European Commission DG TREN

Southern Group

Case Study on Pedestrians

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FOREWORD

The SUNflower+6 project is based on a comparative study regarding road safety in nine countries and one autonomous region from the EU. These countries are divided into three groups:

- "Northern" (SUN) group: Sweden, United Kingdom and The Netherlands;
- "Southern" group: Portugal, Greece, Spain and Catalonia (Autonomous Region of Spain)
- "Central" group: Czech Republic, Hungary, Slovenia

The work of the "Southern" group is carried out by the Laboratório Nacional de Engenharia Civil - LNEC (Portugal), SGI – TRADEMCO (Greece), Servei Català de Trànsit - SCT and DSD (Catalonia), and Dirección General de Tráfico – DGT (Spain). Besides their input for the components of the project which are common to all the countries, they are responsible for the development of comparative studies at the group level, namely as regards seven selected case studies. For each of these studies a leading partner of the group was appointed, as follows:

- drinking and driving (Greece);
- seat belts (Catalonia);
- pedestrians (Portugal);
- powered two-wheelers (Spain)
- novice drivers (Catalonia);
- speed (Greece).

The aim of this document is to report on the "pedestrians" case study for the "Southern" group. Its structure is similar to the one adopted by the SUN group in its draft report on the same case study.

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, speed and aggressiveness. 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 characterizations 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.

2. Extent of the problem

In Portugal, pedestrian accidents show particularly adverse fatality rates, compared to other EU countries (see Figure 1). 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 during the last decade (589 in 1990 to 296 in 2000). The actual number is still high though, as it accounts for near 18% of the total fatalities in road accidents in Portugal.

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 1). In absolute terms, the number of pedestrians killed in road accidents over the last decade has only marginally decreased (from 444 in 1990 to 375 in 2000). In fact, the number of annual pedestrian fatalities had remained practically constant until 1999. It is only in 2000 that a visible decrease has been recorded with respect to that measurement.

According to the latest available values for 2001, the situation remains quite discouraging, as pedestrians account for 18% 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 according to DETR, Road Crashes in Great Britain).

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 2000).

Pedestrian fatalities are a higher proportion of total fatalities in Catalonia (15.1%) than in Spain as a whole, but still lower than in Greece and Portugal (seeTable 1). The proportion of young pedestrian fatalities is the highest for Catalonia. 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 2000).

	Under age 25	Age 25-64	Over 64	Total
Catalonia 2002				
Number	19	35	59	113
Percentage	2.5%	4.7%	7.9%	15.1%
Greece 2001				
Number	32	120	173	338
Percentage	1.7%	6.4%	9.2%	18.0%
Portugal 2002				
Number	28	92	120	246
Percentage	2,1%	6,8%	8,8%	17,7%
Spain 2002				
Number	93	319	305	717
Percentage	1,7%	6,0%	5,7%	13,4%

Table 1 – Pedestrian fatalities as percentage of all fatalities.

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 nighttime).

For Portugal, 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 Greece, no data on pedestrians' exposure is presently available.

For Spain, no data in terms of pedestrians' exposure is presently available. For Catalonia, a study is underway that should provide exposure data for pedestrians for 2004, but no data is yet available.

In Table 2, pedestrian fatality risk in Portugal and in the Sun countries is shown. Portugal reveales 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.

2000	Distance walked 1000 million person km	Deaths per 1000 million person kms	Population million	Person km per population
Portugal	3,5	70,3	9,9	354
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 2 - Pedestrian fatality risk related to distance walked in Portugal (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 rate 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 Greek pedestrians exposure should be greater than in North European countries. The average proportion of accidents involving pedestrians was 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 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).

4. Differences in safety levels

4.1 General trends

In Figure 1, trends for pedestrian fatality rates (fatalities per million population - FMP) are shown, for a 15 year period (1988-2003) for Portugal and Greece, and for a 10 year period (1994-2003) for Spain and Catalonia. 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 are similar (around 20 FMP). However, past values and trends show some differences. In the case of Portugal, extremely high rates in the 80s (around 70 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.

