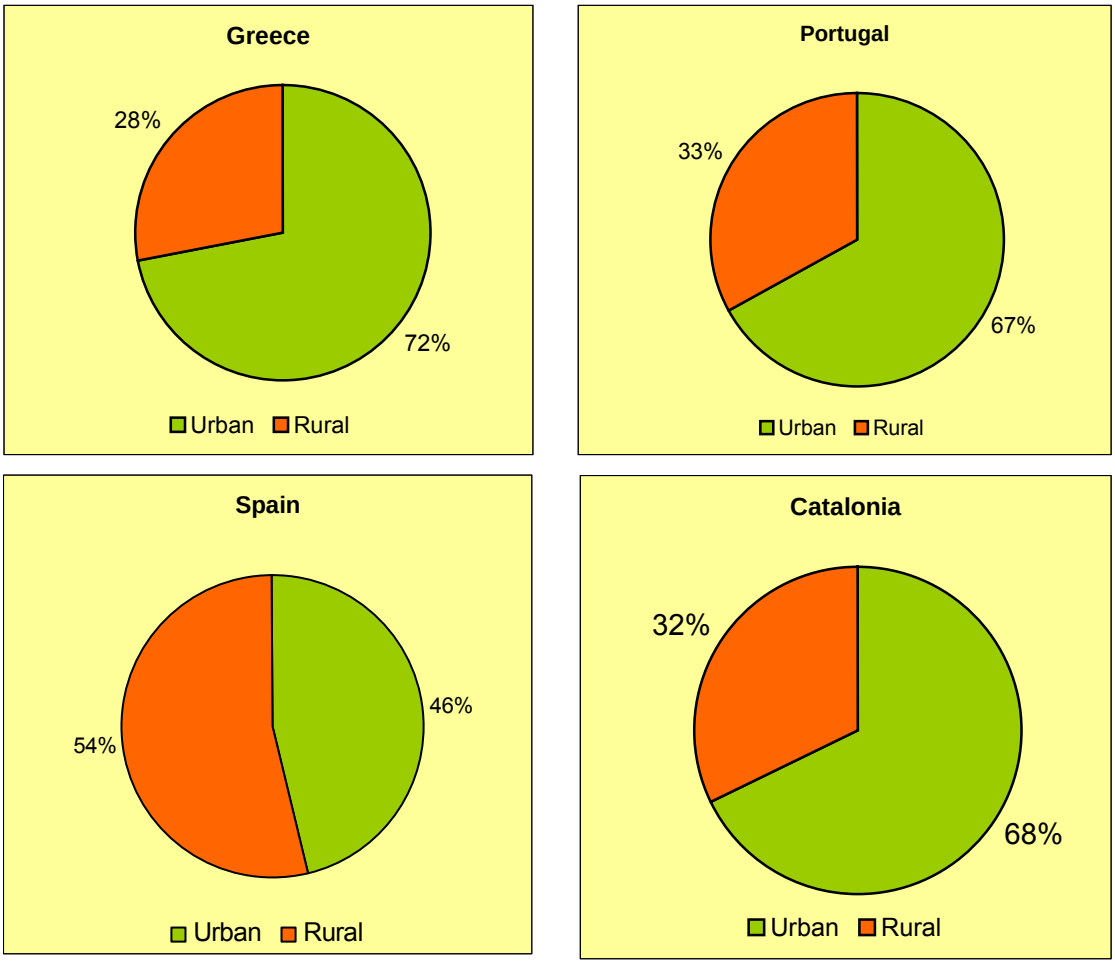


Figure 8.9. *Percentage of killed pedestrians according to accident location (2003).*

It is also possible to consider separately the situation on through roads (Figure 8.10), where pedestrian casualties are usually fatal and serious (KSI), due to speed and environment conditions. This case presents higher percentages for Portugal (16%), next for Greece (9%) and lower percentages for Catalonia (4%) and Spain (3%).

A more detailed analysis of the above distributions is also possible, regarding lighting conditions. Figure 8.10 shows that in urban roads there are higher percentages of casualties at day-time than at night-time (almost the double in case of Greece and around the triple in case of Portugal, Spain and Catalonia). On the other hand, in rural roads, the three countries and the autonomous region present percentages for day-time approximately equal to or slightly higher than those for nigh time. The same is observed in the case of through roads, except for Portugal, with higher day-time percentages.

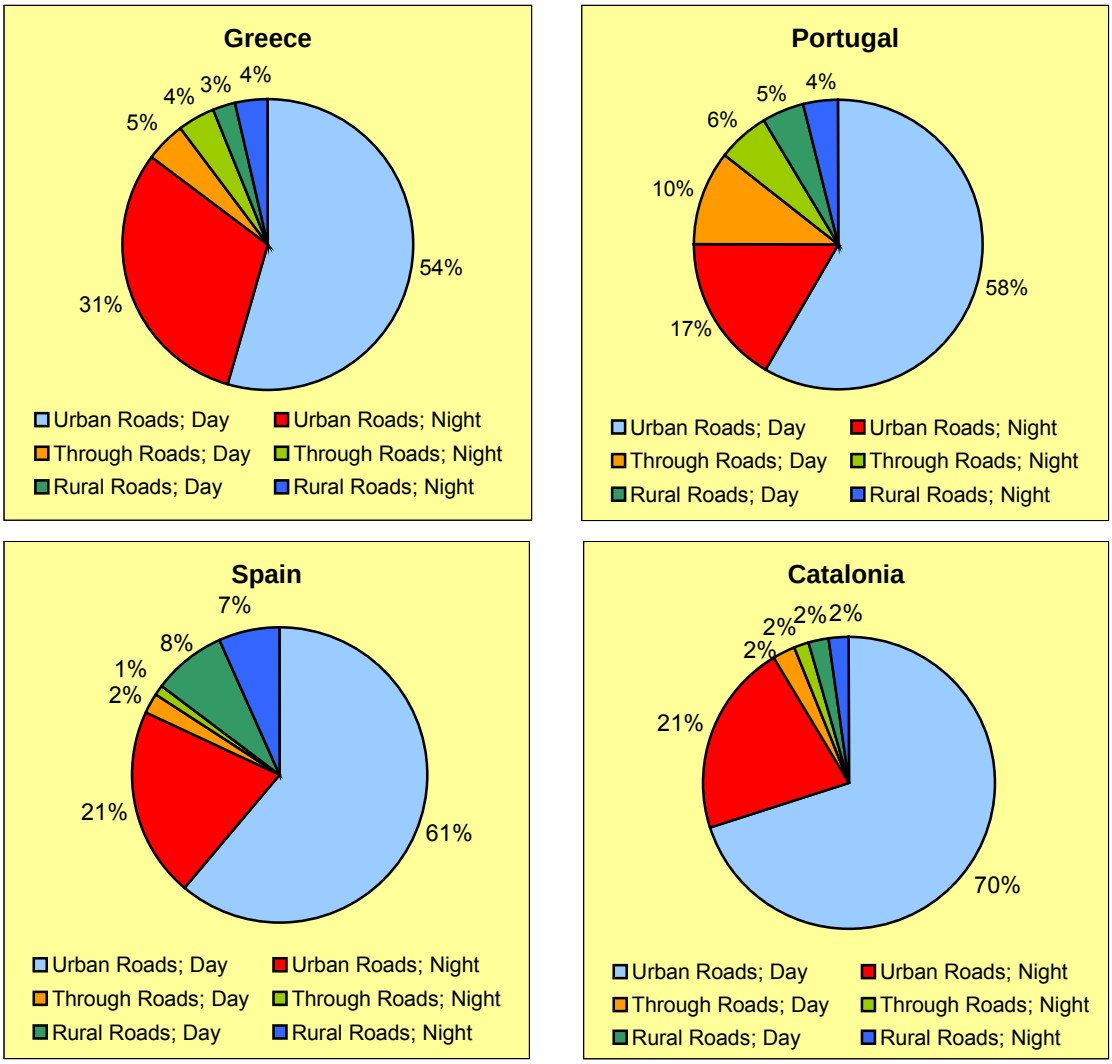


Figure 8.10. *Percentage of all pedestrian's casualties in rural roads, through roads and urban roads, according to lightning conditions (2003).*

In terms of distribution over time, the percentage of pedestrian casualties observed on different days of the week (Figure 8.11), reveals a very similar pattern for the three countries and the autonomous region. There is an average percentage of 15% from Monday to Thursday, which becomes a little higher on Friday and decreases to around 10% on Sundays.

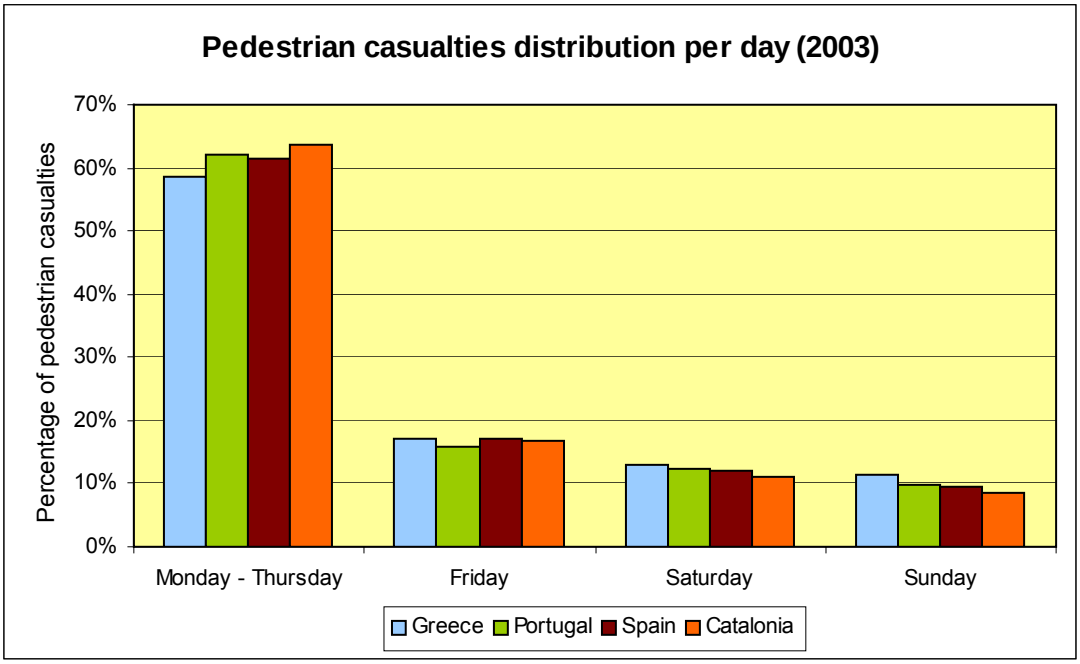


Figure 8.11. *Pedestrian casualties by day.*

The percent distribution of pedestrians killed on road accidents by hour of day, for the cases of Portugal, Greece, Spain and Catalonia (Figure 8.12), shows a bigger concentration in the period from 18:00 to 20:00 (over 25% in Portugal and between 15% and 20% for the others) and from 20:00 to 22:00 (over 15% in Spain), and also a local peak (12,5%) from 12:00 to 14:00 for Catalonia.

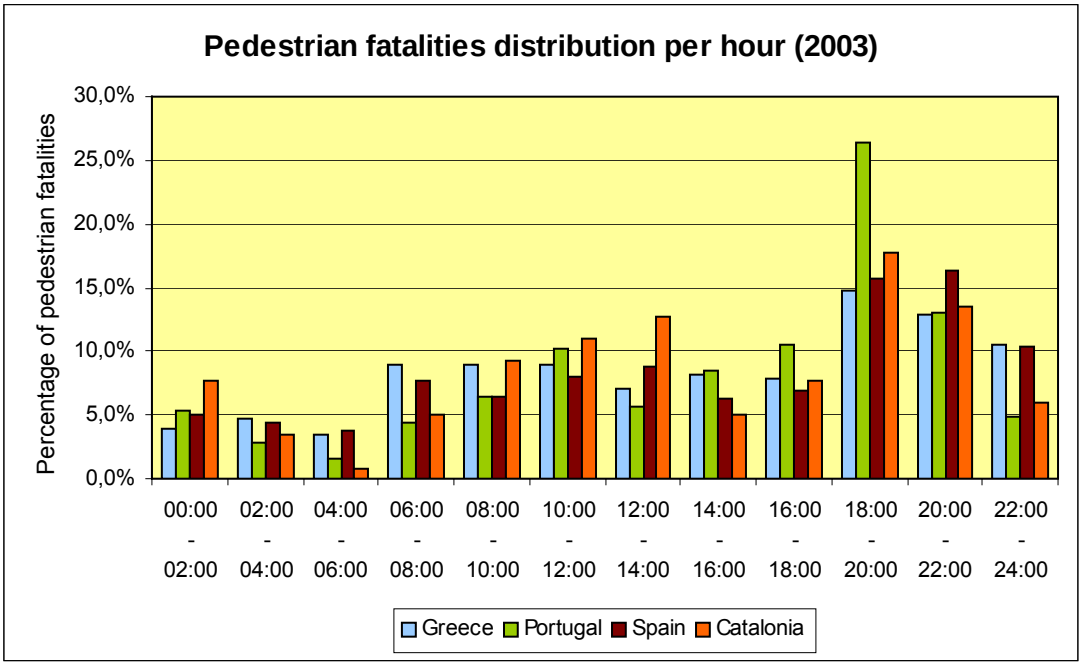


Figure 8.12. *Percentage of killed pedestrians by hour of day.*

If killed and seriously injured pedestrians are considered (Figure 8.13), the countries and the autonomous region show more similar percentages within each time period,

revealing a local peak between 10:00 and 14:00, and also maximums from 18:00 to 20:00 (Portugal and Catalonia) and from 20:00 to 22:00 (Spain and Catalonia).

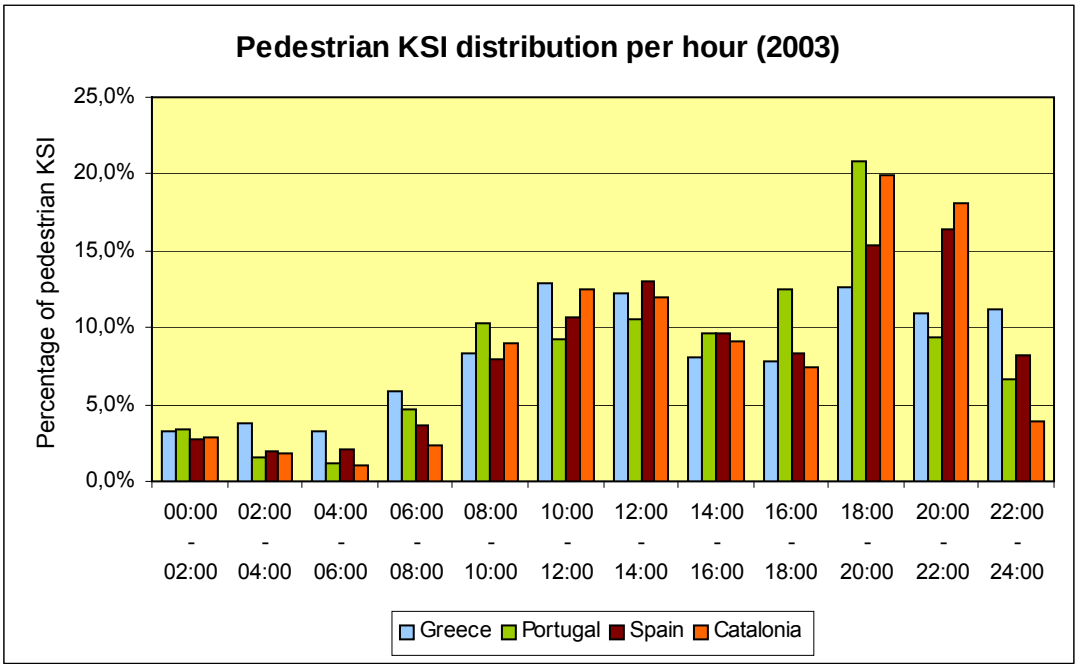


Figure 8.13. *Percentage of killed and seriously injured pedestrians by hour of day.*

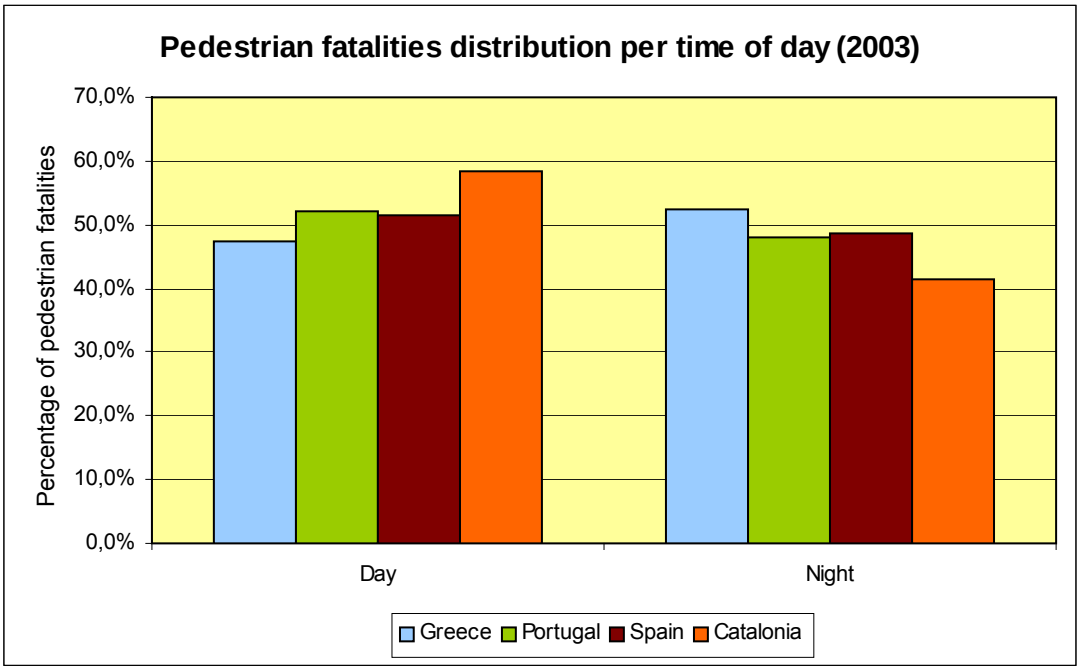


Figure 8.14. *Proportion of pedestrian fatalities by time of day.*

The percent distribution of pedestrian fatalities according to lighting conditions (day-time and night-time – Figure 8.14) for the three countries and the autonomous region, shows in general a certain balance between the two situations (values between 40% and 60%). However the higher percentages are not one sided,

because in the case of Catalonia those percentages correspond to day-time, whereas for Greece they correspond to night-time, being almost equal in the cases of Portugal and Spain.

Although revealing attitudes rather than the actual behaviour, the responses given by drivers to SARTRE 3 pan-European survey, in some questions related to the theme under consideration, may also provide some complementary information, which should be interpreted with the necessary caution.

As regards the responses on how much consideration should governments give to different road user groups (including pedestrians), the percentage of drivers that responded "very much" (Figure 8.15), in Portugal and in Greece, revealed some differences between the two countries. In the case of Portugal the higher percent (45%, near the average of 47,5% for all 23 countries) was given to pedestrians, the lowest (32%) to cyclists and in between (41%) for car drivers. On the contrary, in the case of Greece, there was a higher percent (42%) for cyclists and lower for pedestrians (35%) and car drivers (32%). This may show that there is awareness among Portuguese drivers on the high risk for pedestrians, and a prevailing opinion that Governmental actions are far from being satisfactory in this field. In the case of cyclists, respondent's attitude probably is more related to the fact that the cyclist population is comparatively small. Apparently this is not the case in Greece where more value is given to the risk for cyclists. In the case of Spain, the percentages are all very high (around 90%) for the three road user groups, and substantially higher than the average countries.