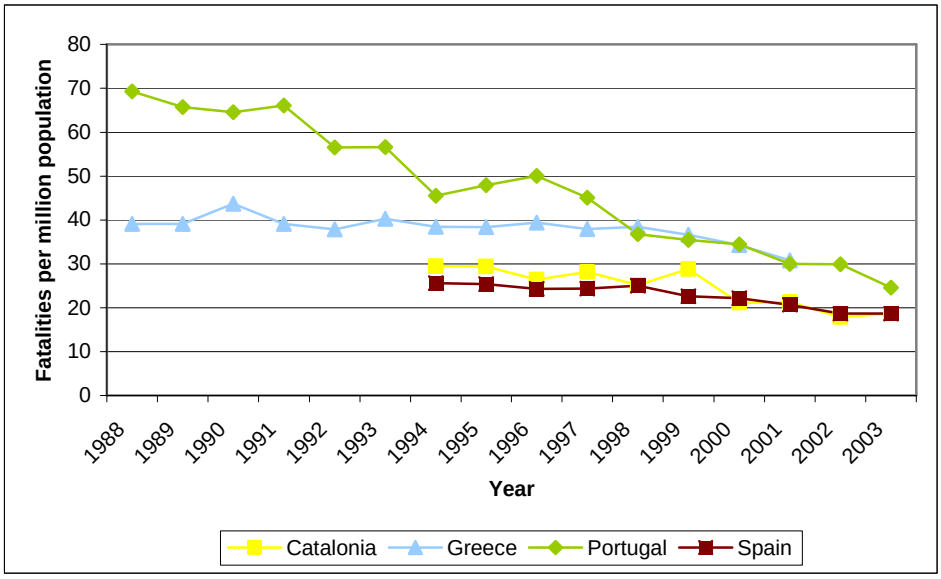

Figure 1 – Pedestrian Fatality Rates for Catalonia, Greece, Portugal and Spain.

Rates for killed and seriously injured pedestrians (KSI – see Figure 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.

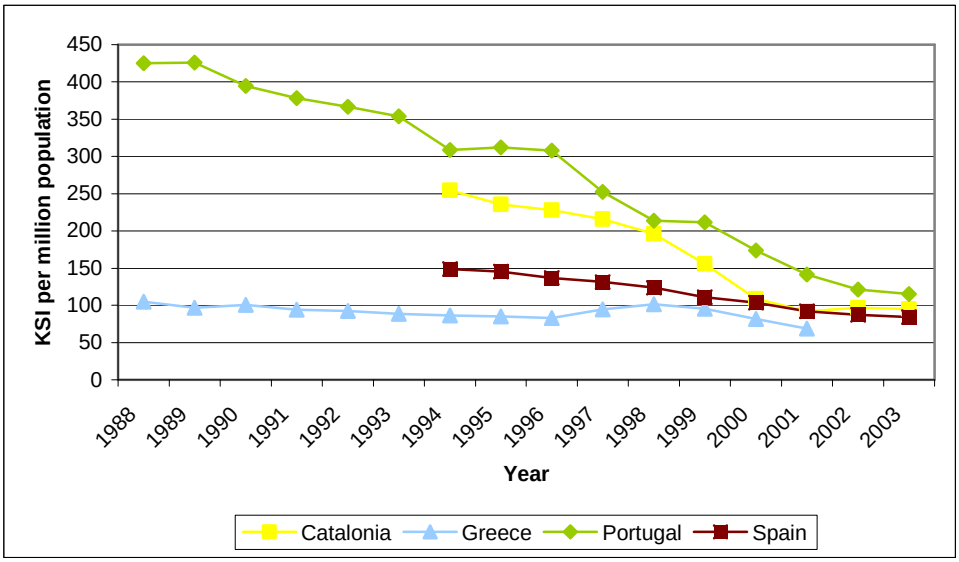

Figure 2 – Pedestrian killed and seriously injured rates for Catalonia, Greece, Portugal and Spain.

When considering all pedestrian casualties, there is a different pattern in the tendency shown, over time, by the rates of the three countries and autonomous region, when compared to fatality and KSI rates. In fact, there is a clear tendency for these rates to present very slow decreases, keeping almost the same differences between each of them. The highest rates are observed for Portugal (around 800) and the lowest for Greece and Spain (around 300), with Catalonia in between (around 600). Furthermore, in the case of Portugal there is a difference in that general trend, in the same period, corresponding to two clear levels, one since mid 90s, and another since 2000, with a very sharp decrease in a very short period (1999). 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.

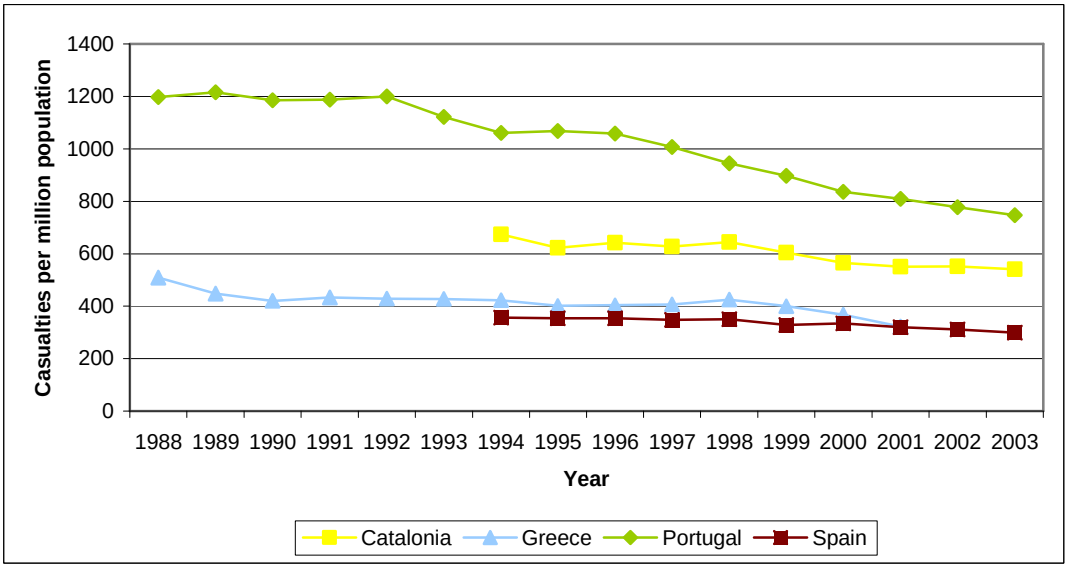

Figure 3 – Pedestrian casualty rates for Catalonia, Greece, Portugal and Spain.

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); the time variation 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 and Greece (see collision matrices – Table 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 very high (80%), while in Greece is lower (57%), as other types of vehicles have also a significant involvement, as lorries (20%) and motorcycles (14%). These latter values are more similar to those exhibited by the SUN countries, especially the Netherlands.

Pedestrians deaths in collision with:								
	Pass. Car	Lorry	Bus	Motorcycle	Moped/cycle	Train/Tram	Other	Total
Greece 2001								
Number	191	68	12	46	3	0	18	338
% of all deaths	10.2%	3.6%	0.6%	2.4%	0.2%	0.0%	1.0%	18.0%
% of all pedestrian deaths	57%	20%	4%	14%	1%	0%	5%	100%
Portugal 2003								
Number	64	5	1	0	2	0	8	80
% of all deaths	7,5%	0,6%	0,1%	0,0%	0,2%	0,0%	0,9%	9,3%
% of all pedestrian deaths	80%	6%	1%	0%	3%	0%	10%	100%
Catalonia 2003								
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%
Spain 2003								
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%

Table 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 65, reaching more than 50% in the cases of Greece and Catalonia, and a little over 40% in the cases of Spain and Portugal. In all the other age groups the percentages for the three countries and the autonomous region are always below 10%, with no significant differences, except in the case of Catalonia, with a higher percentage in the 20-24 age group, and lower percentages in the 55-59 and 60-64 age groups, which is not similar to the case of Spain. Apart any possible explanations due to local circumstances, these differences in rather small values, may also be related to the particular year under consideration.