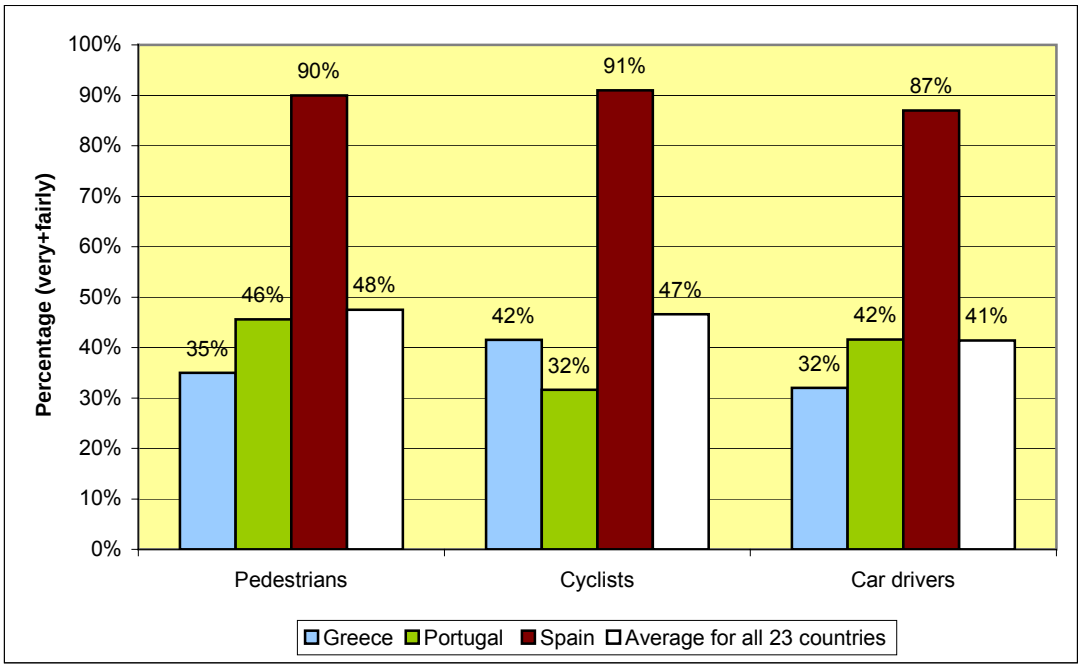


Figure 8.15. *How much consideration should government give to different road user groups (Sartre3).*

The opinion expressed by divers of Portugal, Greece and Spain, in SARTRE 3, on how often they stop at pedestrian crossings, giving way to pedestrians, show high percentages of positive ("always", "very often" and "often") responses (Figure 8.16) in the case of Portugal (91%) -above the average obtained for 23 countries (88,4%)

-, and also for Greece (86%), while in Spain those percentages are lower (69,0%). Since Portugal and Greece are two countries where pedestrians safety is a bigger problem than in Spain, as shown before, the explanation of this apparent contradiction, can be in the side of the pedestrians (they might frequently cross the streets out of the crossings), in the side of the infrastructure (reduced number of crossings, traffic signals next to crossings, problems with the criteria used for their locations and with the information given to pedestrians, etc.), and in the side of the drivers themselves, whose stated and actual behaviour may be different.

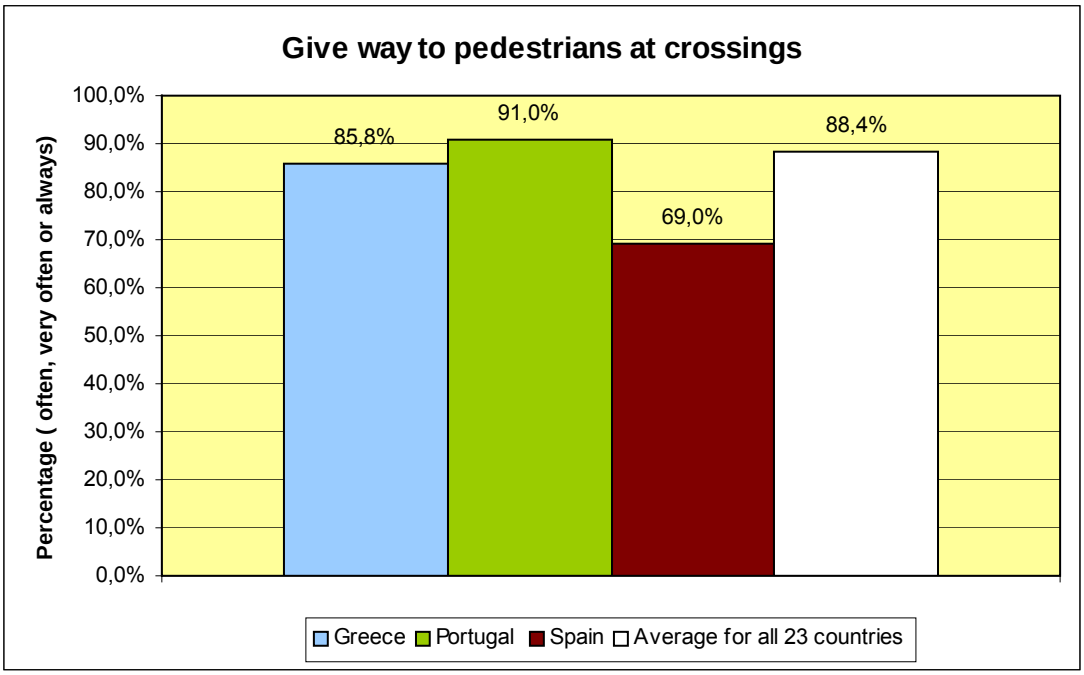


Figure 8.16. *Proportion of drivers giving way to pedestrians at crossings (Sartre3).*

Speed is a very important factor related to the severity of accidents involving pedestrians. The responses given in SARTRE 3 by drivers from Portugal, Greece and Spain, on the frequency they exceed speed limits on different types of roads (Figure 8.17) could provide some indications related to pedestrian risk. However, besides the subjective nature of this information and its weak relation with the concept of inappropriate speeds, there are other factors that must be considered as well, such as differences, from country to country, in speed limits and in criteria for their application, in the extent of excess speeds over the limit and in the types and characteristics of roads within the adopted classification. Moreover, the same inquiry has shown that, in general, the responding drivers consider that the other drivers exceed the limits more often than themselves. The responses show higher percentages of drivers exceeding speed limits in main roads for Portugal and Spain, and in country roads for Greece. In all these countries the lower percentages correspond to roads in built up areas. The percent values and their incidence were not very far from the average found for 23 countries, with Portugal and Spain over the average and Greece below, in the cases of main roads and roads in built up areas.

In this context, reference should be made to the case of Portugal, where a systematic study on the actual drivers' speeds (LNEC, 2003), which was also

referenced in the case study on speeds, reveals much higher percentages of excessive speeds for all types of roads, attaining over 70% in through roads, and well over 30% in minor urban roads, with 50 km/h speed limits. A conclusion is that drivers are usually not aware of how much they drive over the speed limit, especially in the cases where lower limits are applied, and these usually correspond to the zones with the highest number of pedestrian trips.

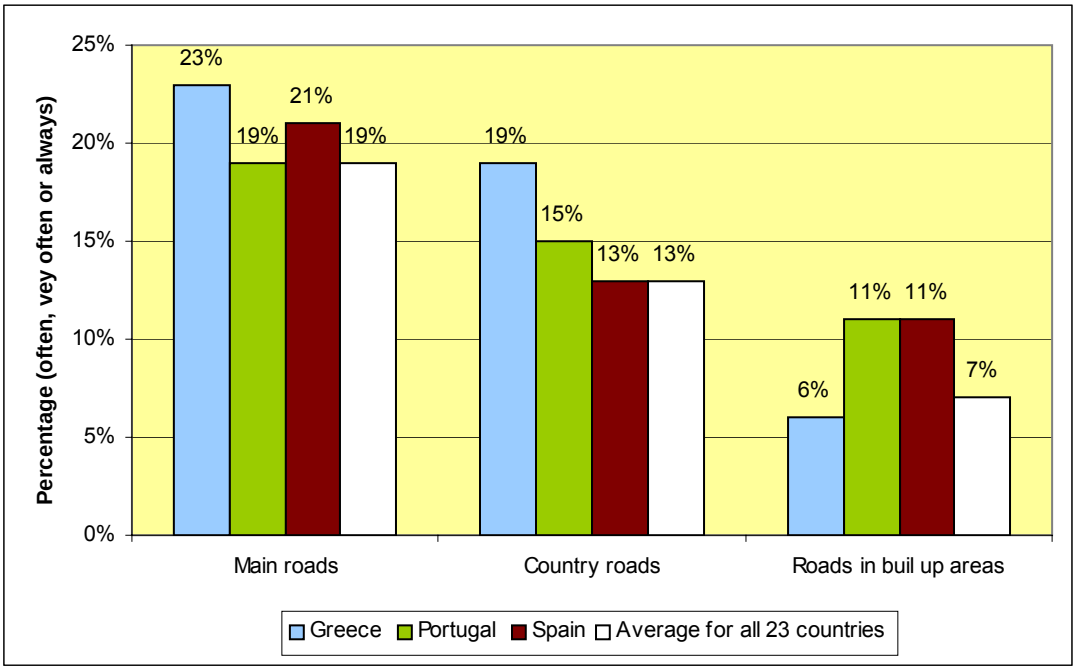


Figure 8.17. *Frequency of exceed speed limit on different types of roads (Sartre3).*

8.5. Interventions to reduce the risk

Pedestrian behaviour, driver behaviour and road and traffic conditions are considered the main factors related to this type of accidents, upon which safety analysis ought to be made and actions directed to.

In Portugal, the provision of facilities for pedestrians, under safety schemes, has not yet been put into practice in a generalized way. This kind of interventions has a punctual nature, undertaken at the local authority level. The same applies to the implementation of 30 km/h zones. Safety awareness campaigns directed to pedestrian safety have been, until now, the main actions undertaken on a nation-wide basis:

- Campaign to teach children how to walk on the road, and how to cross it (1982);
- Campaign addressing young road users on the way to school (1984);
- Campaign for pedestrian protection (1988);
- Campaign addressing speed, pedestrians, alcohol and seat belts (1992);
- Campaign addressing pedestrians, alcohol and seat belts (1996).

In Greece the existence of a systematic provision of facilities for pedestrians in terms of related safety schemes is rather questionable. In some cases, sidewalks construction or other facilities promotion and application have been recorded as a result of some special circumstance at local authority level. For instance, in view of the recent Olympic Games, hosted by the city of Athens, an extended renovation of existing sidewalks along central arterials and other roads was carried out. Reconstruction included the provision of specially designed tracks for the convenience of blind persons walking, as well as ramps, allowing the transition of wheelchairs from sidewalks to streets and vice versa.

Campaigns aiming at the enhancement of people's awareness on pedestrian related dangers have been organized, in Greece, from time to time, on a nation-wide basis. The Automobile and Touring Club of Greece (ELPA), is actively involved in informative campaigns, which are quite frequent actually. Among the latest activities of the Club, a guide under the name "Teaching children road safety" was developed in cooperation with British agencies, to promote a better understanding of safe walking principles. ELPA also intervenes in public opinion formation procedures, whenever this seems appropriate (e.g. after unfortunate incidents, or during public debates).

The Greek Road Traffic Police plays an important role in this field. It is typical that in the beginning of every academic year, representatives of the agency visit schools throughout the country to give a speech and present facts on safe walking. In the period from September 30th to October 2nd 2003, a campaign was carried out in order to underline the need of behaving more safely and efficiently as pedestrians (crossing streets at intersections with or without traffic signals, etc).

As regards existing legislation on pedestrians behaviour and their relation with motorized vehicles, according to Article 7 of the Greek Road Traffic Code (RTC), pedestrians are obliged to comply with traffic signals indications, or else a 30 Euro fine is applicable. There are also well-defined rules determining a framework for the facilities to be used by pedestrians, as well as for crossing streets and cooperating with drivers and traffic policemen (Article 38). Violators are also imposed a 30 Euro fine. Generally, sidewalks have to be used, so that separated traffic is secured between pedestrians and motor vehicles. If this is not feasible, pedestrians may use the edge of the street under certain rules.

On the other hand, there are rules describing the behaviour of drivers towards pedestrians (Article 39). Speed adjustment is required under certain conditions, especially at signalised intersections and more specifically in permitted phases (right turns) and direction changes in general. Drivers caught as violators are called to pay a 150 Euro fine. In practice, it is observed that this is not efficiently enforced in urban areas, so it is not established as common practice yet.

In Spain, a study based on observations of pedestrian and driver behaviour has been undertaken in 13 Spanish cities, from which it was concluded that:

- 27% of drivers do not obey "stop" signs, 8% disobey red traffic lights and almost 40% do not respect pedestrian priority at crossings;

- 20% of pedestrians cross on red and 22% cross roads at locations other than provided crossing points.

These results highlight the need for campaigns to educate road users to respect the rules. The DGT has carried out several campaigns at national level, and given support to local authorities as well. The first message targeted to pedestrians was in 1961 “quien mal anda... mal acaba” (who bad walks... bad finishes). Since then until now, different campaigns have been made. The last one was in 2002 paying attention to common sense, attention, crossroads, and, in rural areas, walking on the left hand side and visibility.

In Spain actions are also being taken to improve pedestrian safety on interurban roads. Since June of 2003, it is compulsory to wear a reflective jacket when vehicle occupants move around outside the vehicle.

Spanish cities and towns historically have denser populations than the EU average, and historic centres are subject to considerable expenditures to improve walking areas and to calm road traffic. There is no research so far to examine the relationship between town size and pedestrian accident rate; one of the methodological challenges would be to ensure comparable confidence in accident reporting of the various local police. Such a study would probably have to find a way to treat non-uniform travel survey data to allow for different mode splits.

In Spanish cities, it can be observed in certain cities that signals at junctions run the pedestrian green phases and right-turn green phases together, with flashing amber to indicate that motorists have to give way if a pedestrian is using the crossing. This practice does not seem to introduce a safety problem (the vehicles are travelling at low speeds); in cases of high conflict the phases are separated.

In Catalonia, the SCT coordinates a campaign of road safety education in schools. A number of local authorities promote the “walking bus” to facilitate safe walking to schools. Other areas where Catalan local authorities are active are the extension of the pedestrian green phase to facilitate the crossing of elderly, slower pedestrians. To date, only Barcelona, the Catalan capital, has installed red-light cameras at signal black spots.

8.6. Explanation of differences and/or similarities

The analysis that was undertaken has revealed some common features when comparing Portugal, Greece and Spain, or Portugal, Greece and Catalonia.

Influencing these comparisons there is a general issue that must be previously pointed out, which is the lack of sufficient exposure data, as far as pedestrians are concerned. In fact, for the three countries and the autonomous region, unavailability of data has been reported regarding average distances walked on streets and roads or the number and type of roads crossed. Furthermore, general information on related infrastructure interventions is not available as well, regarding for example the extent to which facilities dedicated to pedestrians have been deployed, or the length of urban road networks subject to traffic calming schemes, including 30 km/h speed limits.

Portugal presents, in general terms, the worst rates for pedestrian fatalities and injuries. However the trends point to a convergence towards similar present rates to those presented by the other two countries and the autonomous region, especially in

the cases of killed and seriously injured. These current rates, however, are still well over those shown by the SUN countries, especially Sweden and the Netherlands (which has less 75% fatalities per million population), revealing that pedestrians are an important issue within the context of road safety in these southern European countries and autonomous region.

The rates for Portugal over the last 15 years show, comparatively to those of the other countries and the autonomous region, a much worse situation from the beginning, but also a steeper reduction in rate during this period. These differences may partly be explained by a later application in Portugal of measures aiming at directly or indirectly improving pedestrian safety, than in the other three cases.

The still high current accident and fatality rates presented by the three countries and the autonomous region, and also the stabilisation of differences on overall casualty rates, reveal the influence of factors other than those that were already positively affected by the referred safety measures. On the one hand exposure related aspects and trends and, on the other hand, educational and behavioural aspects at the individual, the social and the decisional level, may play a significant part in this context.

The punctual, non systematic, nature of the interventions in the infrastructure having pedestrian safety as an objective, at the planning, design and construction phases, especially in the cases of Portugal and Greece, can also explain part of the problem.

8.7. Conclusions and specific recommendations

For all three countries and the autonomous region from southern Europe, in spite of the improvements shown by similar progressive downward trends in pedestrian fatalities, that there is a need and ground for further improvements in pedestrian safety.

Besides continuous educational, training and information efforts, improvements in current legislation and in the level of its enforcement, together with the implementation of more pedestrian friendly road environments, are measures of a general nature that apply to the four cases under study, in order that their current pedestrian accident and casualty rates may decrease to values already attained by other European countries, such as the SUN countries.

It is highly noteworthy that, in 2003, the percentage of fatal accidents where the person killed is over 60 years old is over 60% for Greece, over 50% for Portugal and Catalonia and over 45% for Spain. It is proposed that these accident be further investigated by time of day and urban / rural road type, with a view to identifying possible systematic deficiencies (e.g. insufficient signal green crossing times).

A particular attention should also be paid to decreasing the proportion of night-time accidents, through adequate measures (artificial lighting, improvement of pedestrian visibility, etc.).

Specifically in the case of Portugal, it is clear that campaigns directed to pedestrian safety, must be accompanied by other more permanent and effective actions. The case of pedestrian casualties in through roads must deserve special attention with

specific infrastructure, traffic control and enforcement measures. Also, integrated actions must be implemented in urban road environments, with more attention given to the needs of vulnerable road users, such as the older ones.

As regards Greece, it is important that data quality related issues are improved, as regards, for example data on severe and slight injured pedestrians. Systematic interventions in the infrastructure, especially if included in well planned overall safety schemes applied in whole built-up areas, are certainly steps that must be encouraged to proceed. As in the case of Portugal, more attention should also be given to pedestrian safety in through roads.

In the case of Spain, where pedestrian accident records seem better in general than those of Portugal and Greece, continuous improvements should not be disregarded. Attention should be given to the causes of a higher percentage of fatal pedestrian accidents outside urban areas, maybe related to excessive speed in rural roads, calling for adequate measures, in traffic control, enforcement and also in providing segregated and protected paths for pedestrians.

As regards Catalonia, some of the conclusions and recommendations made for Spain as a whole are also applicable. Furthermore, attention should be given to the causes of relatively high fatality rates not only in the case of the older age groups but also as regards certain young age groups, and specific solutions found for their decrease.

9. Powered Two-Wheelers: motorcycles

9.1. Introduction

Recent years have seen an increase in road traffic across Europe which, in the Southern countries, has been accompanied by an increase in the stock of motorcycles. In some cases the growth in motorcycle stock has been spectacular (Greece 44% and Portugal 33%). The ability to by-pass queuing vehicles, in addition to their relatively low cost are explanatory factors.

At the same time, motorcyclists and mopedists are considered vulnerable road users because they are much more unprotected than car occupants, and these Powered Two-Wheelers (PTWs) share the same roadway as the other motor vehicles with higher mass. Motorcycles speeds are, however, of the same magnitude, or higher, than car speeds, contributing to higher severity rates when accidents involving motorcycles occur. PTWs users are now the second group in the ranking of road fatalities (third for Spain), see Table 9.1.

Ranking killed as occupant	Greece		Portugal		Spain		Catalonia	
First	Car	47.4%	Car	61.1%	Car	59.5%	Car	55.5%
Second	PTWs	22.6%	PTWs	22.7%	Pedestrian	14.6%	PTWs	19.4%
Third	Pedestrian	16.0%	Pedestrian	9.3%	PTWs	14.0%	Pedestrian	15.4%

Table 9.1. *Extract from 2003 collision matrices showing ranking of PTWs fatalities*

9.2. Extent of the problem

9.2.1. Legislation

Table 9.2 summarises the legislation regarding motorcycle licence acquisition. For Spain, in the second half of 1997, a new regulation came into force requiring that drivers of motorcycles of more than 250cc needed to have at least two years of experience driving motorcycles of over 125cc.

In Greece and Portugal it is not allowed to obtain a licence before a person becomes 18 while in Spain (including Catalonia) persons can obtain a licence from the age of 16 for motorcycles of less than 125cc. Furthermore from October of 2004, it is possible to drive motorcycles of less than 125cc if the person holds a car driving licence for more than 3 years.

	Engine size	Min Age	Compulsory test		Compulsory documents	Compulsory helmet use	Registration plate
			Theoretical	Practical			
Greece							
Motorcycle	>50 cc	18	Yes	Yes	Licence	Yes	Yes
Portugal							
Motorcycle	>50 cc	18	Yes	Yes	License	Yes	Yes
Spain & Catalonia							
Type A1	50 -125 cc	16	Yes	Yes	Licence	Yes	Yes
Type A	125+cc	18	Yes	Yes	Licence (1)	Yes	Yes

Table 9.2. *Motorcycle legislation*

Note 1: for engines over 250cc, the driver must have 2 years experience driving vehicles of 125cc+.

9.2.2. Contribution of the topic to traffic un-safety

Table 9.3 shows the trend in persons killed driving motorcycles. The notable reduction in deaths in Greece is highlighted.