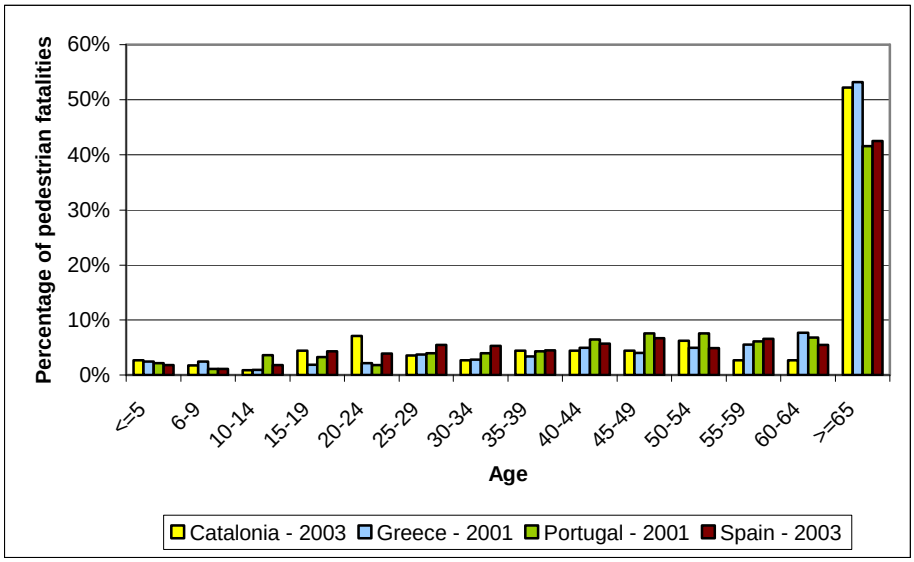

Figure 4 – Age distribution of fatally injured pedestrians for Catalonia, Greece, Portugal and Spain.

When considering together killed and seriously injured (KSI) pedestrians (Figure 5), the general pattern is similar to the previous one, the percentages being a little lower in the group over 65 (between 35% and 47%) and more uniformly distributed by the other groups (around 5%), showing an increase in the lower age groups (under 5, 6-9 and 10-14). This tendency is reinforced when the percentage of all casualties are taken into account (Figure 6). In this case the group over 65 shows percentages between 25% and 37%, while in all the other groups, with few exceptions (Greece and Spain) in the lower groups, the percentages are already a little over 5%, reaching values in the order of 8% in Portugal for the 6-9 and 10-14 groups.

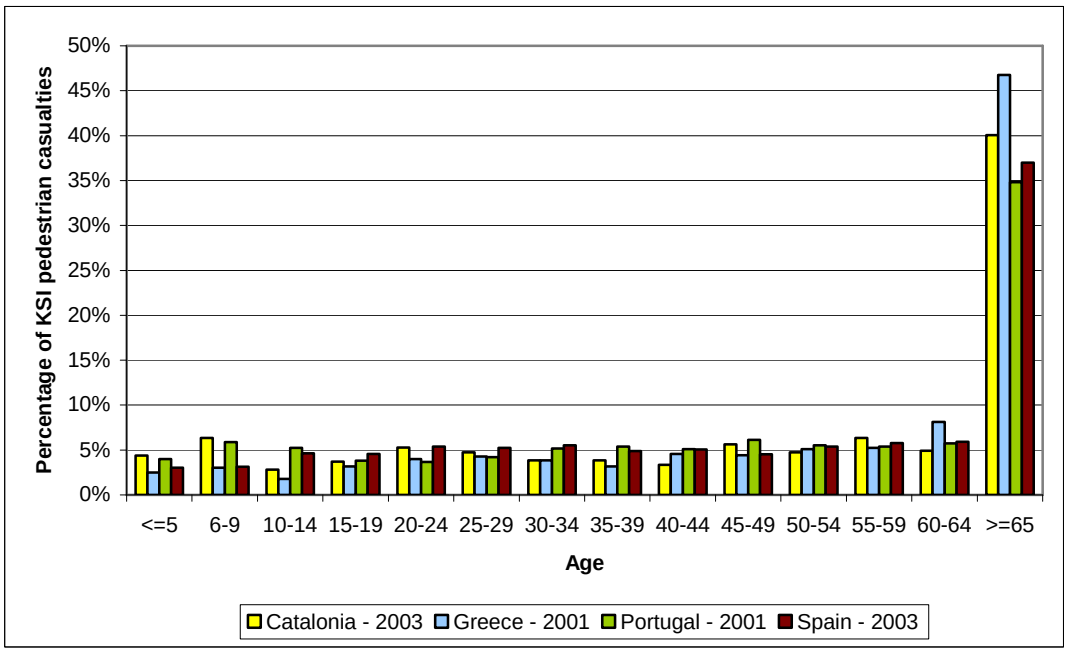

Figure 5 – Age distribution of killed and seriously injured pedestrians for Catalonia, Greece, Portugal and Spain.

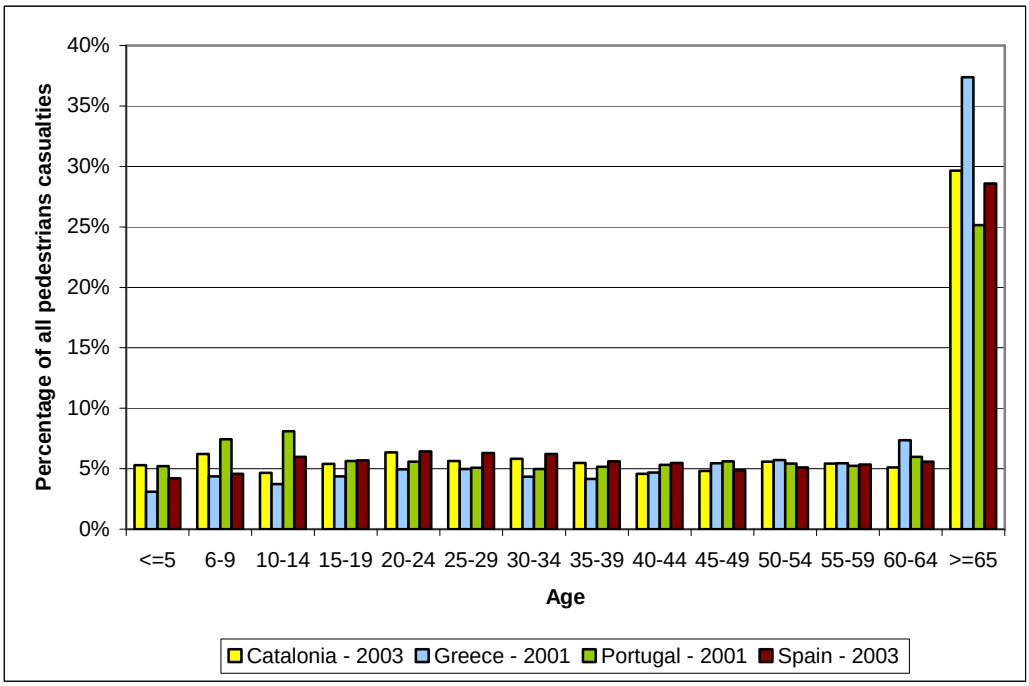

Figure 6 – Age distribution of pedestrian casualties for Catalonia, Greece, Portugal and Spain.

Introducing exposure in this analysis, in terms of population, a more clear distinction is reached by age groups for the three countries and the autonomous region. As far as fatality rates are concerned (Figure 7), there is evidence of higher rates for Greece and Portugal in most of the age groups, but especially in the groups over 40 or in the very young (less than 14), with Catalonia presenting higher rates in the groups from 15 to 24. When adding seriously injured pedestrians (KSI – Figure 8), the main differences are clearly related to the higher rates exhibited by Portugal in all the age groups, only shared with Catalonia for groups 6-9 and 20-24. In these rates there is a tendency for two peaks, one in the lower age groups (from 6 to 14) and the other at the other extreme, corresponding to ages over 65. Here also should be noticed 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 2.