Year	Motorcycles fatalities			
	Greece	Portugal	Spain	Catalonia
1998	455	211	424	101
1999	453	222	388	84
2000	406	186	392	82
2001	426	201	370	82
2002	341	197	401	91
2003	310	187	367	87

Table 9.3. *Motorcycles fatalities in Greece, Portugal, Spain & Catalonia.*

Table 9.4 and Table 9.5 show respectively the evolution in the number of motorcycles and motorcycles per population; the figures show rapid growth in the motorcycle stock for Portugal and Greece. The more modest growth for Spain and Catalonia has to be viewed also from the absolute levels of stock; the Spanish stock of motorcycles is one-and-a-half times that of Greece, and almost all this difference could be attributed to the part of the stock that Catalonia “contributes” to the national figure. Greece has the highest level of motorcycle motorization, Portugal the lowest.

Year	Motorcycles (x1000)			
	Greece	Portugal	Spain (1)	Catalonia
1998	634	115	1361	386
1999	711	127	1404	398
2000	781	144	1446	408
2001	853	158	1483	418
2002	911	149	1517	425
2003	970	153	1514	420

Table 9.4. *Number of motorcycles in Greece, Portugal, Spain & Catalonia.*

Note 1: Figures for Spain include Catalonia

Year	Motorcycles per inhabitant			
	Greece	Portugal	Spain (1)	Catalonia
1998	0.0585	0.0119	0.0343	0.0624
1999	0.0653	0.0131	0.0351	0.0640
2000	0.0716	0.0147	0.0358	0.0650
2001	0.0779	0.0160	0.0363	0.0659
2002	0.0829	0.0150	0.0365	0.0654
2003	0.0878	0.0153	0.0359	0.0633

Table 9.5 *Motorcycles per inhabitant in Greece, Portugal, Spain & Catalonia.*

Note 1: Figures for Spain include Catalonia

The number of motorcycles registered in Greece is continuously growing during the last 5 years (from 0.63M in 1998 to 0,97M in 2002). Interestingly, this coincides with some reduction of motorcyclists' fatalities (from 455 in 1998 to 310 in 2003). This reduction follows a generally declining trend in road accident fatalities in Greece.

Greece –like most EC countries– exhibits a satisfactory reduction of the ratio of fatalities per thousand PTWs. For 2000, this indicator was 0.21 (it was 0.35 in 1993).

The number of motorcycles registered in Portugal is continually growing since the last decade, to a present number around 150,000. This fact partially explains why the number of fatalities in accidents involving these vehicles has risen from 109 in 1990 to 201 in 2001, with a peak in 1995, while there has been a decrease in the total number of fatalities in road accidents in Portugal, including accidents with mopeds.

Portugal has a poor safety record concerning overall motorized two wheeled vehicles – for instance, the fatality rate of accidents involving these vehicles in Portugal is over twice the average ratio for the EU (15 countries). This is the reason why, within the scope of the National Road Safety Plan, a target was set concerning two wheeled motor vehicles road accidents, which points to a 60% fatalities reduction until 2010, whereas the general target of the Plan is 50% fatalities reduction for all types of accidents.

The number of motorcycles registered in Spain now exceeds 1.5M. Within the motorcycle stock larger vehicles of 500cc have increased as a percentage of the stock from 20.7% in 1997 to 25.3% in 2003.The number of motorcyclists killed annually in Spain is around 370, approximately 7% of all fatalities in 2003.

28% of the registered motorcycle are located in Catalonia, with higher-than-national-average rates of ownership per head of population. In 2003, Catalonia experienced 24% of the motorcyclists killed in Spain, being only 19% of the total permit holders.

9.3. Availability, quality and comparability of data

For the South countries, there are no data available on the annual kilometrage of motorcyclists, as an indicator of exposure. Therefore, it is difficult to attempt any risk level comparison. Information is not available, either at aggregate or at disaggregate level.

In the absence of exposure data, the following ratio is used to examine and compare motorcycle accident levels:

$$\text{Relative risk ratio} = \frac{\dfrac{\text{Number of motorcycles intervening in fatal accidents}}{\text{Number of motorcycles}}}{\dfrac{\text{Number of all vehicles intervening in fatal accidents}}{\text{Number of all vehicles}}}$$

9.4. Differences in safety levels

9.4.1. Fatal casualties

Considering the years 1998 to 2003, the number of motorcycle fatalities in Greece has reduced from 455 to 310 (32% reduction) in spite of the growth in the motorcycle stock (44% increase) – see Figure 9.1. Portugal also shows a reduction (11%) in fatalities accompanied by a growth in the motorcycle stock (33%).

In Spain, during this time period, motorcycle fatalities have reduced by 13% whilst the stock has increased by 11%; within the national figure, the fatalities for Catalonia have reduced by the 14% whilst the stock has grown by 9%.

In spite of the absolute reductions in fatalities, Figure 9.2 indicates that in terms of percentages of the total accidents little change is observed over the last five years. Motorcyclists in Greece constitute 19.3% of all fatalities in 2003, this being a slight drop from the previous year. In the case of Portugal, motorcyclist fatalities increased to 12.1% in 2003, a two percent growth in the share since 1998. For Catalonia, motorcycle fatalities in 2003 account for 11.3% of all deaths, showing a slight increase in recent years. Motorcyclists in Spain constitute 6.8% of all fatalities in 2003.

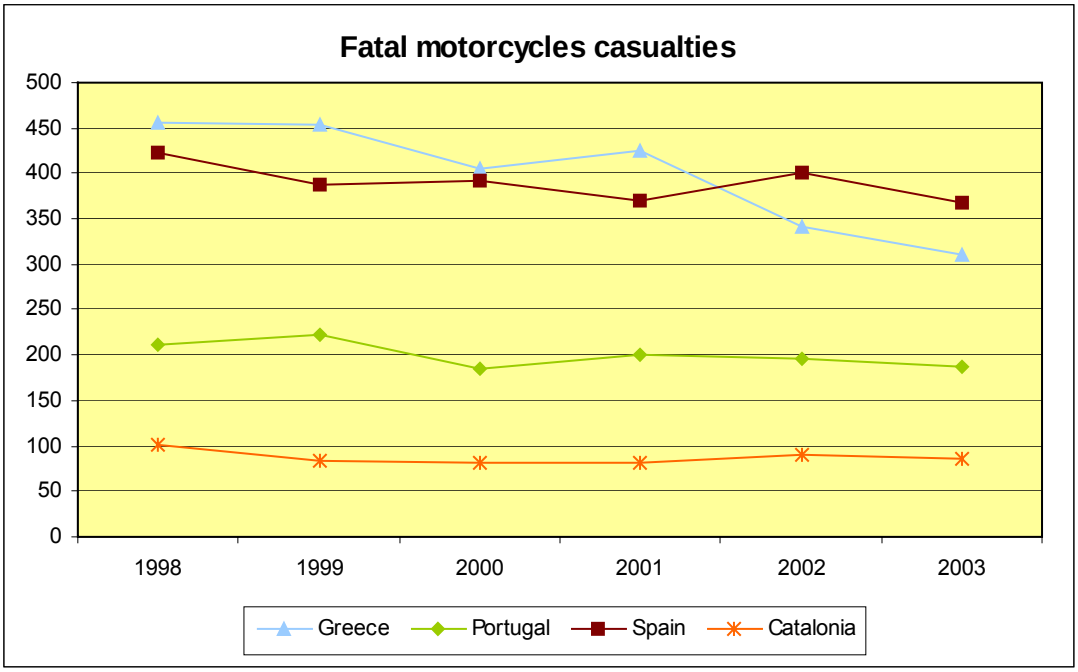


Figure 9.1. *Motorcyclists fatalities in Greece, Portugal, Spain & Catalonia*

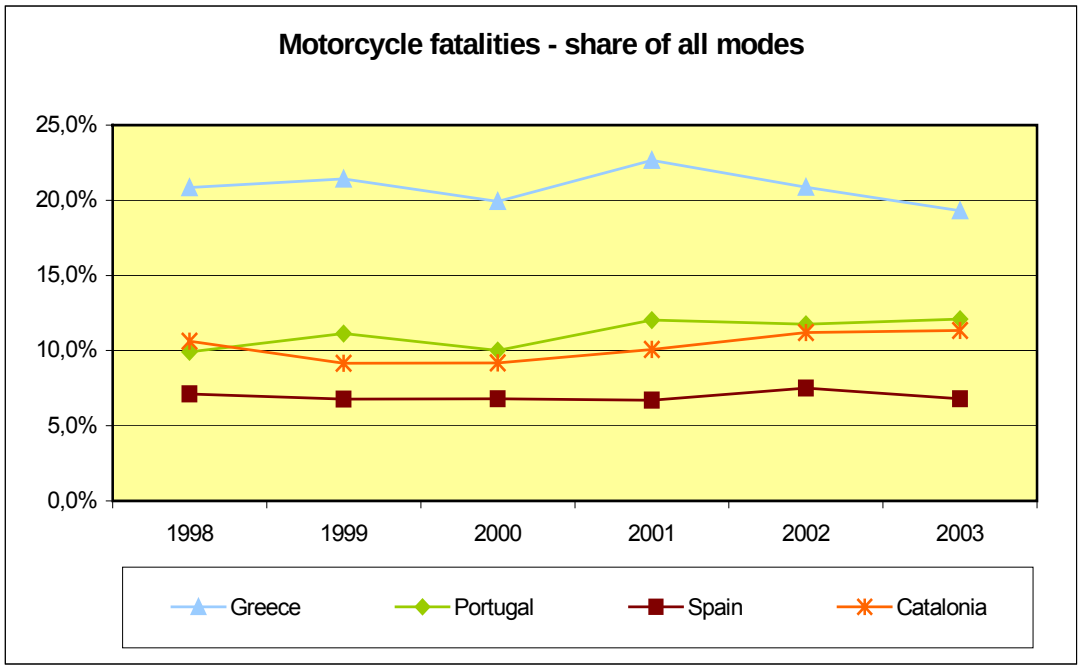


Figure 9.2. *Motorcyclists fatalities as share of all fatalities, in Greece, Portugal, Spain & Catalonia*

9.4.2. KSI casualties

Figure 9.3 and Figure 9.4 present the absolute and relative trends for motorcycle KSIs. The biggest reductions have been achieved in Spain (more than 1500 less in 2003 than in 1998) and Greece (2003 showing a halving of the 1998 figure of almost 2000 KSIs).

In relative terms, in 2003, the level of motorcycle KSIs in Greece is approximately twice the level for Portugal or Catalonia, and around three times the level for Spain.

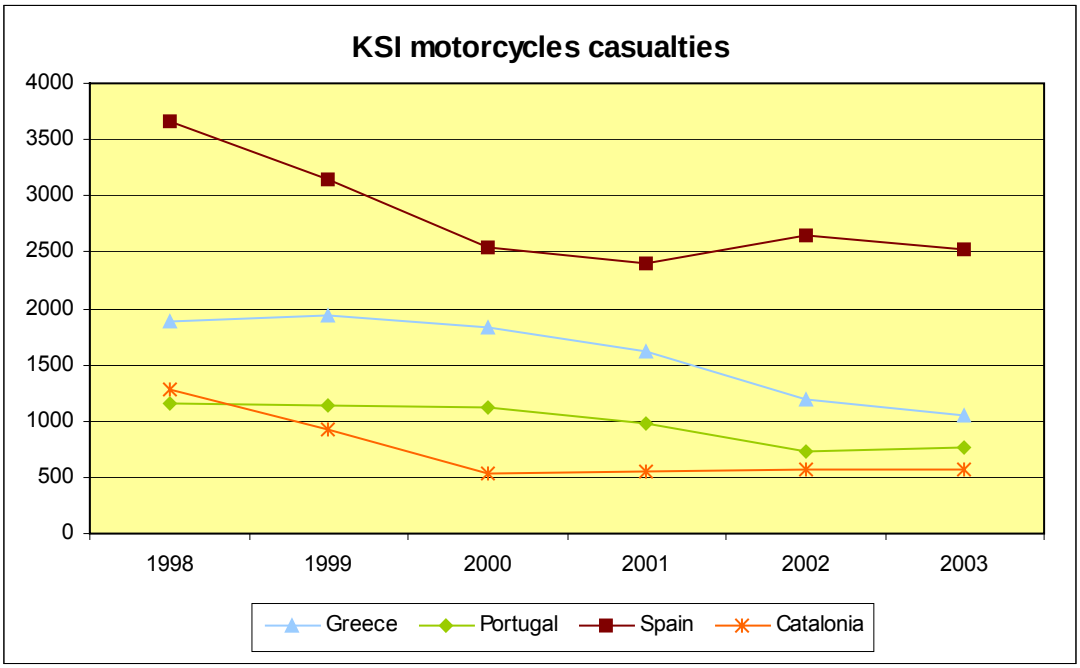


Figure 9.3. *Motorcyclists KSI casualties in Greece, Portugal, Spain & Catalonia*

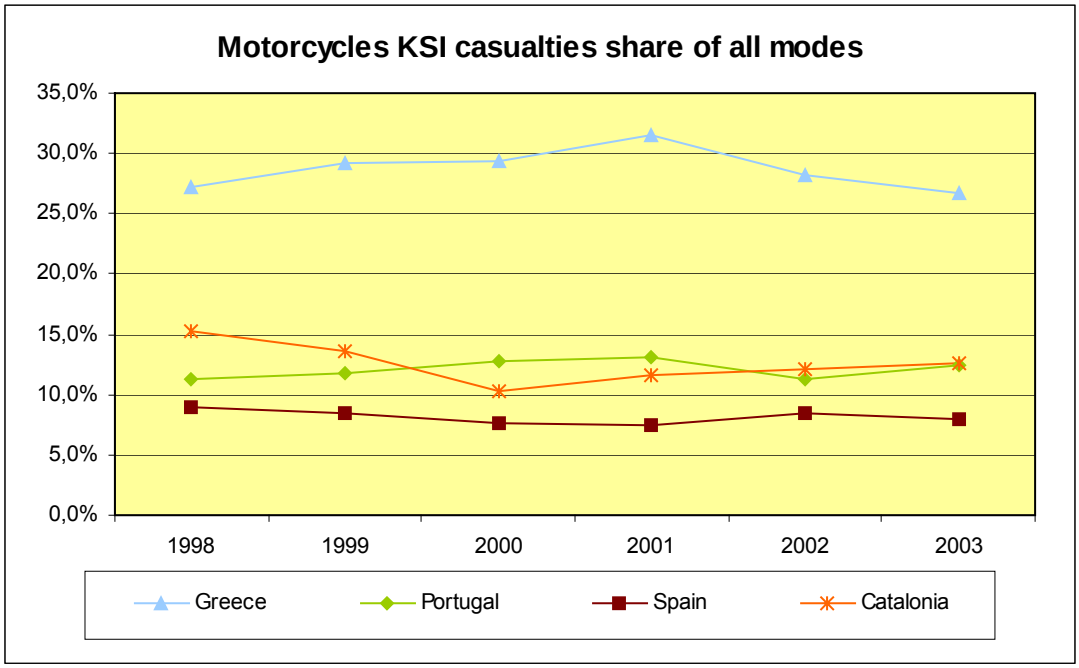


Figure 9.4. *Motorcyclists KSI casualties as share of all KSI casualties, in Greece, Portugal, Spain & Catalonia*

9.4.3. In depth

Motorcycle accidents are examined in terms of five aspects: road type, type of occupant, type of accident, age and helmet usage.

In the case of “road type” and “type of accident” the analysis is made in terms of numbers of vehicles involved in accidents rather than the number of accident victims. These comparisons are made for the total vehicle stock and aim to separate the effect that the low level of vehicle occupancy can have when analysing the importance of these vehicle accidents with other types of vehicles.

The analysis by age, by type of occupant and the use of helmet are computed for the number of accident victims without comparison to the total number of victims.

9.4.3.1. Road type

Figure 9.5 shows that motorcycles have a high risk of intervening in fatal accidents, especially in urban areas, in relation to their proportion of the vehicle stock. The level of risk is highest for Portugal both for urban (more than 5 times the risk for all vehicles) and rural areas (3 times the risk), and the trend shows a recent increase in the risk level. For Spain and Greece the risk level remains constant, being twice as high for urban areas and the same as for all vehicles in rural areas. For Catalonia the risk level for rural areas is low, but for urban areas has increased in recent years from 1.1 to 1.7.

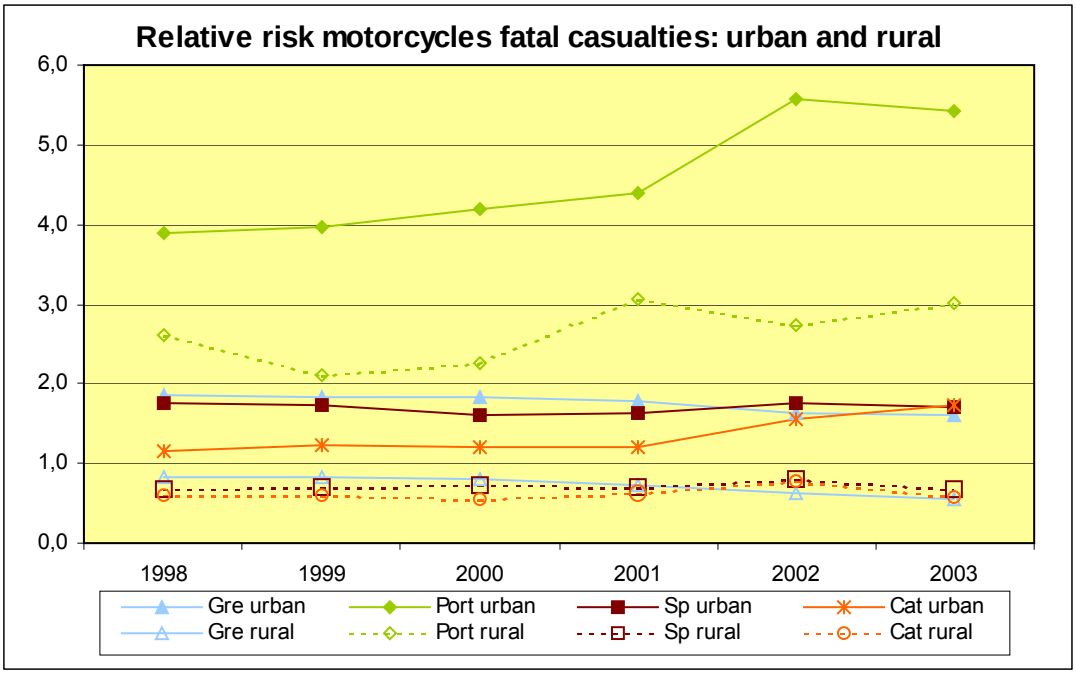


Figure 9.5. *Motorcycle relative risk ratio according to its location*

9.4.3.2. Drivers vs Passengers

In general, around 90% of the fatalities are drivers (10% are passengers); for serious injury accidents, the percentage of drivers for Greece drops to 85%, but stays around 90% for Portugal, Spain and Catalonia.

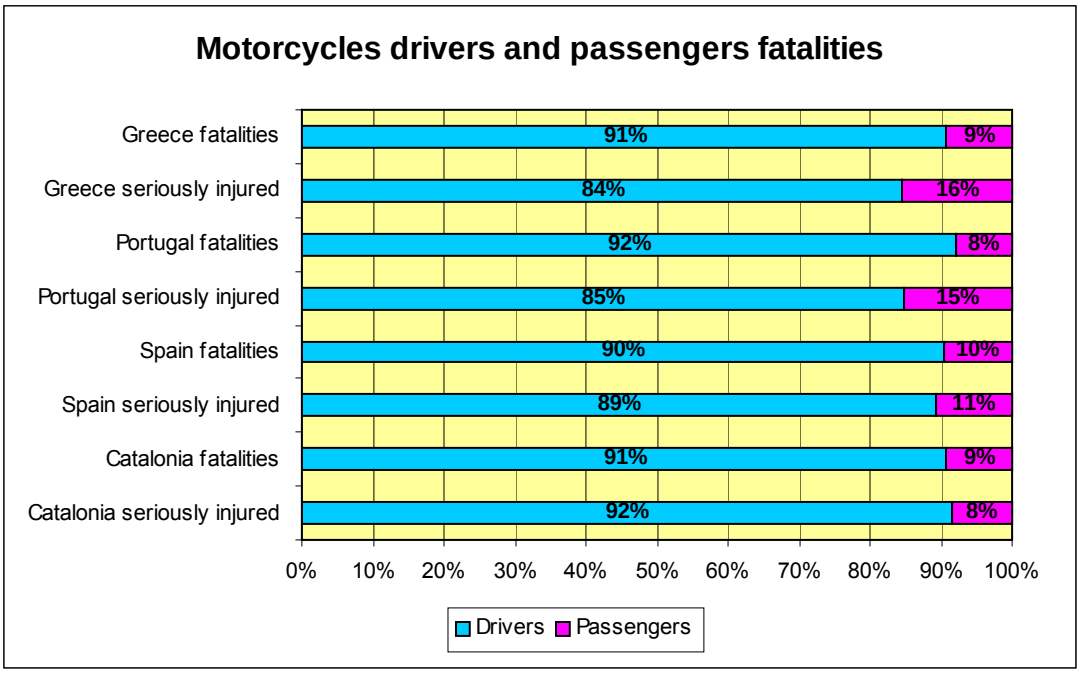


Figure 9.6. *Motorcyclists fatalities, in Greece, Portugal, Spain & Catalonia (2003)*

9.4.3.3. Type of accident

Table 9.6 shows that between 66% and 77% of motorcycles that are involved in accidents are in collision with other vehicles. Driving off the road accounts for one quarter of Portuguese accidents, and 17% of Spanish accidents, but less than 10% of accidents in Greece and Catalonia. Hitting a pedestrian accounts for 10% of Portuguese accidents and lower percentages for the other cases.

	Type of accident									
	Collisions		Drive off road		Hit pedestrians		Collision with obstacle		Other	
Greece	5467	77.7%	634	9.0%	673	9.6%	203	2.9%	61	0.9%
Portugal	2383	63.8%	1019	27.3%	194	5.2%	137	3.7%	0	0.0%
Spain	6699	65.9%	1698	16.7%	542	5.3%	237	2.3%	989	9.7%
Catalonia	2987	73.8%	279	6.9%	282	7.0%	76	1.9%	425	10.5%

Table 9.6. *Number of motorcycles intervening in accidents according to the accident type (2003).*

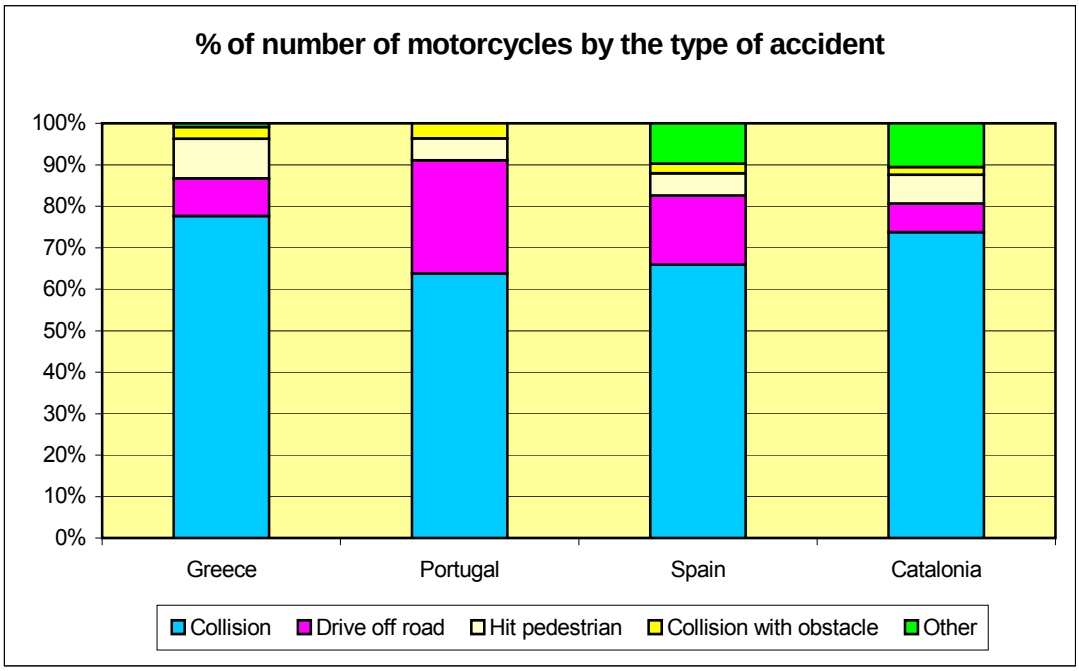


Figure 9.7. *Motorcycles involved in accidents by the type of accidents, in Greece, Portugal, Spain & Catalonia (2003)*

Table 9.7 examines the intervention of motorcycles in accidents and compares the percentages by accident type with the overall share of motorcycle in the total vehicle stock. It can be seen that, for Greece, motorcycles are involved in higher proportions of accidents of all types than their share of the vehicle stock. However, the difference in percentages is highest for Portugal, with three times the proportion of accidents involving driving off the road compared to the share in the vehicle stock.

	Share of all vehicles	Share of all accidents				
		Collisions	Drive off road	Hit pedestrians	Collision with obstacle	Other
Greece	16%	21%	25%	21%	18%	12%
Portugal	3%	5%	8%	3%	4%	0%
Spain	6%	5%	6%	5%	6%	15%
Catalonia	9%	11%	11%	9%	8%	22%

Table 9.7. M*otorcycles intervening in accidents according to the accident type as share of all accidents of its type (2003).*

9.4.3.4. By age

Except for Spain, the age group with highest percentage of fatal motorcyle accidents is 20 to 29 years. In 1999 the percentage of killed motorcyclist drivers aged 20 to 29 in Spain was 55% whilst the percentage of those aged 30 to 39 was 28%; in 2003, the percentage for both age groups was slightly over 35%, being those aged 30 to 39 being the first group with 38%. A study made by the DGT already detected this trend and measured that the average age of a driver involved in accidents had increased from 29 to 32.3 years.

Catalonia shows similar high percentage of killed motorcyclists in the 20 to 29 age group with the main variation (compared to Spain) being the higher percentage of deaths 40 to 49 year olds (over 20% in 2003). in Catalonia, for fatalities, the 20 to 29 age group has decreased from 52% in 1999 to 34% in 2003, but the change is not evident for serious injury accidents where 30 to 39 age group has increased from 28% in 1999 to 37% in 2003.

Almost half of all killed motorcycle drivers in Greece are in the 20-29 age group (43%), followed by those aged 30-39 (increased from 16% in 1999 to 20% in 2003). The third most numerous age group is 15-19. The situation is very similar as far as seriously injured drivers are concerned, with one slight difference involving some decrease of the 20-29 age group's share (from 50% in 1997 to 46% in 2003). Some 6% of killed motorcyclists are over 60 years old.

In Portugal the first age group is 20 - 29 (47%) followed by 30 - 39 with 30%.

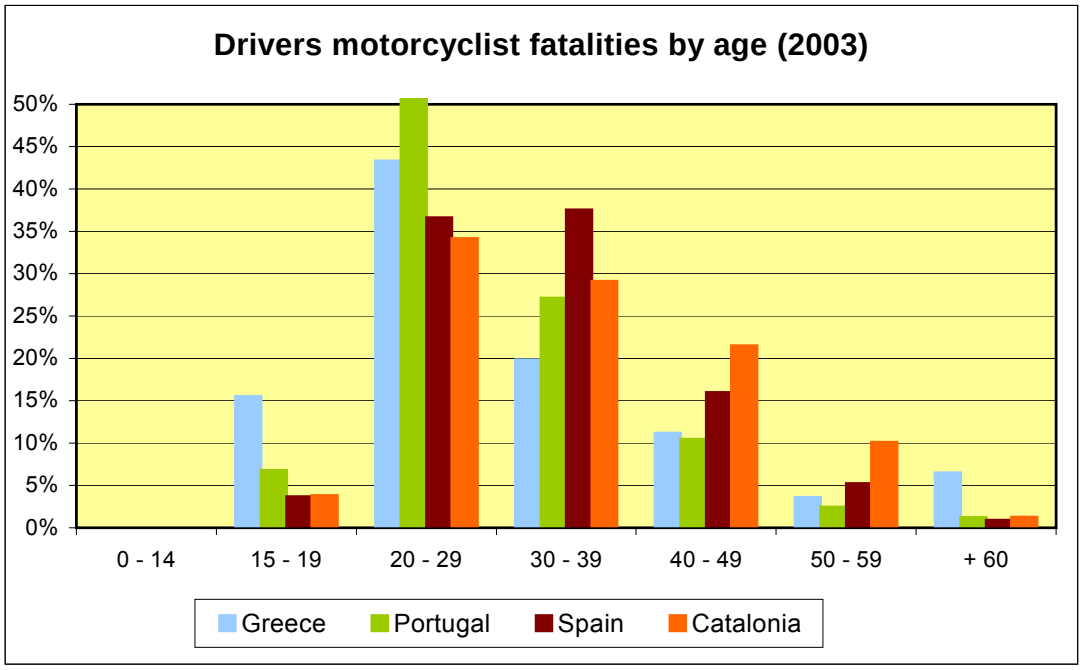


Figure 9.8. *Percentage of dead motorcycles drivers by age group, in Greece, Portugal, Spain & Catalonia*

Note: For Portugal, drivers and passengers.

9.4.3.5. Helmet usage

Figure 9.9 and Figure 9.10 respectively show the percentage of use of a helmet in fatal serious injury accidents involving motorcyclists. The low level of helmet use in Greece is striking in both figures. The levels for Catalonia, Portugal and Spain are constant and high, and in this order (Catalonia highest).

For Catalonia, 1 in 25 of killed motorcyclists did not wear a helmet in 2003. In Portugal, one in eleven of the killed motorcyclist was not wearing a helmet. In Spain, approximately one in seven of the killed motorcyclists was not wearing a helmet (a constant level over the last five years). In Greece the rates are a lot worse; 2 in 3

killed motorcycle drivers did not wear a helmet in 2003, this representing an improvement levels at the end of the 1990s, when 6 out of 7 did not wear helmet.

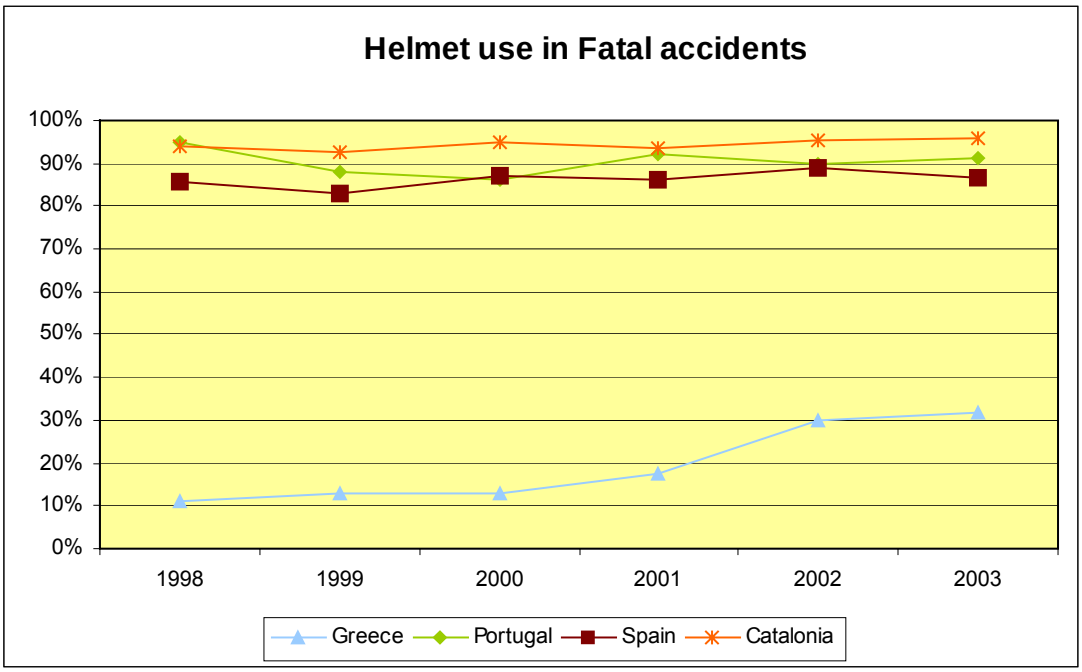


Figure 9.9. *Percentage of helmet use in motorcycles fatal accidents for Greece, Portugal, Spain & Catalonia*

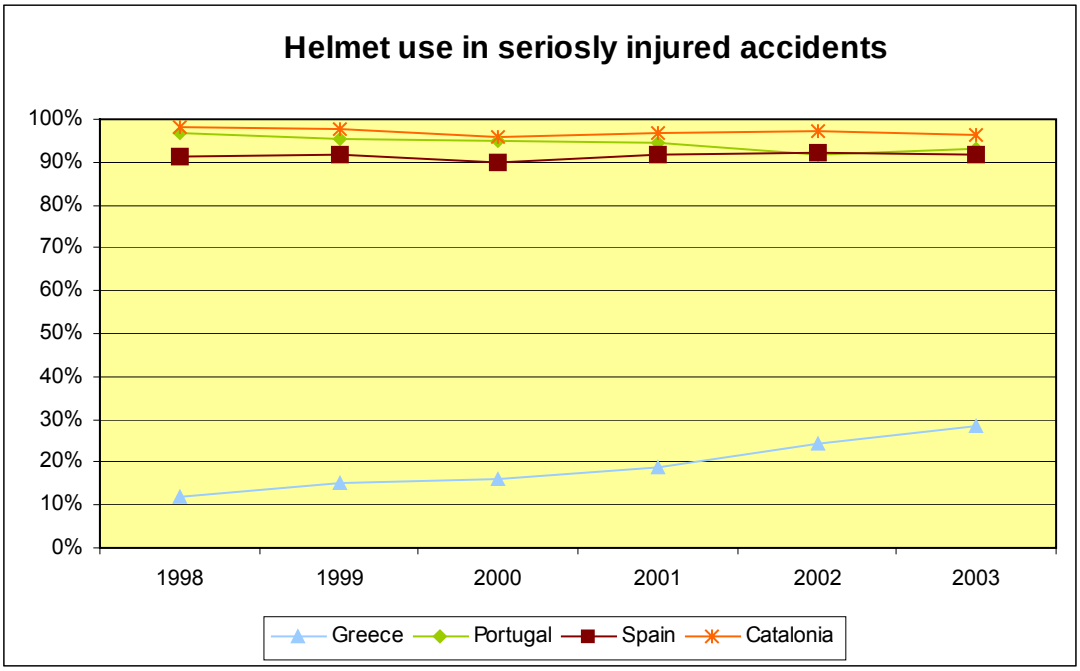


Figure 9.10. *Percentage of helmet use in motorcycles seriously injured accidents for Greece, Portugal, Spain & Catalonia*

9.5. Traffic safety risks

Looking at the trend in fatality rates per capita shows big improvements for both Greece and Portugal, although by 2003 the former remains three times, and the latter two times the level of Spain.

Looking at the trend in fatality rates per motorcycle shows a big improvement for both Greece and Portugal, although the rate for Portugal in 2003 is four times that of Greece and six times that of Spain / Catalonia.

The fact that the Spanish fatality rates are lower is not consistent with the indicators based on person kms presented in Chapter 3. The reason is that PTW's person kms don't include urban distance.

Year	Casualty rate per 100.000 population											
	Greece			Portugal			Spain			Catalonia		
	Killed	SI	All	Killed	SI	All	Killed	SI	All	Killed	SI	All
1998	4.2	13.2	94.1	2.2	9.8	60.9	1.1	8.2	30.1	1.6	19.2	79.2
1999	4.2	13.7	99.9	2.3	9.4	62.8	1.0	6.9	28.1	1.4	13.4	73.4
2000	3.7	13.0	95.3	1.9	9.5	59.2	1.0	5.3	27.8	1.3	7.1	69.8
2001	3.9	10.8	87.1	2.0	7.9	56.7	0.9	5.0	27.2	1.3	7.5	68.2
2002	3.1	7.8	72.1	2.0	5.4	51.4	1.0	5.4	25.7	1.4	7.4	64.6
2003	2.8	6.7	66.3	1.9	5.9	48.6	0.9	5.1	24.9	1.3	7.4	60.9

Table 9.8. *Casualty rates for motorcycle users, Greece, Portugal, Spain and Catalonia.*

Year	Casualty rate per 1.000 motorcycles											
	Greece			Portugal			Spain			Catalonia		
	Killed	SI	All	Killed	SI	All	Killed	SI	All	Killed	SI	All
1998	0.7	2.3	13.1	1.8	8.3	51.2	0.3	2.4	8.8	0.3	3.1	12.7
1999	0.6	2.1	12.6	1.7	7.2	48.0	0.3	2.0	8.0	0.2	2.1	11.5
2000	0.5	1.8	11.0	1.3	6.5	40.2	0.3	1.5	7.8	0.2	1.1	10.8
2001	0.5	1.4	9.3	1.3	4.9	35.4	0.2	1.4	7.5	0.2	1.1	10.4
2002	0.4	0.9	7.4	1.3	3.6	34.2	0.3	1.5	7.1	0.2	1.1	9.9
2003	0.3	0.8	7.6	1.2	3.8	31.8	0.2	1.4	6.9	0.2	1.2	9.6

Table 9.9. *Casualty rates for motorcycle users, Greece, Portugal, Spain and Catalonia.*

9.6. Interventions to reduce the risk

Among the measures directed to enhance motorcycles safety in Portugal, some have a legal nature, others relate to information and drivers training, to enforcement and to improvements in the infrastructure.

1983 - Daytime running lights for two wheeled vehicles.

1985 - Mandatory installation of reflector devices on two wheeled vehicles.

1988 - Campaign to increase the use of reflector devices on two wheeled vehicles.

1990 - Campaign to increase the use of reflector devices on two wheeled vehicles.

1993 - Campaign addressing young drivers related with the use of seat belts, speeding, drinking and driving and two wheeled vehicles.

Similarly to the case of Portugal, in Greece measures related to PTW safety are mostly coming from revisions of the Road Traffic Code (legislation – enforcement) and campaigns (information).

1986 – Compulsory wearing of helmets by motorcyclists (driver and passenger)

2001 – Nation-wide road safety advertising campaign “On the way 2001-2005”

2002 – Nation-wide road safety advertising campaign “Bob campaign”

2003 – Nation-wide road safety advertising campaign “How do you drive?”

The Road Traffic Police Dept. of The Ministry of Public Order does keep a record of notices issued for not wearing a helmet, but this is not classified separately for motorcycles and mopeds.

Greece	1999	2000	2001	2002	2003
PTW victims	12,869	11,996	10,597	8,820	8,170
PTW vehicles (*1000)	2,332	2,342	2,461	2,525	2,586
Non-wearing helmet penalty notices	n.a.	81,252	151,909	236,781	216,519

Table 9.10. *Sanctions relating to PTW regulations enforcement in Greece*

In Spain, the main effort to reduce PTW casualties has focussed upon the enforcement of helmet-wearing, see Table 9.11. The relation between enforcement effort and PTW safety is not readily discernible from the figures. It is noted that the latest years show less deaths, more ownership with less sanctions.

Spain	1999	2000	2001	2002	2003
PTW victims	39,872	40,959	37,984	35,051	33,484
PTW vehicles (*1000)	1,404	1,446	3,290	3,561	3,657
Non-wearing helmet penalty notices	60,634	68,184	64,356	50,427	47,771
Penalty notices regarding illegal carriage of PTW passenger				618	625

Table 9.11. *Sanctions relating to PTW regulations enforcement in Spain*

Notes: sanctions are those issued by the ATGC (Agrupación de Tráfico de la Guardia Civil) and exclude those of the autonomous regions of Basque Country & Catalonia and local police.

Number of PTW’s vehicles, years 1999 and 2000, doesn’t include mopeds

Catalonia has a very good level of wearing helmet and the penalties have dropped down.

Catalonia	2001	2002	2003
PTW victims	12,022	11,134	10,658
PTW vehicles (*1000)	701	740	746
Non-wearing helmet penalty notices	8,926	5,676	5,431

Table 9.12. *Sanctions relating to PTW regulations enforcement in Catalonia*

Notes: sanctions are those issued by the Mossos d'Esquadra and exclude those of the local police.

9.7. Explanation of differences and/or similarities between the countries

The numbers of motorcycles in Southern countries is increasing, particularly in Greece and Portugal. Greece has the highest level of motorcycles per inhabitant of the three countries (Portugal the lowest). In spite of the growth in vehicle stock, all countries show a reduction on motorcycle fatalities over the last 5 years. For Portugal, Spain and Catalonia, one of the reasons for the improved safety is the sustained high usage of helmets, supported by police enforcement.

The higher motorcycle motorization in Greece is clearly one of the factors that result in the higher share of total fatalities (around 20% for Greece, compared to 7 to 12% for the other cases).

Another important factor is the much lower level of helmet usage. In 2003, for Greece, two out of every three killed motorcyclists was not wearing a helmet, compared with approximately one in seven of the killed motorcyclists in Spain, 1 in 10 for Portugal, and 1 in 25 for Catalonia.