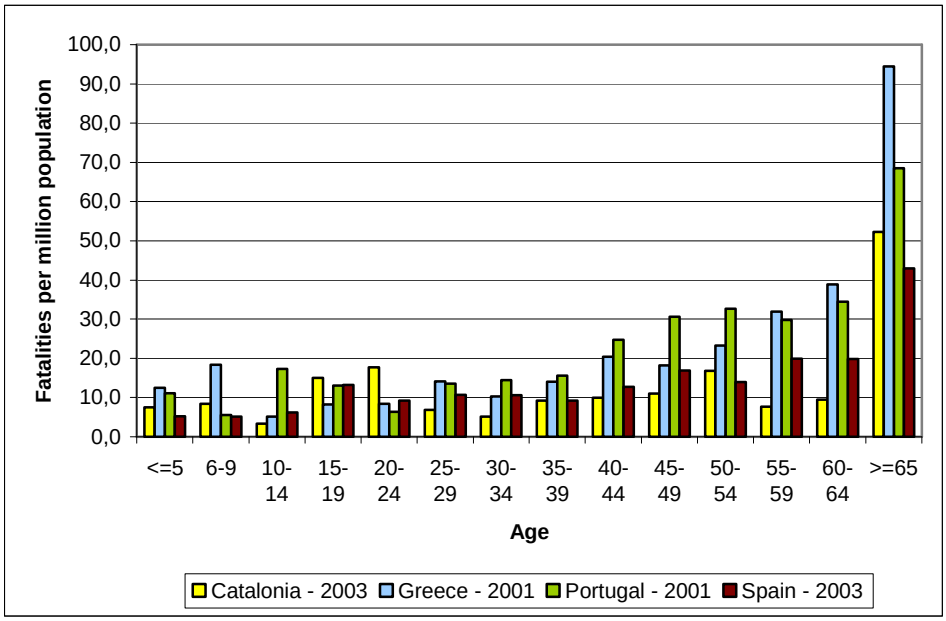

Figure 7 – Age distribution of pedestrian fatality rates per million population for Catalonia, Greece, Portugal and Spain.

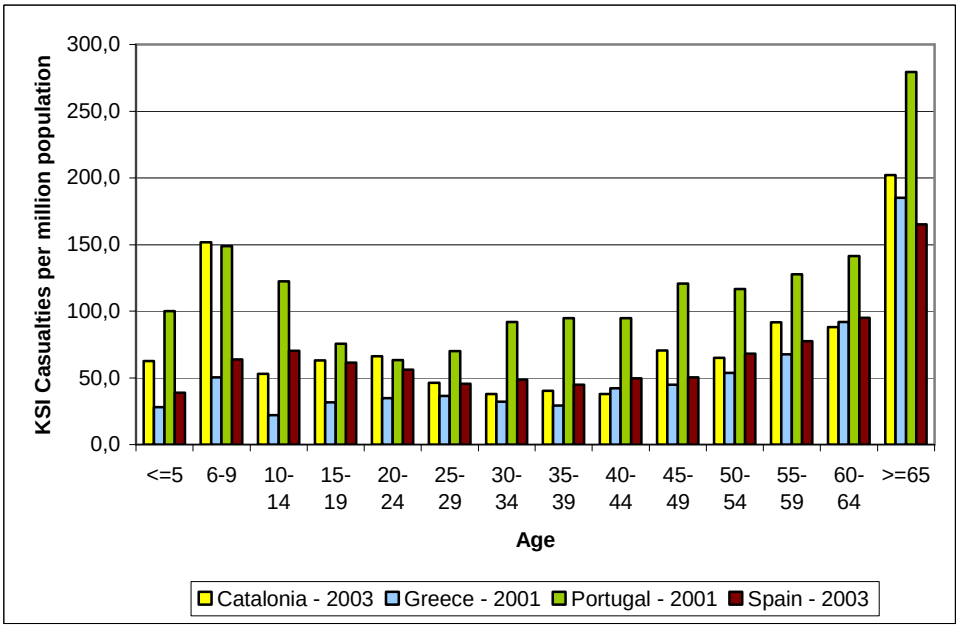

Figure 8 – Age distribution of killed and seriously injured pedestrian rates per million population for Catalonia, Greece, Portugal and Spain.

As shown in Figure 9, accidents having pedestrians killed are located mainly in urban road environments for the case of Portugal (66%), Catalonia (68%) and Greece (74%). 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's casualties are considered (Figure 10), then there is a much higher incidence in the urban side (over 80%) for all the three countries and the autonomous region, which can be

explained by the larger amount of exposure associated to lower speeds than in rural roads.