A third factor concerns the higher proportion of younger Greek motorcyclists (young drivers generally having less experience and being willing to take greater risks – see chapter 6). Over half of killed motorcyclists in Greece are aged 20 to 29, whereas the highest risk age group in Spain is 30 to 39 and for Catalonia is 40 to 49).

The safety performance of motorcycles has to take into account the national situation of mopedists. Mopedist fatalities constitute a lower share of total fatalities for Greece (see chapter 10) and it could be considered that more Greek youngsters opt directly for a motorcycle instead of a moped – thus increasing the relative exposure to more powerful PTWs. One further factor that may be relevant – given the sharp increase in Greek motorcycle ownership – is the possibility of lower insurance premiums than for the other Southern countries; this matter would require further investigation.

The difference in percentages of accidents compared with share of motorcycles in the vehicle stock has identified a problem concerning a high proportion of Portuguese motorcyclists driving off the road. The proposed explanation for this is a low level of motorcycle driver training (roads infrastructure in Portugal being broadly comparable to Greece, and with a higher population density).

9.8. Conclusions and country specific recommendations

The high level of motorized two-wheeler fatalities (at 15 to 23% of national fatalities) presents a particular challenge; failure to address this challenge could seriously undermine the potential of the Southern countries to achieve their road fatality targets.

The most obvious recommendation is that Greek authorities should address the low level of helmet usage by a massive publicity and police enforcement effort. The situation has improved during the last couple of years, and this would appear to be related to the increase in the number of penalty notices issued; the enforcement effort needs to sustained and even more extensively implemented if Greece is to reduce the share of motorcycle fatalities to the levels of other Southern countries.

Improving helmet wearing is unlikely to fully resolve the problem, and it is recommended that further study be made of the relative insurance costs and rates of vehicle acquisition for motorcycles, moped and cars in the Southern countries so as to further examine the relative exposure to modes having different safety levels.

Given the growing importance of the number of motorized two wheelers in Southern countries, and the higher fatality risk of such vehicles, it is strongly recommended that efforts are made to quantify the exposure of these users in terms of kilometres travelled.

All countries should register and publish the number of penalty notices issued for non-compliance with helmet wearing.

The higher relative risk ratio for Portugal has been investigated in terms of accident types in comparison with share of vehicle stock; it is recommended that Portuguese motorcyclists need improved training or the introduction of a points driving licence that can curb reckless driving.

The analysis of relative risk ratios identifies higher risks in urban areas, presumably due to higher exposure. This result leads to a recommendation for more enforcement of road discipline (controls of drink-driving, red-light jumping, excess speed as well as helmet wearing) in urban areas targeted on motorcyclists.

Systems for removing the driving rights for repeat offenders of serious infringements are also needed.

10. Powered Two-Wheelers: mopeds

10.1. Introduction

As mentioned before, motorcyclists and mopedists are considered vulnerable road users. Although the same driving rules apply to all road users, moped drivers are in many instances subject to lower demands as far as license and training requirements are concerned. Finally, since it is allowed that mopeds can be ridden by youngsters below 16 years of age (in some of the studied territories), there is a special incidence of accidents and fatalities in the lowest age groups.

10.1.1. Legislation

This study applies to PTW's with an engine < 50 cc. Table 10.1 gives an overview of vehicle specifications and legal arrangements for mopeds in the three countries and autonomous region.

	Min Age	Speed Limit		Compulsory test		Compulsory documents	Compulsory helmet use	Registration plate
		Urban	Rural	Theoretical	Practical			
Portugal								
Light Moped	14	40	45	Yes	no	Licence	Yes	yes
Moped	14	40	60	Yes	no	License	Yes	yes
Greece								
Moped	16	40	70	Yes	yes	License	Yes	yes
Spain & Catalonia								
Moped	14	45	45	Yes	No	Licence (1)	Yes	Yes
	16	45	45	No	No	Licence	Yes	Yes

Table 10.1. *Mopeds and legislation in the Southern countries*

Note 1: Drivers under 16 cannot transport passengers.

For youngster below age 16 (14 to 16) to get a license for driving mopeds, the attendance of a course given by the Portuguese Accident Prevention is mandatory. Furthermore, they need their parents' authorisation, and also to have completed at least the 7th scholarship year and approval in the previous scholarship year. In case they succeed in the course, a provisional license is given, which must be renewed as definitive at age 16.

According to the Greek legislation, there is no discrimination between regular and light mopeds. The minimum age of 16 years applies, and the person has to pass a theoretical and practical test.

Spanish legislation allows a 14 year old to acquire a licence to drive mopeds, providing the person passes a theoretical test. From the age of 16, it is possible to obtain the licence without taking the test. A passenger can be carried if the

passenger is above 7 years of age, provided that the driver is the passenger's parent, tutor or otherwise authorized to carry the passenger.

10.2. Extent of the problem

Figure 10.1 provides an illustration of the moped safety problem based upon data for Spain (for 2002). It shows that the number of moped accidents (fatal and total) per 1000 population for different ages, giving details for ages 14 and onwards when the user still does not have legal access to other types of vehicle. It is seen that 11 of every 1000 14 year-olds were injured o killed in moped accidents, and the problem subsequently doubles for 15, 16 and 17 year-olds (apart from the test requirement, parental resistance and economic factors are likely to influence the lower moped use of 14 year olds).

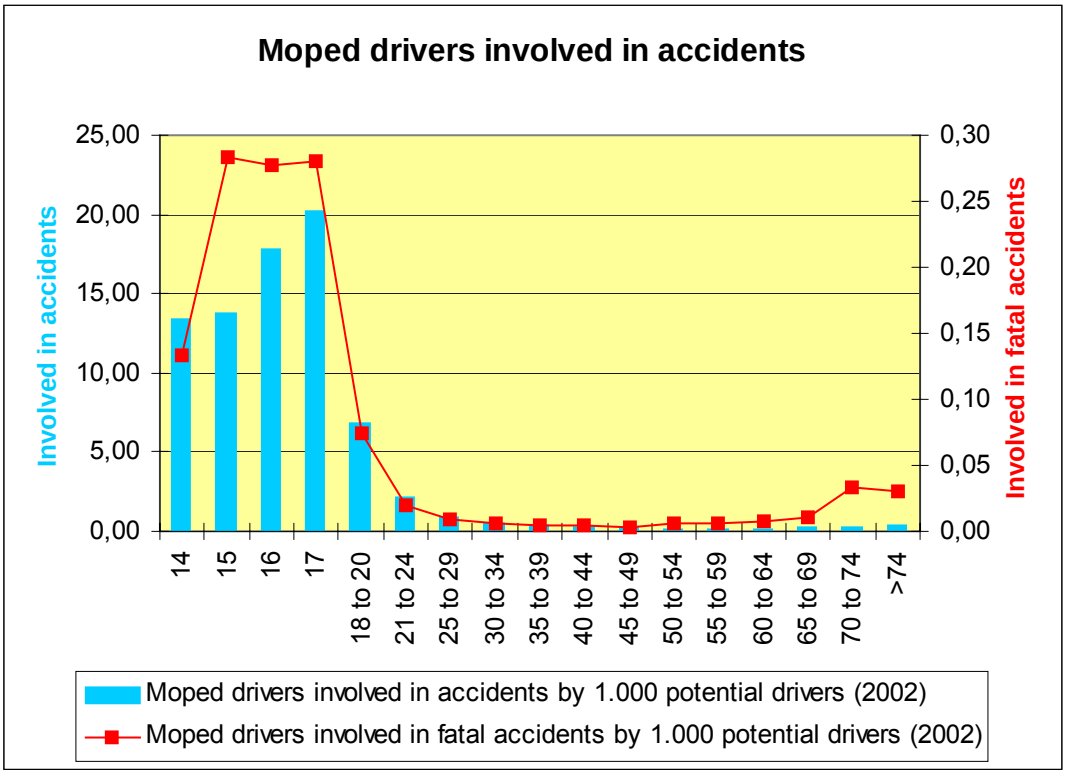


Figure 10.1. *Mopedist drivers involved in total & fatal accidents by '000s of potential drivers in Spain*

10.2.1. Contribution of the topic to traffic un-safety

Table 10.2 presents the moped fatalities evolution for the three countries and autonomous region of Southern Europe. The tendency is to the loss although the increase of the moped stock.

Year	Moped fatalities			
	Greece	Portugal	Spain	Catalonia
1998	114	342	507	96
1999	108	258	515	88
2000	90	246	474	92
2001	77	205	463	76
2002	55	188	383	70
2003	53	193	391	62

Table 10.2. *Moped fatalities in Greece, Portugal, Spain & Catalonia.*

Table 10.3 and Table 10.4 show respectively the evolution in the number of mopeds and mopeds per young moped drivers. In Portugal the moped stock is decreasing, in Greece it is stable (according to available data), whilst in Spain and Catalonia it is increasing. In both Greece and Portugal, this time period shows a growth in the motorcycle stock (see Chapter 9).

Year	Mopeds (x1000)			
	Greece	Portugal	Spain	Catalonia
1998	1,505	623		
1999	1,621	574		
2000	1,561	590		
2001	1,608	551	1,807	283
2002	1,614	455	2,044	315
2003	1,617	480	2,144	325

Table 10.3. *Number of mopeds in Greece, Portugal, Spain & Catalonia.*

Year	Mopeds per inhabitant (15-17 years old)			
	Greece	Portugal	Spain	Catalonia
1998	4.13	1.52		
1999	4.58	1.44		
2000	4.40	1.52		
2001	4.52	1.49	1.28	1.44
2002	4.78	1.27	1.48	1.63
2003	5.05	1.40	1.58	1.70

Table 10.4. *Mopeds per inhabitant in Greece, Portugal, Spain & Catalonia.*

Whilst the levels of moped motorisation per capita are similar for Spain, Portugal and Catalonia (Table 10.4), the rate for Greece is very high (around three times the other cases). In absolute terms, Spain has the largest moped stock.

The number of moped occupants killed in Greece annually is constantly decreasing in the past few years (from 114 in 1998 to 77 in 2001). In the year 2001, mopedist

fatalities accounted for 4.1% of all road accident fatalities. It was significantly lower than motorcyclist' fatalities (22.7%).

The accurate number of mopeds in Portugal is not known, due to deficiencies in the way the registration of these vehicles is recorded and up-dated. An estimation of their number points to around 500 thousand, and the tendency is for moped ownership to decrease. This is one of the reasons why a decrease in fatalities involving moped users has been registered for some years (around 800 in 1990 to 193 in 2003).

The number of mopeds registered in Spain now exceeds 2.1M vehicles. For mopedists the number of deaths has recently reduced to less than 400 per year, some 7% of the total deaths recorded in 2003. 15% of mopeds are located in Catalonia, with higher-than-national-average rates of ownership per head of population. In 2003, Catalonia experienced 16% of the killed mopedists killed in Spain.

10.3. Availability, quality and comparability of data

For the Southern countries, in addition to the aforementioned problems regarding moped stock, there are no data available on the annual kilometrage of motorcyclists, as an indicator of exposure. Therefore, it is difficult to attempt any risk level comparison. Information is not available, either at aggregate or at disaggregate level. In the absence of exposure data, the following ratio is used to examine and compare mopedist accident levels:

$$\text{Relative risk ratio} = \frac{\dfrac{\text{Number of mopeds intervening in fatal accidents}}{\text{Number of mopeds}}}{\dfrac{\text{Number of all vehicles intervening in fatal accidents}}{\text{Number of all vehicles}}}$$

The number of motor vehicles, being consistent with IRTAD, doesn't include mopeds in all the study. Only in this chapter, the moped stock is added.

10.4. Differences in safety levels

10.4.1. Fatal casualties

Figure 10.2 and Figure 10.3 respectively present the trends in mopedist fatalities, and the share of mopedists in the total fatalities. In absolute numbers, the problem is greatest in Spain, at around twice the level of Portugal and around five times that of Greece. As a share of total fatalities, the problem is greatest for Portugal, followed by Catalonia, Spain and Greece.

In all cases there has been a reduction in the absolute numbers of mopedist fatalities over the last five years, and the reduction for Spain and Portugal is considerable. As a share of total fatalities the reduction is greatest for Portugal.

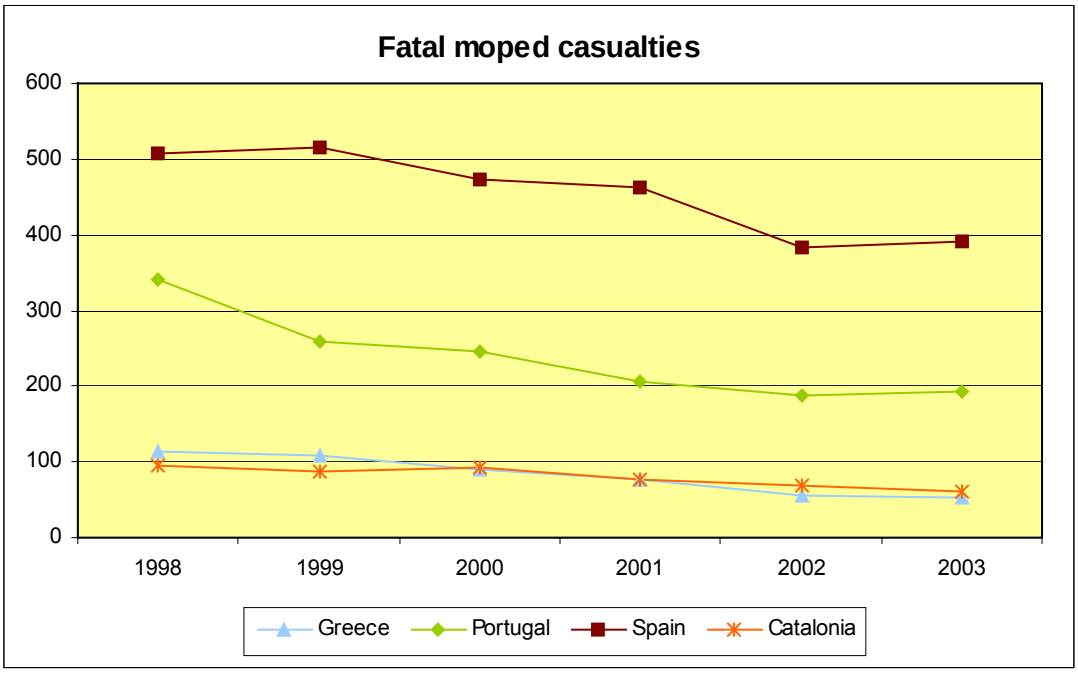


Figure 10.2. *Mopedist fatalities in Greece, Portugal, Spain & Catalonia*

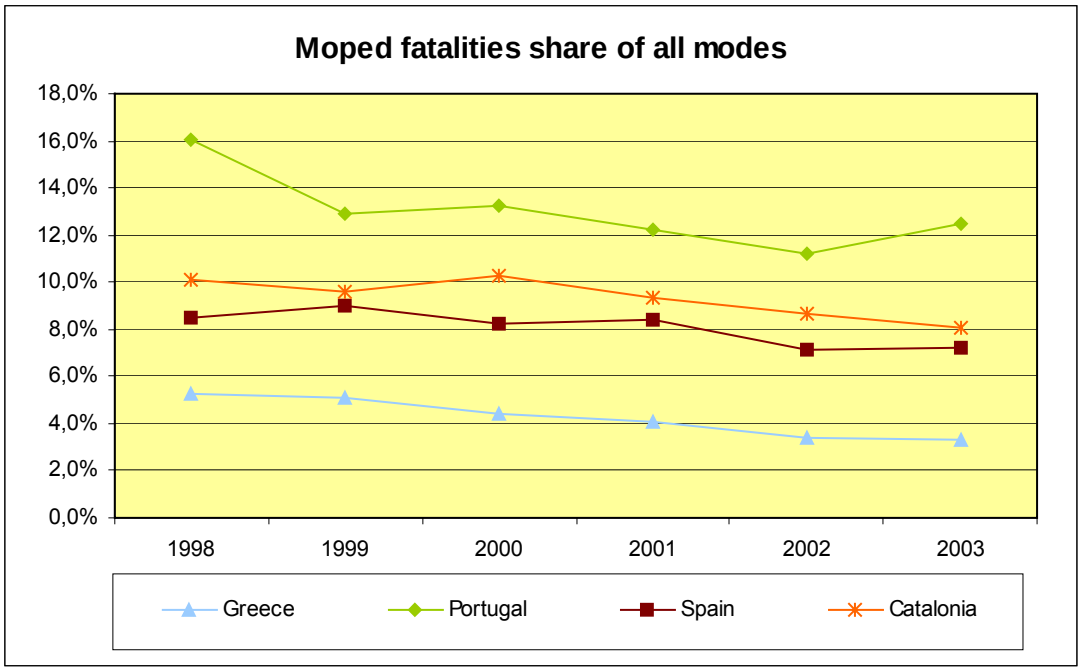


Figure 10.3. *Mopedist fatalities as share of all fatalities, in Greece, Portugal, Spain & Catalonia*

10.4.2. KSI casualties

Figure 10.4 and Figure 10.5show similar trends information for KSIs. There is a bigger difference between the problem in Spain (5000 KSIs in 2000, but dropping) and Portugal (1000) and Greece. In terms of the share of total KSIs, for 2003, mopedist constitute a similar share for Portugal, Spain and Catalonia – with Greek levels being much lower.

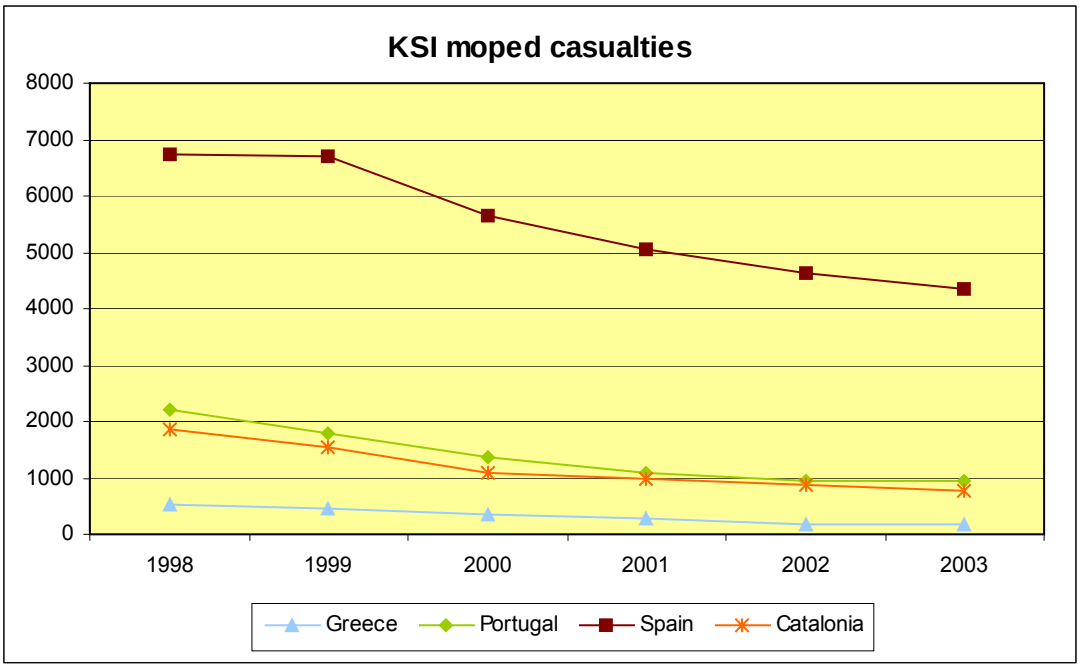


Figure 10.4. *Mopedist fatalities in Greece, Portugal, Spain & Catalonia*

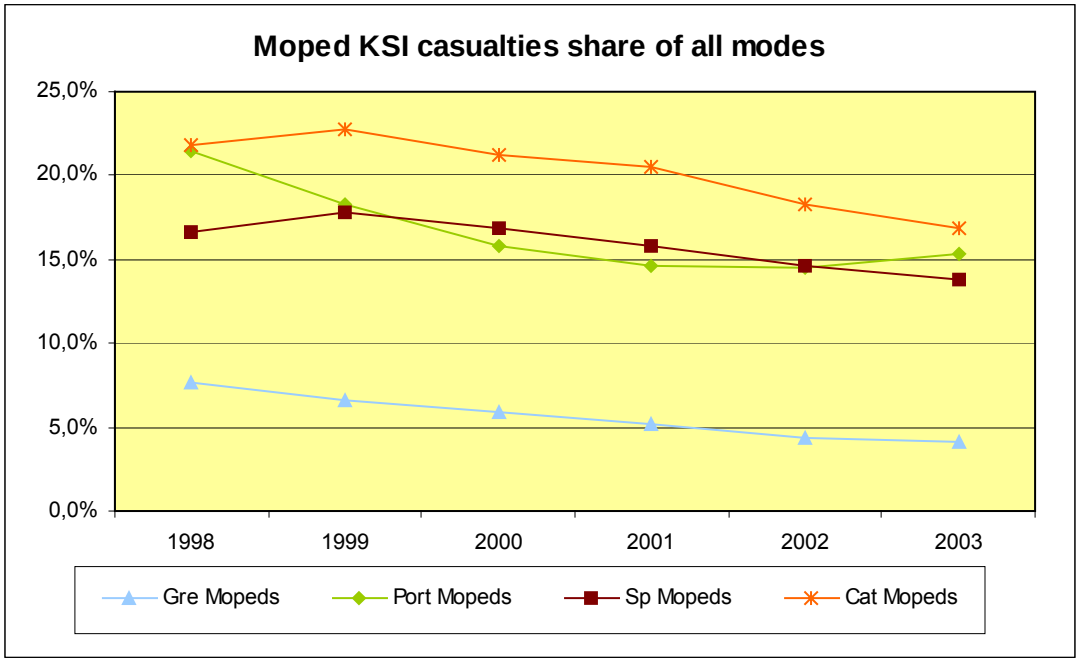


Figure 10.5. *Mopedist KSI casualties as share of all KSI casualties*

10.4.3. In depth

10.4.3.1. Road type

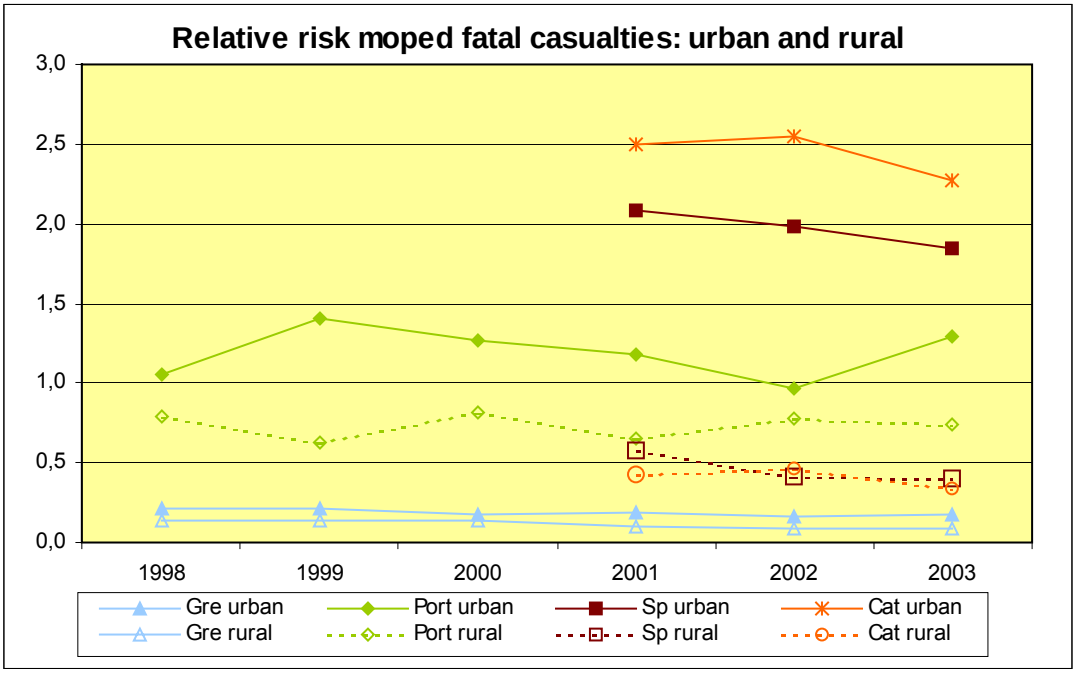


Figure 10.6. *Moped relative risk ratio according to its location*

The relative risk ratio (Figure 10.6) shows higher levels for urban moped fatalities than for rural areas, a result that is consistent with that for motorcyclists and is assumed to relate to higher levels of urban exposure.

If we compare the ratios of motorcycles and mopeds, (Figure 9.5 y Figure 10.6 respectivamente) Spain and Catalonia show a higher moped risk exposure in urban areas whereas on interurban roads the risk is clearly higher for motorcycles. For Greece and Portugal the risk associated with motorcycle is higher for both urban and interurban roads.

10.4.3.2. Drivers vs Passengers

The main difference between the pattern of driver and passenger fatalities is the higher percentage of passenger fatalities for Portugal; at 12% this is around twice the percentage of fatalities for the other cases.

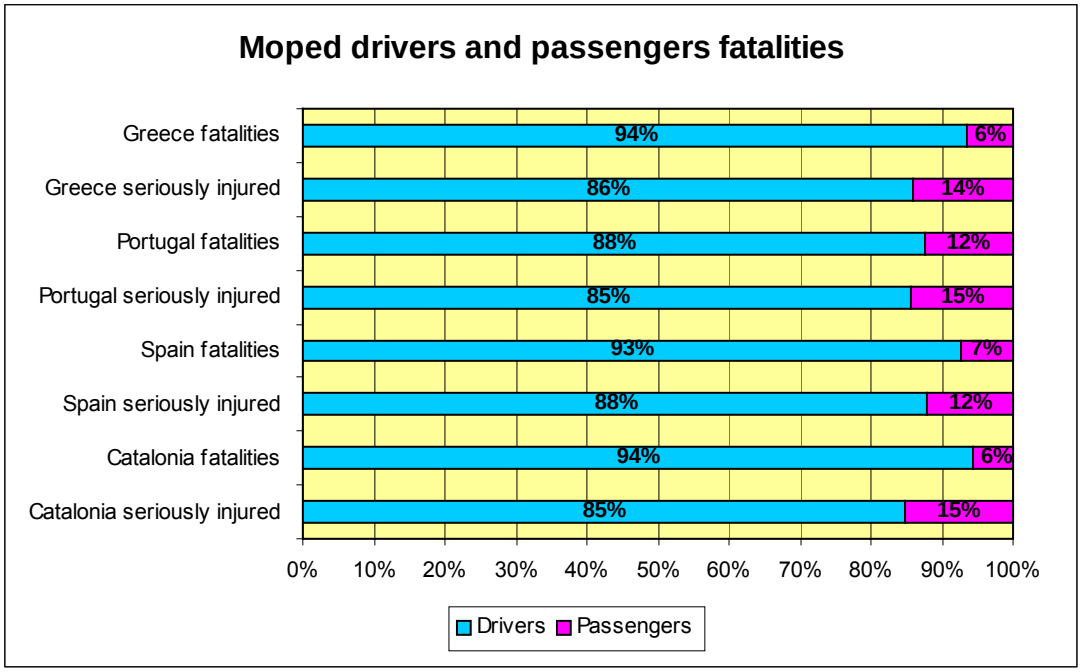


Figure 10.7. *Mopedist fatalities and seriously injured, in Greece, Portugal, Spain & Catalonia (2003)*

10.4.3.3. Type of accident

Figure 10.8 and Table 10.5 shows that between 64% and 77% of mopeds that are involved in accidents are in collision with other vehicles. Driving off the road accounts for one quarter of Portuguese accidents, 11% of moped accidents in Spain and Greece, but less than 10% of accidents in Catalonia.

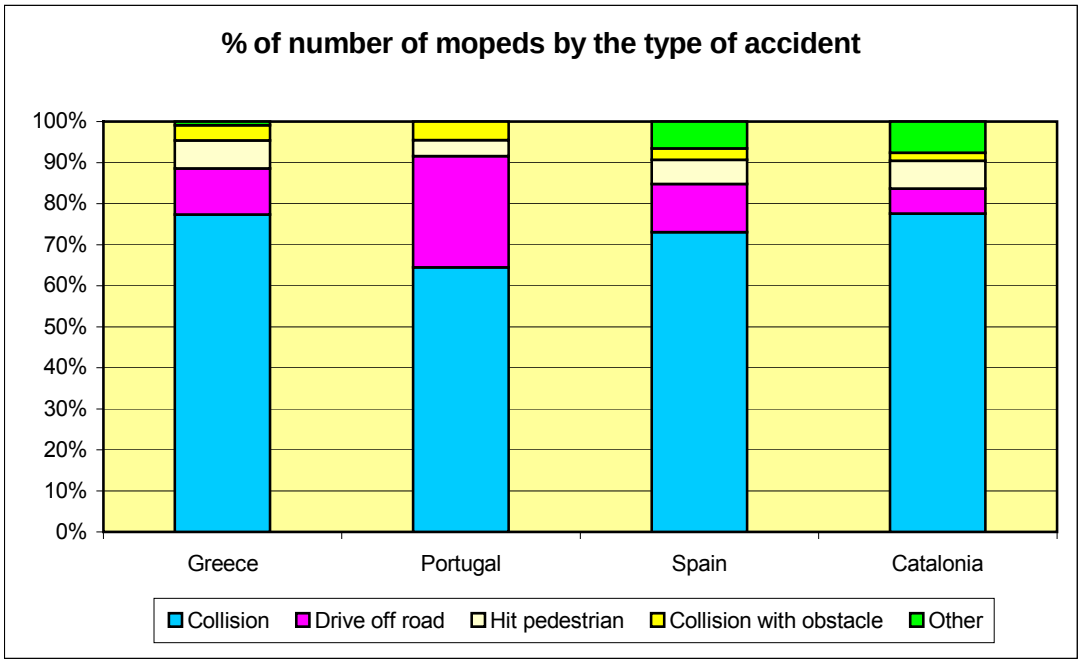


Figure 10.8. *Mopeds involved in accidents by the type of accidents (2003)*

	Type of accident									
	Collisions		Drive off road		Hit pedestrians		Collision with obstacle		Other	
Greece	616	77%	90	11%	54	7%	30	4%	7	1%
Portugal	4,425	64%	1,861	27%	270	4%	310	5%	0	0%
Spain	15,299	73%	2,470	12%	1,240	6%	569	3%	1,376	7%
Catalonia	4,824	78%	377	6%	422	7%	124	2%	471	8%

Table 10.5. *Number of mopeds intervening in accidents according to the accident type (2003).*

Table 10.6 examines the intervention of mopeds in accidents and compares the percentages by accident type with the overall share of mopeds in the total vehicle stock. It can be seen that the percentage of mopeds in the total vehicle stock is similar for Portugal, Spain and Catalonia, but much higher for Greece; it appears that the numbers of mopeds for Greece is too high, possibly due to an accumulation of registrations of obsolecent vehicles. The low involvement of mopeds in the total accidents for Greece is also noteworthy; compared with the high accident involvement of motorcycles (see Table 9.7 in Chapter 9), this suggests a different level of usage of the two modes compared to the other Southern countries – possibly linked to the restriction of access of youngsters of less than 16 years but manifesting itself as a behavioural difference in older age groups, too. For Catalonia, mopeds are involved in twice the proportion of accidents of all types than their share in the total vehicle stock.

	Share of all vehicles	Share of all accidents				
		Collisions	Drive off road	Hit pedestrians	Collision with obstacle	Other
Greece	21.3%	2.3%	3.5%	1.7%	2.7%	2.7%
Portugal	8.4%	9.9%	14.4%	4.0%	8.1%	8.1%
Spain	7.8%	12.4%	9.3%	10.6%	13.3%	13.3%
Catalonia	6.7%	17.0%	15.3%	13.1%	13.6%	13.6%

Table 10.6. M*opeds intervening in accidents according to the accident type as share of all accidents of its type (2003).*

10.4.3.4. By age

Figure 10.9 shows the age distribution of dead moped drivers by country and region for 2003. The age groups are designed to separate the differences in age for acquiring a moped licence (16 years in Greece).

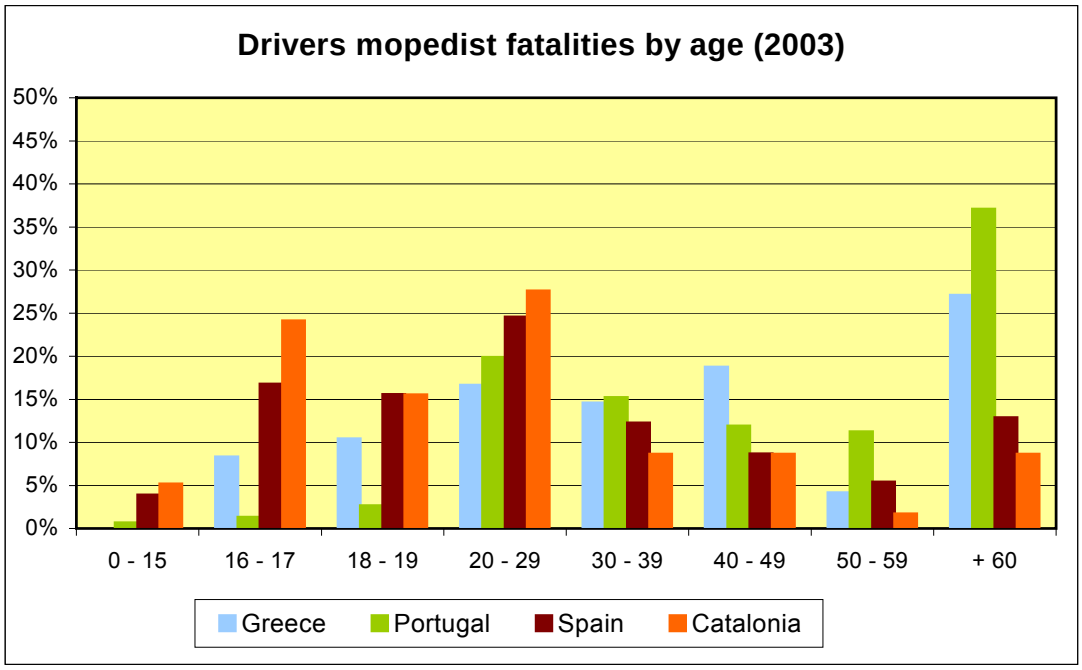


Figure 10.9. *Percentage of dead moped drivers by age group, in Greece, Portugal, Spain & Catalonia.*

Note: For Portugal Drivers and passengers.

The most striking aspect of the comparison is the high percentage of mopedist fatalities for Portugal (40% over 60 years) and Greece (more than a quarter over 60 years). Taking into account the smaller age bands, the highest ranking age groups for Spain and Catalonia are the 16 and 17 year olds followed by those aged 18 to 19; the figures for Portugal for these age groups are notably low. The percentage of mopedist fatalities age 14 to 15 for Spain and Catalonia is much lower than the levels aged 15 to 19, even though the levels are higher than for Portugal.

10.4.3.5. Helmet usage

Figure 10.10 and Figure 10.11 show, respectively, the levels of helmet use in fatal and serious injury accidents. The figures show similar trends, with the levels of usage in serious injury accidents being higher for most countries.

The most striking aspect from this comparison is the low level of helmet usage by mopedists in Greece. As for motorcyclists, the trend shows an improvement since 2001, but the level of usage recorded in 2003 is still only 20%, compared to 80 to 90% for Portugal and Spain. Catalonia shows lower levels of helmet usage at just over 50%, and this is also a matter of concern.

Compared to the usage of helmets in motorcycle fatalities it is noted that Portugal maintains similar high levels of helmet usage. The level of usage in Spain drops significantly (from over 90% to just over 50%). The most recent data (2003) shows similar levels of helmet usage by both mopedists and motorcyclists for Catalonia.

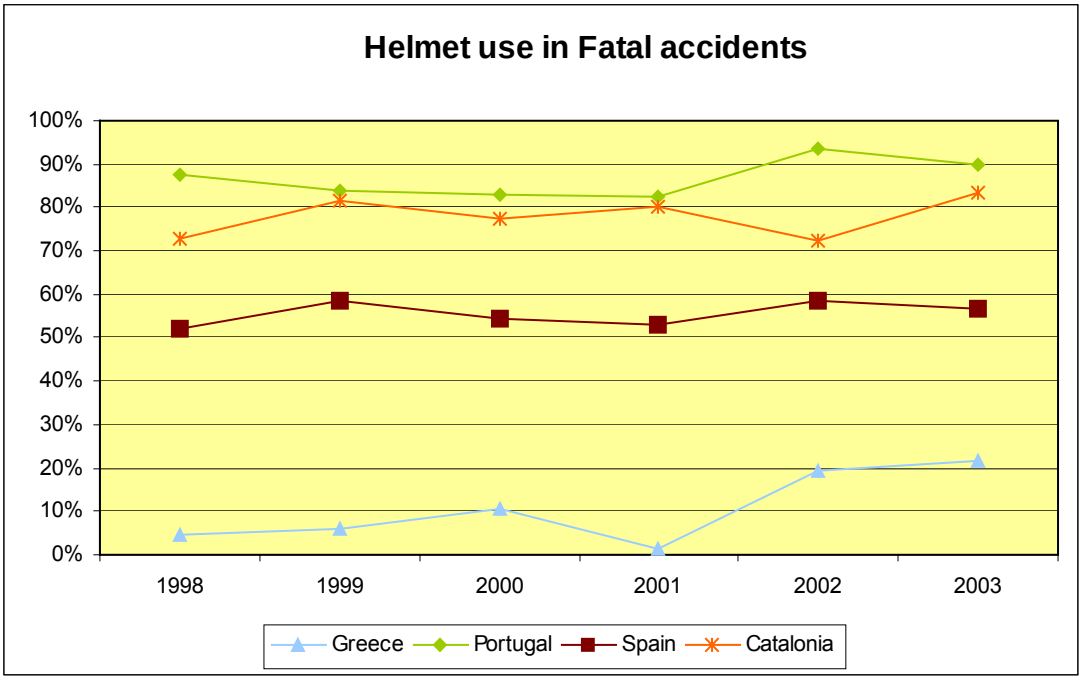


Figure 10.10. *Percentage of helmet use in mopeds fatal accidents for Greece, Portugal, Spain & Catalonia*

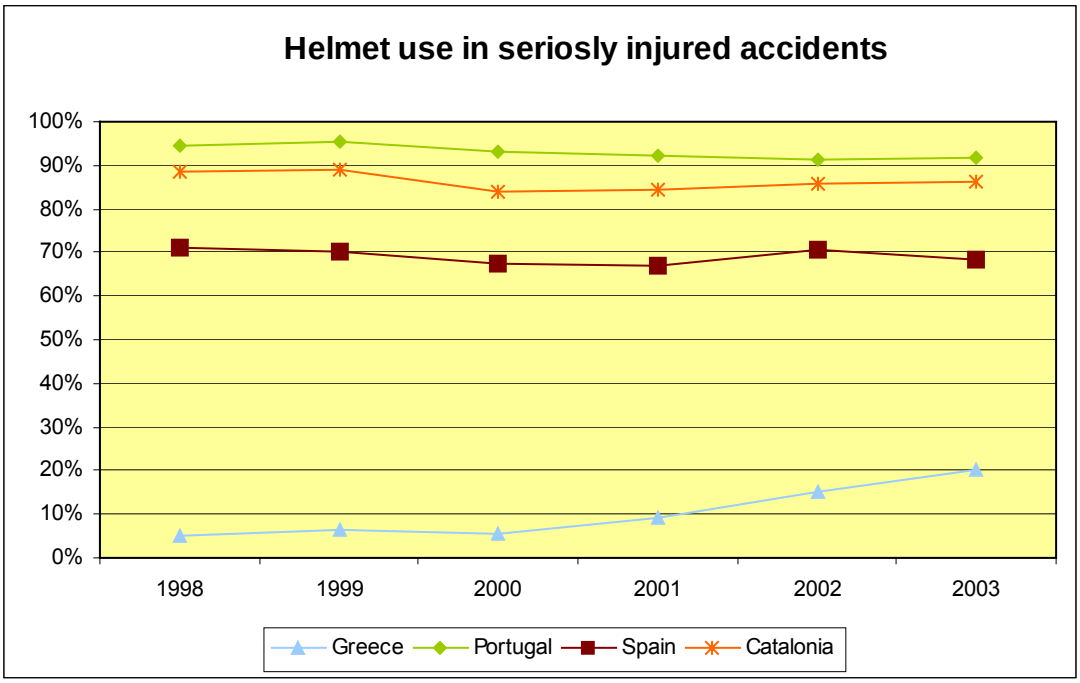


Figure 10.11. *Percentage of helmet use in mopeds seriously injured accidents for Greece, Portugal, Spain & Catalonia*

10.5. Traffic safety risks

Table 10.7 and Table 10.8 show the casualty rates for moped users per capita and per vehicle, respectively.

In terms of both population and moped motorisation the 2003 figures show Portugal as having around twice the casualty rates of Spain and Catalonia.

All countries show an improvement in casualty rates per capita, with Greece Portugal and Catalonia halving the rates between 1998 and 2003.

Year	Casualty rate per 100.000 population											
	Greece			Portugal			Spain			Catalonia		
	Killed	SI	All	Killed	SI	All	Killed	SI	All	Killed	SI	All
1998	1.1	3.8	23.3	3.5	19.3	163.9	1.3	15.7	66.6	1.6	28.3	120.2
1999	1.0	3.1	18.3	2.7	15.6	135.3	1.3	15.5	71.7	1.4	23.4	132.5
2000	0.8	2.5	14.6	2.5	11.6	104.1	1.2	12.8	73.6	1.5	15.9	129.3
2001	0.7	1.7	9.7	2.1	9.0	90.4	1.1	11.3	65.8	1.2	14.4	121.3
2002	0.5	1.2	8.2	1.9	7.5	79.6	0.9	10.2	58.6	1.1	12.2	106.7
2003	0.5	1.0	7.6	1.9	7.6	76.2	0.9	9.4	54.5	0.9	10.7	99.5

Table 10.7. *Casualty rates for moped users, Greece, Portugal, Spain and Catalonia.*

Year	Casualty rate per 1.000 mopeds											
	Greece			Portugal			Spain [8]			Catalonia		
	Killed	SI	All	Killed	SI	All	Killed	SI	All	Killed	SI	All
1998	0.1	0.3	1.7	0.5	3.0	25.4						
1999	0.1	0.2	1.2	0.4	2.6	22.9						
2000	0.1	0.2	1.0	0.4	1.9	17.3						
2001	0.05	0.1	0.7	0.4	1.6	16.2	0.3	2.5	14.9	0.3	3.2	27.2
2002	0.03	0.1	0.6	0.4	1.6	17.4	0.2	2.1	11.9	0.2	2.5	22.0
2003	0.03	0.1	0.5	0.4	1.6	15.9	0.2	1.8	10.7	0.2	2.2	20.3

Table 10.8. *Casualty rates for moped users, Greece, Portugal, Spain and Catalonia.*

Looking at the trend in fatality rates per capita for mopeds shows big improvements for all counties but especially for Portugal. By 2003 the rate for Portugal remains four times that of Greece, with Spain and Catalonia at almost twice the Greek figure.

Looking at the trend in fatality rates per moped shows a big improvement for Greece. For 2003 the rate for Portugal is twice that of Spain / Catalonia, and almost tens times that of Greece.

10.6. Interventions to reduce the risk

Among the measures directed to enhance motorcycles safety, in Portugal, some have a legal nature, others relate to information and drivers training, to enforcement and to improvements in the infrastructure.

[8] numbers of mopeds for Spain (and Catalonia) not available for years prior to 2001.

1983 - Daytime running lights for two wheeled vehicles.

1985 - Mandatory installation of reflector devices on two wheeled vehicles.

1988 - Campaign to increase the use of reflector devices on two wheeled vehicles.

1990 - Campaign to increase the use of reflector devices on two wheeled vehicles.

1993 - Campaign addressing young drivers related with the use of seat belts, speeding, drinking and driving and two wheeled vehicles.

Similarly to the case of Portugal, in Greece measures related to PTWs safety are mostly coming from revisions of the Road Traffic Code (legislation – enforcement) and campaigns (information).

1986 – Compulsory wearing of helmets by motorcyclists (driver and passenger)

2001 – Nation-wide road safety advertising campaign “On the way 2001-2005”

2002 – Nation-wide road safety advertising campaign “Bob campaign”

2003 – Nation-wide road safety advertising campaign “How do you drive?”

A driving licence for mopeds can only be obtained by persons who have completed their 16th year of age. Anyone caught driving a moped with no proper licence is subject to imprisonment of 1-3 months. Furthermore, if someone is caught driving under a suspended licence status, imprisonment ranges from 3 to 6 months. Unfortunately, the Road Traffic Police Dept. of The Ministry of Public Order does not keep a separate record of notices issued for not wearing a helmet.

Greece	1999	2000	2001	2002	2003
PTW victims	12,869	11,996	10,597	8,820	8,170
PTW vehicles (*1000)	2,332	2,342	2,461	2,525	2,586
Non-wearing helmet penalty notices	n.a.	81,252	151,909	236,781	216,519

Table 10.9. *Sanctions relating to PTW regulations enforcement in Greece*

For Spain and Catalonia, youngsters aged 14 to 16 can receive a provisional moped driving licence provided they complete and pass the test. In Spain, the main effort to reduce PTW casualties has focussed upon the enforcement of helmet-wearing, see Table 10.10. The relation between enforcement effort and PTW safety is not readily discernible from the figures. It is noted that the latest years show less deaths, more ownership with less sanctions.

Spain	1999	2000	2001	2002	2003
PTW victims	39,872	40,959	37,984	35,051	33,484
PTW vehicles (*1000)			12,800	14,802	15,781
Non-wearing helmet penalty notices	60,634	68,184	64,356	50,427	47,771
Penalty notices regarding illegal carriage of PTW passenger				618	625

Table 10.10. *Sanctions relating to PTW regulations enforcement in Spain*

Notes: sanctions are those issued by the ATGC (Agrupación de Tráfico de la Guardia Civil) and exclude those of the autonomous regions of Basque Country & Catalonia.

Number of PTW's vehicles, years 1999 and 2000, doesn't include mopeds.

Like in Spain, enforcement has focussed in helmet wearing. The casualties has been reduced by 11% while the number of PTW's vehicles has risen by 6%.

Catalonia	2001	2002	2003
PTW victims	12,022	11,134	10,658
PTW vehicles (*1000)	701	740	746
Non-wearing helmet penalty notices	8,926	5,676	5,431
Penalty notices regarding illegal carriage of PTW passenger			

Table 10.11. *Sanctions relating to PTW regulations enforcement in Catalonia*

Notes: sanctions are those issued by the Mossos d'Esquadra and exclude those of the local police.

10.7. Explanation of differences and/or similarities between the countries

Recent trends in absolute numbers of mopedist fatalities show a decrease for all countries. In the case of Spain and Catalonia the reduction is achieved in spite of an increase in the moped stock.

The relative risk ratio for mopeds for 2003 shows similar levels of Portugal, Spain and Catalonia, but levels two to three times lower for Greece. Casualty rates for Greece in 2003 were four times lower than Portugal, and half the rates for Spain and Catalonia.

This positive result for Greece appears to be related to the strict negation of driving rights to persons aged 14 to 16 in Greece. The overall result seems to be quite complex since Greece suffers much higher levels of motorcyclist fatalities; those Greek young people who have been denied earlier access to a moped appear to overlook this mode of transport, and this appears to result in greater usage of motorcyclists by a larger proportion of youngsters (than in Spain and Catalonia).

Given the high level of helmet usage for Portugal and the legislation to restrict moped usage by the youngest persons, it is not evident why the casualty rates are higher than Spain and Catalonia. Part of the reason could be due to a greater enforcement effort (without data for Portugal this can only be a conjuncture).

Another reason may be due to the higher level of motorisation of PTWs and the effect that a higher number of vehicles has upon the overall driving behaviour.

There is a big difference between the risk ratios for urban and rural areas for Spain and Catalonia. The greater enforcement effort on interurban roads, and the lower level of exposure, are the likely reasons. For Catalonia, mopeds are involved in twice the proportion of accidents of all types than their share in the total vehicle stock. Catalonia has the highest rate of mopeds per capita, which could be part of the explanation – but the indicator would justify more enforcement to improve road discipline.

10.8. Conclusions and country specific recommendations

In spite of the fact that moped safety levels in Greece can be considered to be better than the other Southern countries, it is recommended that Greek authorities address the low level of helmet usage by publicity and police enforcement effort; it is not clear why the situation improved during the last couple of years, but whatever has changed needs to be more extensively implemented. Such an action is primarily needed for motorcycles – but can be extended to mopeds at little marginal cost.

The possibility that other countries adopt Greek restrictions on access to mopeds to persons aged 14 and 15, needs careful consideration – not only due to the popular resistance but also because there appears to be an associated increase in the number of motorcycle accidents and fatalities.

Portugal and Greece experience a higher proportion of elderly mopedist fatalities. In part this is due to the lower number of young mopedist fatalities, but the percentages are high, and the absolute numbers could be sufficient for this to be a concern. If so, re-training courses and / or enforcement of helmet usage would be appropriate measures.

Portugal also shows a higher proportion of moped passenger fatalities. Given the lower usage of mopeds in Greece, the interesting thing is the lower level of passenger fatalities in Spain and Catalonia.

Improved monitoring (especially for Greece and Portugal) of numbers of moped registrations, and of enforcement actions, would improve the quality of the benchmarking.

Given the overall high share of PTW fatalities, all countries are recommended to make greater efforts to develop appropriate technological solutions to make PTWs safer – especially for young persons. For instance, mopeds could be a first candidate for introducing the alcohol ignition lock, or for using global positioning systems to limit the range (of home) within which a young person is allowed to use a moped or motorcycle. As vulnerable road users, much more needs to be done to introduce protection systems such as external air bags for PTW users.

11. Conclusions and recommendations

The aim of this report has been to identify the major road traffic risk differences between Southern European countries based upon a comparative approach initially applied by the SUN (Sweden, United Kingdom & the Netherlands) countries, and focussed on the analysis of fatalities by users of different modes of road transport.

As part of the extended study, involving nine countries, the report examines a series of safety actions (case studies) as part of a benchmarking of road safety performance across a range of countries at different stages of safety development.

11.1. General conclusions

- Current trends in all three countries (and in Catalonia) show a positive reduction in fatalities, but the trend has not been a steady overall progressive reduction (as in the SUN countries). The last decade has seen an important development in roads infrastructure and in vehicle stock (especially cars and powered two wheelers) in all three countries. On the one hand, the varying trends and the changes in roads and vehicles make it difficult to quantify the impact of specific measures; on the other hand, there is a good basis for the comparison in so far as the Southern countries are seen to be facing similar changes and challenges.

- There is room for improvement in well-established safety fields in all three countries, and in the autonomous region, and scope to learn from each other to ensure collective experience is used effectively.

- All three countries (and the autonomous region of Catalonia) have published a plan covering a period of three or more years (including the current year of 2005) that sets quantified targets for a reduction in the number of road accident fatalities. Such progress in road safety planning is a relatively new aspect of road safety activity in the Southern countries studied.

- The targeted reductions for Portugal are even more ambitious than those of the EU White Policy paper proposing a halving in road deaths by 2010, whilst those for Spain and Catalonia are in line with the European overall projection and those for Greece are more modest. (The plan for Greece aims to achieve a 40% reduction by 2015, and compares with an achieved 20.5% reduction in persons killed during the first period of the plan, covering 2000 to 2004). This study provides indications that help to explain some of the differences between planned and actual changes in fatalities.

- Measures of risk exposure in terms of kilometres travelled are not yet being systematically monitored at national/regional level with the precision required to examine exposure by mode, age, road type etc.. Where travel exposure indicators could not be developed the analysis has generally been developed in terms of population (as agreed with researchers studying the SUN and Central countries).

- Comparisons of statistics for road fatalities are based on national factors applied to police data recording deaths within 24 hours in all three countries. In collecting indicators, various efforts to improve data systems are ongoing. In some cases, improvements to data systems are recommended to facilitate improved comparisons. In general, a greater use of information and communications technologies could improve the process of data registration as well as facilitating improved analysis.

11.2. For safety indicators

- The Southern countries exhibit accident rates in terms of deaths per hundred thousand population that range from 12 to 17 (figures for 2002) and from under 2 to over 3 deaths per ten thousand motor vehicles[9]; rates per kilometre travelled are similar. Spain (41.6 million population in 2002) has approximately four times more people than Greece or Portugal. At just over 80 persons per sq. km., Greece and Spain have the lowest population densities.

- Spain has more than five times the number of passenger cars than Greece, but less than four times the number for Portugal. Catalonia comprises 6% of the area of Spain, but 16% of its passenger car stock. The motorway length per area is similar for Portugal and Spain, being four times that of Greece; in terms of motorway length per capita, Spain has the highest ratio, and that for Portugal is around 2.8 times that for Greece.

- The analysis of collision matrices shows that the percentage of car occupants involved in all fatalities varies from 47% for Greece to 61% for Portugal, and up to 65% for Spain (when vans are included with cars). The lower proportion of passenger car fatalities for Greece is partly related to the lower level of car motorisation, but also to the relatively high ownership of motorcycles; Greece has the highest proportions of motorcyclist, pedestrian and lorry occupant fatalities. Spain, Portugal and Catalonia have higher proportions of car occupant and mopedist fatalities.

- Combined, the fatalities of riders of motorized two wheelers (mopeds and motorcycles) account for between 15% (Spain) and 23% (Greece and Portugal) of all fatalities. These figures - for Southern countries with relatively large stocks of motorized two wheelers - compare with around 17% for Great Britain and the Netherlands, (see SWOV, 2002). One of the factors explaining the lower fatality rates for motorcyclists and mopedists in Spain and Catalonia (compared to Greece and Portugal) is the higher rate of helmet usage. In Greece youngsters do not legally have access to a moped until a year later than Spain or Portugal; the consequent lower exposure probably contributes to the relatively low proportion of mopedist fatalities.

[9] Catalonia: 1.79, Portugal 3.17

11.3. For drink and drive safety

- Drink-driving remains a serious problem for Southern countries with a total of around 1900 persons killed in total in 2003 (i.e. 22% of accident fatalities).

- The current legislative framework across the Southern countries is similar (all apply a general limit of 0.5 g/l of alcohol in blood), but with some differences (Greece and Spain apply lower limits for young drivers, Greece and Portugal apply intermediate and higher limits).

- The benchmarking examines various indicators to ascertain the extent and nature of this problem:

    - The proportions of drink and drive related infringements range from 3.2% in Portugal up to 4.4% in Catalonia.

    - It seems that Portugal perceived earlier than the others the severity of the problem and responded earlier; it experimented with lowering the limit and it currently applies the severest sanctions.

    - Greece currently performs the most screening tests per passenger car, (1 check per 3 cars, approaching the 1 per 2.5 cars target set by EC), followed by Portugal (in the order of 1 test per 5.5 cars) and Spain and Catalonia (1 test per 8, and 1 test per 10 cars, respectively). Largely due to the improvement in enforcement, Greece shows the largest % reductions in positive in accident-related tests over the period 1998 - 2003.

    - Greece has also obtained the more comprehensive record of alcohol levels of killed drivers.

Authorities in all Southern countries are actively trying to change the behavioural culture of drink-driving. It is evident that this is not something that can be achieved in a short period of time, and that intensive police control supported by a severe penal system and marketing are all necessary.

11.4. For seat belt safety

- Seat belt wearing rates by Greek drivers are well below those of the other countries. With seat belt use in KSI (Killed or Seriously Injured) accidents just over 40%, there is a great opportunity for saving lives by improving seat belt usage by Greek drivers. The rates achieved in other Southern countries exceed 80%; in Portugal this may be at least partially attributed to suspension of those drivers repeatedly found not wearing the seat belt; in Spain the programme of continued monitoring has facilitated targeting of publicity and enforcement by age, sex and between urban / interurban roads.

[10] controls by local police and Basque regional police not included.

- It is estimated that somewhere between two-thirds and three-quarters of children in the Southern countries and region that are killed were not using the appropriate child restraint system. It is evident that the administrations have been making efforts to obtain information about this problem, but further efforts are required to ensure more complete recording (both of usage levels in accidents and numbers of sanction penalty notices issued). Attention should be given to analysis of usage rates of children by year of age once the data recording is improved.

- Greece, Spain, and Catalonia show low belt wearing rates for rear seat occupants and for urban roads; Portugal does not have disaggregated information. Whilst part of the improvement in driver seat belt wearing may be attributable to the improved safety features of new cars, it is evident that police enforcement has contributed to raising the belt wearing rates for all countries in recent years.

11.5. For young drivers safety

- The relative risk ratio compares the number of drivers in fatal accidents related to the population aged between 18 and 25 years with those of the 30 to 59 age group; for all the countries for the most recent year (2003) the ratio is between 1.5 and 2.0, indicating that this is a common problem, of similar magnitude. The trends show an improvement for Portugal (from over 2.0 in 2001) and a slight worsening for Greece and Spain (from 1.2 in 1997). The accident data indicates that young Southern males are five times more likely to be involved in fatal accidents than young females (data giving veh-kms by sex of driver is not available). Data for Spain indicates that, in terms of accidents per licence holder, the youngest age group is three times more likely to be involved in road accidents than the older age group.

- Considering the data for 2003, the types of accident in which young drivers of Southern countries are over represented are single accidents (especially Greece and Spain), accidents at weekends (particularly Portugal) and accidents with several passengers present (particularly Catalonia, Spain and Greece). The problem of dangerous driving by young drivers during the weekend nights is particularly severe in Southern countries due to the combination of good climate and extended late night activities.

11.6. For speed management

- The speed limits applied by type of road and by vehicle class are similar for the Southern countries. The kilometrages of roads with specific speed limits is not known.

- Based on police accident records, the percentage of fatal accidents where speeding was a contributory factor in Greece rose from 18% in 1996 to 23.5% in 1998, then dropping to 15% in 2003. The recent reduction coincides with a fourfold increase in speeding penalty notices issued by police.

- The recording of speed as a contributing factor in fatal accidents is higher in other countries, indicating possible differences in reporting. For Portugal, figures (40% in 1998, 33% in 2003) suggest a reduction in the speeding problem, but this is in variance with site observations of vehicles speeding on different road types conducted in 2002. In Spain, the proportion is almost constant, around 27-28%, with Catalonia recording higher levels (33-34%) than the national average.

- Catalonia is the first location of the Southern countries to implement automated camera systems to manage excessive speeding, and the first results show that this type of system is very effective in reducing speeds, infringements and accidents.

- It is concluded that the Southern countries continue to experience serious problems of vehicles exceeding speed limits. In terms of fatalities this may well be of a similar magnitude to the drink-driving problem, although this is hard to determine without comparative data such as is obtainable from a systematic deployment and monitoring of speed cameras.

11.7. For pedestrian safety

- Portugal presents, in general terms, the worst rates for pedestrian fatalities and injuries. However the trends point to a convergence towards similar current rates to those presented by the other two countries and the autonomous region, especially in the cases of killed and seriously injured. These current rates, however, are still well over those for Sweden and the Netherlands, and the proportions of night-time accidents and elderly are particular problems. The relative improvement in Portugal is attributed to a greater effort in localized improvements in roads infrastructure and junction layouts (low-cost infrastructure was not part of the cases studied for Southern countries).

- The age pattern of pedestrian fatalities for the Southern countries is similar to that for Sweden (see SWOV, 2002). Compared to Sweden, based on 2003 data, elderly pedestrians are a particularly vulnerable group for the Southern countries, especially for Greece.

11.8. For powered two wheeler safety

- The number of motorcycles in Southern countries is increasing, particularly in Greece and Portugal. Catalonia has a notably high stock of motorcycles (in 2003, almost a third of the Spanish total, almost half the stock of Greece). Motorcycle fatalities per capita show great improvement for both Greece and Portugal, although by 2003 the former remains three times, and the latter two times, the level of Spain. Similar improvements are seen for fatalities per motorcycle, although the rate for Portugal in 2003 is four times that of Greece and six times that of Spain / Catalonia.

- In 2003, for Greece, two out of every three killed motorcyclists were not wearing a helmet, compared with approximately one in seven of the killed motorcyclists in Spain, 1 in 10 for Portugal, and 1 in 25 for Catalonia.

- There are proportionately more young killed motorcyclists in Greece (half are aged 20 to 29) than in Spain (highest age group being 30 to 39) and Catalonia (highest age group is 40 to 49). This suggests that Greece may have a harder challenge (of enforcing helmet usage) but all Southern countries have to make and maintain high levels of enforcement to ensure acceptable rates of helmet usage.

- Portugal appears to have a particular problem with motorcyclist fatalities driving off road, especially on rural roads.

- Greece exhibits the best moped safety performance, thanks largely due to a higher minimum age limit and more rigorous testing. However, the possibility that other countries adopt Greek restrictions on access to mopeds to persons aged 14 and 15, needs careful consideration – not only due to the popular resistance, but also because there appears to be an associated increase in the number of motorcycle accidents and fatalities.

- The number of mopeds is increasing in most Southern countries, except Portugal where there is a decline. The trend in fatality rates per capita for mopeds shows great improvement, especially for Portugal. Nonetheless, for 2003, the rate for Portugal remains four times that of Greece, with Spain and Catalonia at almost twice the Greek figure. In terms of fatality rates per moped, for 2003, the rate for Portugal is twice that of Spain / Catalonia, and almost ten times that of Greece.

11.9. Specific recommendations for the European Commission

The Southern countries thus far examined by applying the SUNflower approach show that this approach is useful for identifying common characteristics and in identifying the better practice(s) that could be applied to the lesser performer(s). If the EU is to achieve the 2010 target of halving road fatalities, the contribution has to come from those countries where there is a high potential for improvement. The Southern countries of Greece, Portugal, and Spain (including Catalonia) are making progress towards this ambition, but more needs to be done to ensure that progress is sustained and that best practice is more widely adopted.

Whilst some of the challenges can be considered to be “improved housekeeping” such as improving seat belt wearing performance, and sustained enforcement through police control, others require the adoption of improved technologies and procedures (camera-based speed management, point-based driver demerit).

In some cases it is possible to quantify the potential for saving lives associated with a particular action (for example improved seat belt wearing), but the lack of a common overall trend, and the rapid expansion in roads and vehicles renders it difficult to establish new relationships quantifying specific policies or actions.

Main recommendations for the Commission of the EU and member states

The proposal made in the SUNflower report, for the EU conditional subsidy of enlarged national / regional investment on large-scale implementation of intensified enforcement on speeding, drink-driving and seat belt/ child restraint is highly

relevant; this report provides findings that could be used to prioritise such actions at the state level.

A similar approach of conditional subsidy is equally applicable to the powered two-wheeler problem. The SUNflowerplus benchmarking shows where improvements should start, (helmet enforcement, improved driver training) but consideration needs to be given to supra-national initiatives that enhance vehicle safety for powered two wheelers (and not just four-wheeled vehicles) and which make it easier to automatically detect infringements made by drivers of such vehicles.

If the overall EU objective of halving fatalities is to be achieved, on time, it is likely that stricter legislation will be needed in areas such as alcohol motor ignition control or the adoption of accident recorders.

Main recommendations with respect to further (EU sponsored) studies

The study of powered two-wheelers has identified a number of areas where authorities can take action, but it also identifies a need for further study to quantify PTW exposure levels; this should also benchmark insurance costs and levels of non-insured usage.

Given the overall high share of PTW fatalities, all countries are recommended to make greater efforts to develop appropriate technological solutions to make PTWs safer – especially for young persons. As vulnerable road users, much more needs to be done to introduce protection systems such as external air bags for PTW users.

Of the basic parameters (vehicle, user, road) benchmarking is hampered by a lack of good data about roads. It is necessary to introduce attributes from digital navigation maps within road accident studies; apart from providing precise and consistent quantification of road lengths by type, such tools can be applied to determine road lengths by speed limits and other inventoried elements; cross-tabulating black spots by problem type (young drivers, single vehicle accidents, ...) could facilitate insights about how to efficiently programme the deployment of police (seat belt, speed, drink) controls.

Unlike some northern European countries, mobile phone-based location has not yet been applied to the collection and data processing of accidents in the studied Southern countries; the use of such technology to geo-reference accidents and other performance indicators can be exploited to reduce police effort, better deploy resources, target enforcement, etc..

Benchmarking at the national level has not been able to provide insights about the relative performance of areas with respect to the use of safer public transport alternatives. To examine this, a study is recommended that applies the SUN method at the regional / urban level. Such a study could usefully compare the provision of traffic signal facilities and standards for pedestrian crossing times which may be too short for elderly pedestrians.

11.10. Specific recommendations for the Southern countries

Common

There is a common need to maintain (and in some cases increase) the police control effort directed at young drivers, drinking-drivers and speeding drivers.

There is a need to improve the procedures and databases to improve police effectiveness for tracking and dealing with re-incident drivers of serious infringements (drinking, speed, non-use of protective systems). The introduction / improvement of points-based driving licences should facilitate improved tracking of habitual offenders, should include reduced thresholds for young drivers, and should cover drivers of powered two-wheelers. The re-training of drivers who lose their licence is an opportunity that can reduce certain types of accidents such as single vehicle accidents (applicable especially to car drivers in Greece and Spain).

Measures of risk exposure in terms of kilometres travelled need more precision to examine exposure by mode, age, road type etc. The need to monitor actions by road type implies the improvement of databases and, typically, information exchange between administrations.

All countries could save lives if the rear seat belt wearing rates were raised.

All countries need to improve the monitoring of Child Retention System usage, and the monitoring of related sanctions.

The analysis of motorcycle and moped relative risk ratios identifies higher risks in urban areas. This result leads to a recommendation for more enforcement of road discipline (controls of drink-driving, red-light jumping, excess speed as well as helmet wearing) in urban areas targeted on PTW users.

For Greece

Improving driver compliance with the existing seat belt law is an area where Greece, in particular, could save lives. By applying the same approach to drink-driving (active, intensive police control and monitored sanctions) it is likely that seat belt-related safety performance can be much improved.

Young drivers are over represented in single accidents. Greek authorities should seek ways to improve the training of young drivers by considering accompanied driving before the driving test.

More attention should also be given to pedestrian safety in through roads and new measures should be studied (artificial lighting, improvement of pedestrian visibility, etc.).

An obvious recommendation is that Greek authorities should address the low level of helmet usage (both motorcycles and mopeds) by better police enforcement and increased sanctions.

One way to increase police enforcement (of seat belts and helmets) would be to incorporate such controls into the drink-driving checks; some rationalisation of police

deployment may be needed, but this could improve overall effectiveness without too requiring a big increase in policing.

For Portugal

The disaggregation of seat belt wearing infringements by front / rear seat occupants would improve knowledge about the relative impact of safer vehicles, police seat belt enforcement etc.

In order to improve the understanding of young drivers' attitudes, data collection should be more developed.

More needs to be done to facilitate safe pedestrian movements on both urban roads and on rural roads passing through towns, with elderly people at night as the design criteria; improved infrastructure needs to be reinforced by the continued effort to educate road users of all ages.

Portugal experiences a higher proportion of elderly mopedist fatalities; re-training courses and / or enforcement of helmet usage could be appropriate measures.

The higher relative risk ratio for Powered-Two-Wheelers PTWs in Portugal has been investigated in terms of accident types in comparison with share of vehicle stock; it is recommended that Portuguese PTW users need improved training or the introduction of a points driving licence that can curb reckless driving.

For Spain

The importance of drink-driving cannot be understated. It is proposed that Spain makes greater efforts to fully record the controls made, with improved recording of levels and accident type. Sanctions for such offences should be increased at least to Portuguese practice.

Stricter legal measures to be considered that include the setting of a standard BAC level of 0.2 g/l for motorcyclists, or the establishment of a common minimum punishment of unconditional suspension of the driving licence for 6 months for anyone passing the limit.

Spain should seek measures to improve rear seat belt use.

The number of fatalities due to speeding shows no sign of lowering. The introduction of automatic detection should be a way to reduce them and to change driver behaviour. Experience gained through early deployment in Catalonia needs to be reviewed so as to facilitate wider deployment in other regions, and to ensure effective monitoring by road type at the various levels.

Data reporting of pedestrian urban casualties should be improved to better know the real scope and nature of the problem.

For Catalonia

In spite of coordinated efforts (of policing and marketing of "Zero tolerance"), drink and drive continues to be an important problem. Catalonia shows a relatively low

detection level of drunk drivers (1 out of 7 cars tested) and this can only be increased through increasing police controls.

Catalonia has installed speed cameras and this should increase the number of speed offenders detected in an efficient manner. To build upon the encouraging initial results, camera control needs to be extended to cover the entire road network (of locations with speed-related accidents) so as to ensure a change in driver behaviour. It should be possible to compare performance for different road types, taking into account the varying exposure levels.

The use of child restraint system and rear seat belt is very low. Catalonia should give more attention to this point and the authorities should consider a campaign to increase driver awareness about the consequences.

Catalonia has a high level of powered two wheeler ownership and usage, and shows a relatively good performance in terms of helmet enforcement. However, the authority should consider whether its participation in ENCAP vehicle testing could facilitate a testing of new protective devices for motorcycle users (e.g. external air bags). It should also investigate how licensing might be improved (plate type, electronic tags, etc..) to facilitate recognition of motorcycles at automated speed controls.

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Appendix A: LISTING OF KEY SAFETY INTERVENTIONS BY COUNTRY

A.1 Safety measures & relevant institutional changes in Greece since 1970

1978 Introduction of a Statistics Department (today in MPO) investigating road accidents inventory on a monthly basis

1983 Establishment of Vehicle Technical Inspection Centres in Greece - according to the EU obligation

1986 Compulsory wearing of helmets by motorcyclists (driver and passenger)

Establishment of "Accident Prevention Sector" in the National Centre for Emergency Care

1987 Compulsory fitting of seat belts in the front seats of all passenger cars, which the driver and the Front seat passenger must wear

Revision and reformation of the Road Traffic Code of Greece

1990 Introduction of compulsory periodical technical Inspection of all vehicles

1991 Introduction of a multi-year program for upgrading geometrical characteristics of the main national Road network with the EU financial support

Three-year programme for the renewal of the passenger car fleet

Establishment of Child Accident Research and Prevention Centre under MHW Public Health Directorate

1992 Foundation of Road Accidents Office under MEPPPW Directorate of Road Works Maintenance

Foundation of Traffic Studies & Attica Technical Support Department under MEPPPW Directorate Of Road Construction Works Studies

Foundation of Traffic Signalling Department under MEPPPW Directorate of Road Construction Works Studies

1993 Revision and reformation of the Road Traffic Code of Greece

1994 Introduction of alco-test to discourage drinking and driving

1995 Constitution of Intrapartial Committee of the Greek Parliament for the investigation of the road Accidents issue

1996 Revision and reformation of the Road Accident Data Report

1997	Foundation of Road Safety Office under Directorate 3 of MEPPPW General Secretariat for Public Works
	Activation of the institution of the School Traffic Warden by joint decision of MTC and MNER
	Foundation of the Union for the Support of Road Accidents Sufferers
1998	Nation-wide road safety advertising campaign for seat belt use: "Seat belt binds us to life"
	Start of a multi-year intensified road safety enforcement programme
1999	Revision and reformation of the Road Traffic Code of Greece
	Introduction of new drinking and driving limits: 0.5gr/l
	Announcement of the National Road Safety Programme by MTC
	Constitution of the National Road Safety Committee by MTC
	Initiation of a co-ordinated surveillance programme by Road Traffic Police
2000	A new Driver Behaviour Control System came into force by MTC
	Organisation of a 1-month trial of a pilot surveillance programme at central Athens & Thessaloniki areas ("Respect our fellow-citizen)
2001	Adoption of the 1st Strategic Plan for the improvement of road safety in Greece, 2001-2005
	Nation-wide road safety advertising campaign: "On the way 2001-2005"
2002	Nation-wide road safety advertising campaign: "Bob campaign"
	Introduction of new drinking and driving limits for professional and young drivers: 0.2gr/l
2003	Nation-wide road safety advertising campaign: "How do you drive?"
2004	Preparation of the 2nd Strategic Plan for the improvement of road safety in Greece

MEPPPW= Ministry of Environment Physical Planning and Public Works

MHW= Ministry of Health and Welfare

MTC= Ministry of Transportation and Communication

MNERA= Ministry of National Education and Religious Affairs

A.2 Road Safety Activities 1970-2000 in Portugal

1970 New speed limits of 60 km/h in urban roads, 90 km/h in rural roads and 120 km/h in motorways.

Mandatory installation of seat belts on front seats, for all cars.

Mandatory use of helmet for all motorcycle occupants.

1976 Campaign “To drive is to live”.

1977 Mandatory use of seat belts by the driver and all passengers on front seats, outside urban roads.

1982 New alcohol limit of 0.8g/l.

Mandatory installation of a special sign on long vehicles.

1983 Daytime running lights for two wheeled vehicles.

Mandatory installation of a special sign on slow vehicles.

1985 Mandatory installation of reflector devices on two wheeled vehicles.

Mandatory installation of tachographs in lorries.

1989 Mandatory installation of seat belts on all seats, for all cars.

Mandatory installation of rear fog lights in all motor vehicles.

1990 New alcohol limits: above de 0.5g/l – level 1 penalty; above 0.8g/l – level two penalty; above 1.2g/l – crime.

Standardisation of early warning signs.

1991 Permission for liquefied petroleum gases (LPG) use in motor vehicles.

1992 Mandatory vehicle inspections every two years.

Mandatory front seat belt use by all occupants in every road.

Probatory character of all drivers license: the license only becomes definitive after two years of its emission.

1993 New regulation for vehicle inspection.

1994 New Highway Code. The main changes were related to dangerous driver behavior.

New speed limits: 50km/h in urban roads; 90 km/h in rural roads; 100 km/h in express roads; 120 km/h in motorways.

Higher penalties for highway code violations.

Mandatory use of seat belts by all occupants in all roads.

Mandatory installation of speed limitation devices in all lorries weighing more than 12000 kg (85 km/h) and buses weighing more than 10000 kg (100km/h).

New priority regulation for roundabouts: traffic entering the roundabout has to give way.

Mandatory use of child protection devices.

Driving under the influence of drugs is forbidden.

New driving, medical and psychological exams are mandatory for dangerous driver behaviour.

1995 New rules for vehicle inspection: increasing its frequency.

1997 New weight and length limits.

Taxi drivers, police officers and firemen are allowed to drive without seat belts.

Campaign “Maximum safety – zero tolerance”.

1998 New Highway Code.

New traffic signs and signals regulation.

Mandatory installation of tyre patterns above 1.6 mm for cars and trailers under 3500 kg, and above 1 mm for motorcycles and the rest of motor vehicles.

Traffic prohibition for dangerous materials vehicles to circulate from 15:00 to 22:00 on Saturdays and from07:00 to 24:00 on Sundays and holidays.

New priority rule, stating the obligation to give way to vehicles on tracks.

New speed limit of 100 km/h for lorries and buses on motorways.

Application of the maximum penalties for recidivist drivers (repetition of serious or very serious offences in less than 3 years).

2001 New Highway Code.

2001-03 Campaigns to remind the use of seat belts

2003 National Road Safety Plan, national safety estrategy

A.3 Road Safety Activities in Spain since 1970

1934	Road Traffic Code
1950	Highways Improvement Plan
1959	Spanish Administration creates the “Jefatura Central de Tráfico” (Central Headquarters of Traffic), later named DGT, “Dirección General de Tráfico” (National Traffic Authority).
1961	First campaign against drink - driving
	First campaign promoting pedestrians safety
1962	First studies on traffic accidents in Spain
1967	Key Routes Improvement Plan
1974	Mandatory seat belt use by front seat occupants on interurban roads
	Speed limit of 130 kph reduced to 110 kph on inter-urban roads
1975	First campaign to promote the wearing of seat belts
1976	Setting up of the National Road Safety Commission
1980	Mandatory helmet for motorcycle drivers on inter-urban roads
	Compulsory use of dipped headlamps for motorcycles
1983	Driving time periods regulations
1985	Roadworthiness test regulations.
	Vehicle inspection test
1989	Road Traffic Act 1989
1989-03	13 Drink and Drive campaigns, almost one per year
	13 Seat belt campaigns
1990-94	“White Flag” campaign
1992	Introduction of mobile cameras for speed limit enforcement
	Speed limit of 60 kph reduced to 50 kph on urban roads
	Compulsory use of front and rear seat belt on inter-urban and urban roads.
	Mandatory helmet for motorcycle drivers on inter-urban and urban roads
1993	Ministry of Interior revises the formal definition of ‘traffic accident’ by accepting and adopting the European standard: “Road traffic fatalities” are those victims from a road accident who die immediately or during the 30

	days following the accident. Studies to calculate the factor to apply to 24hour fatalities data are initiated.
	Increase the severity of penalties
	National Regulation of Dangerous Goods Transport by Road
1994	A periodic (biennial) vehicle inspection test is required for cars older than 4 years
1997	Suspension of the driving licence for drunken drivers (initiated in 1990 if dangerous driving was associated)
1998	Alcohol legal limit (Blood Alcohol Content) reduced from 0.8 to 0.5 g/l (0.5 to 0.3 g/l for professional drivers and novices). Operative since 1999
	The executive responsibility for road traffic management in Catalonia is transferred to SCT (Servei Català de Transit / Catalan Transit Service), including data collection and publication of traffic accident statistics
	Increase the severity of penalties
1999	First campaign concerning the use of Child Retention Systems
2000	Infrastructures Plan 2000-2007
2001	Withdrawal of licence for drivers exceeding in 50% the speed limit, from 30 km/h (adopted in 1990 if additional danger was associated)
2002	Static cameras introduced for speed limit enforcement
2003	Approval of the law prohibiting the use of mobile phones while driving (exception: hands-free modality)
	Approval of the law simplifying the sanction of driving without a permit making it an administrative procedure
	Approval of the law introducing the manifest excess of speed figure, as a clear probe of reckless conduction
	Approval of the law requiring the use of seat belt in back seat (for new vehicles with seat belts installed)
	Obligatory use of child restraint system. Operative since 2004
	Publication of the “Road Safety Plan for Basque Country 2003-2006” with a casualty reduction target for the next five years: 20% decrease in fatalities and seriously injured persons with respect to the values of 2001
	Creation of the Supervisory Board for Road Traffic Safety and Circulation
	Campaign about the obligatory use of CRS.
2004	Creation of the National Road Safety Observatory

A.4 Road Safety Activities in Catalonia since 1970

1934	Road Traffic Code
1950	Highways Improvement Plan
1959	Spanish Administration creates the “Jefatura Central de Tráfico” (Central Headquarters of Traffic), later named DGT, “Dirección General de Tráfico” (National Traffic Authority).
1961	First campaign against drink - driving
	First campaign promoting pedestrians safety
1962	First studies on traffic accidents in Spain
1967	Key Routes Improvement Plan
1974	Obligatory safety belt for car front seat passengers on interurban roads.
	Reduction of speed limit on interurban roads from 130 kph to 110 kph.
1975	First campaign to promote the wearing of seat belts
1976	Setting up of the National Road Safety Commission
1980	Obligatory helmet protection for motorcycle drivers.
	Compulsory use of dipped headlamps for motorcycles
1983	Driving time periods regulations
1985	Roadworthiness test regulations.
	Vehicle inspection test
1989	Creation of Road Safety Agency.
1990- 94	“White Flag” Campaign11 .
1991	Creation of the “Catalan Road Safety Institute”.
1992	Deployment of the first surveillance of speeding using mobile cameras.
	Reduction of the speed limit on urban roads from 60 kph to 50 kph.
	Compulsory use of front and rear seat belt on inter-urban and urban roads.
	Mandatory helmet for motorcycle drivers on inter-urban and urban roads

[11] Several awareness campaigns have been carried out through the White Flag campaign.

1993 The Ministerial Order revises the definition of traffic accident, recognising the European statistics standardisation. Definition of “traffic accident fatalities”: accident victims who die immediately or during the next 30 days. (Studies to calculate the factor to be applied to 24-hour fatalities are also started).

Increase the severity of penalties

National Regulation of Dangerous Goods Transport by Road

1994 Cars older than 4 years have to pass a two-year periodic vehicle inspection.

1997 (Law of 24 December) Creation of the Catalan Traffic Service (SCT).

Automatic withdrawal of the driver license for alcohol abuse infringements (since 1990, if additional danger was involved).

1998 (into force in 1999) the alcohol limit is reduced from 0,5 to 0,3 g/l (professional or beginner drivers) and from 0,8 to 0,5 g/l (other drivers).

Deployment of SCT in the province of Girona.

Approval of 1999-2001 Road Safety Plan .

Transfer to SCT of the executive responsibility for vehicle traffic, including the collection and publication of traffic accident statistics.

1999 Deployment of SCT in the province of Lleida.

First campaign concerning the use of Child Retention Systems

2000 Deployment of SCT in the province of Barcelona and Tarragona (completes the deployment for the whole territory).

2001 Automatic cancellation of driver license for speed infringements if they exceed by more than 50% the maximum speed allowed with a minimum of 30KM/h (since 1990, if additional danger was involved).

2002 Publication of the 2002-2004 Road Safety Plan. Establishes a target of 15% reduction of deaths and serious injuries in 3 years with reference to 2000 values.

Implementation of the first speeding surveillance using fixed digital cameras.

2003 (Law approved) Prohibition of mobile telephone utilisation (except for free hand modality) while driving.

(Law approved) Decriminalisation of driving without insurance, keeping the administrative sanction, as before.

(Law approved) Speeding is considered to be a specific manifestation of reckless driving together with other factors.

(Law approved) Obligatory use of safety belt for rear seat passengers of vehicles with rear seat belts installed.