It is also possible to consider separately the situation on through roads (Figure 10), where pedestrian casualties are usually serious (KSI), due to speed and environment conditions. This case presents higher percentages for Portugal (16%), next for Greece (8%) and lower percentages for Catalonia (4%) and Spain (3%).

A more detailed analysis of the above distributions is also possible, regarding lightning conditions (Figure 10), where it is shown that in urban roads there are higher percentages of casualties at day time than at night time (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 those for nigh time. The same is observed in the case of through roads, except for Portugal, with higher day time percentages.

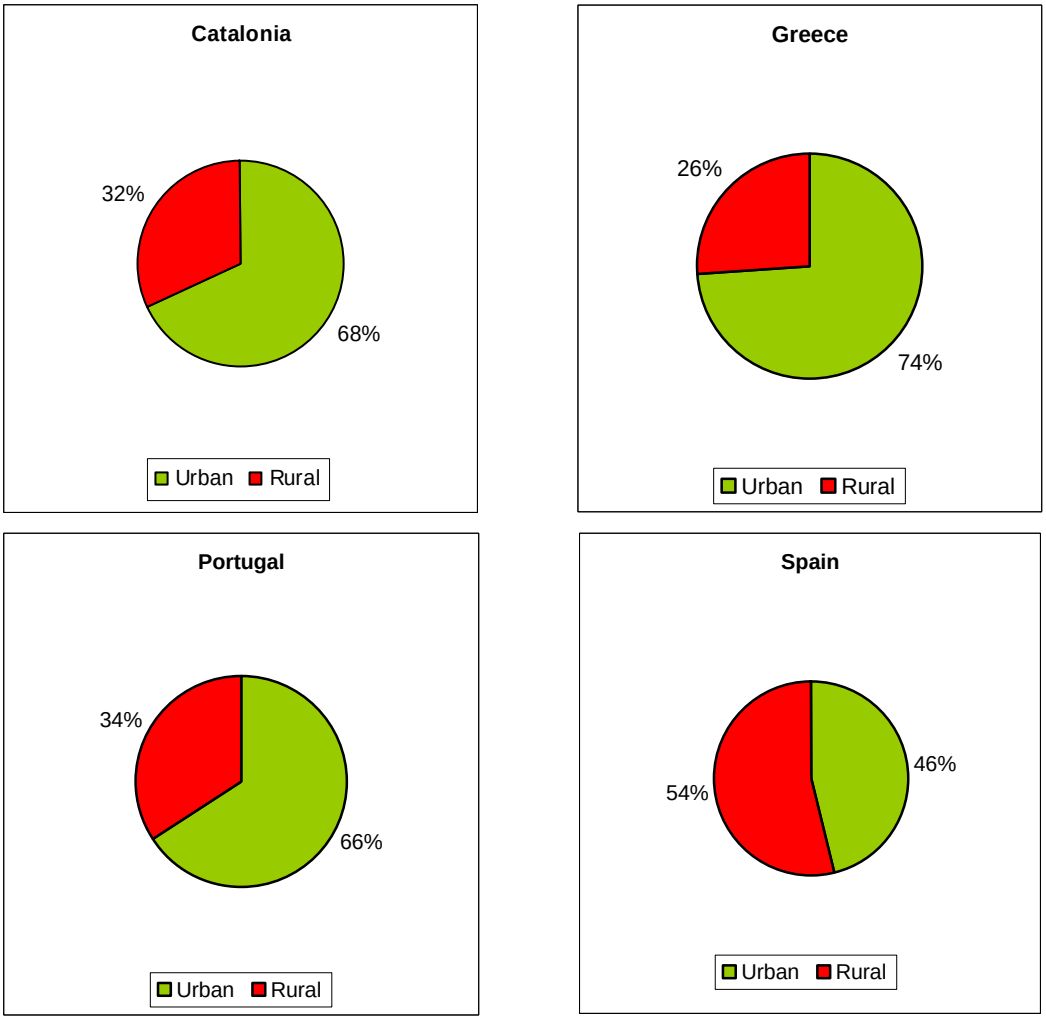

Figure 9 - Percentage of killed pedestrians according to accident location for Catalonia, Greece, Portugal and Spain.

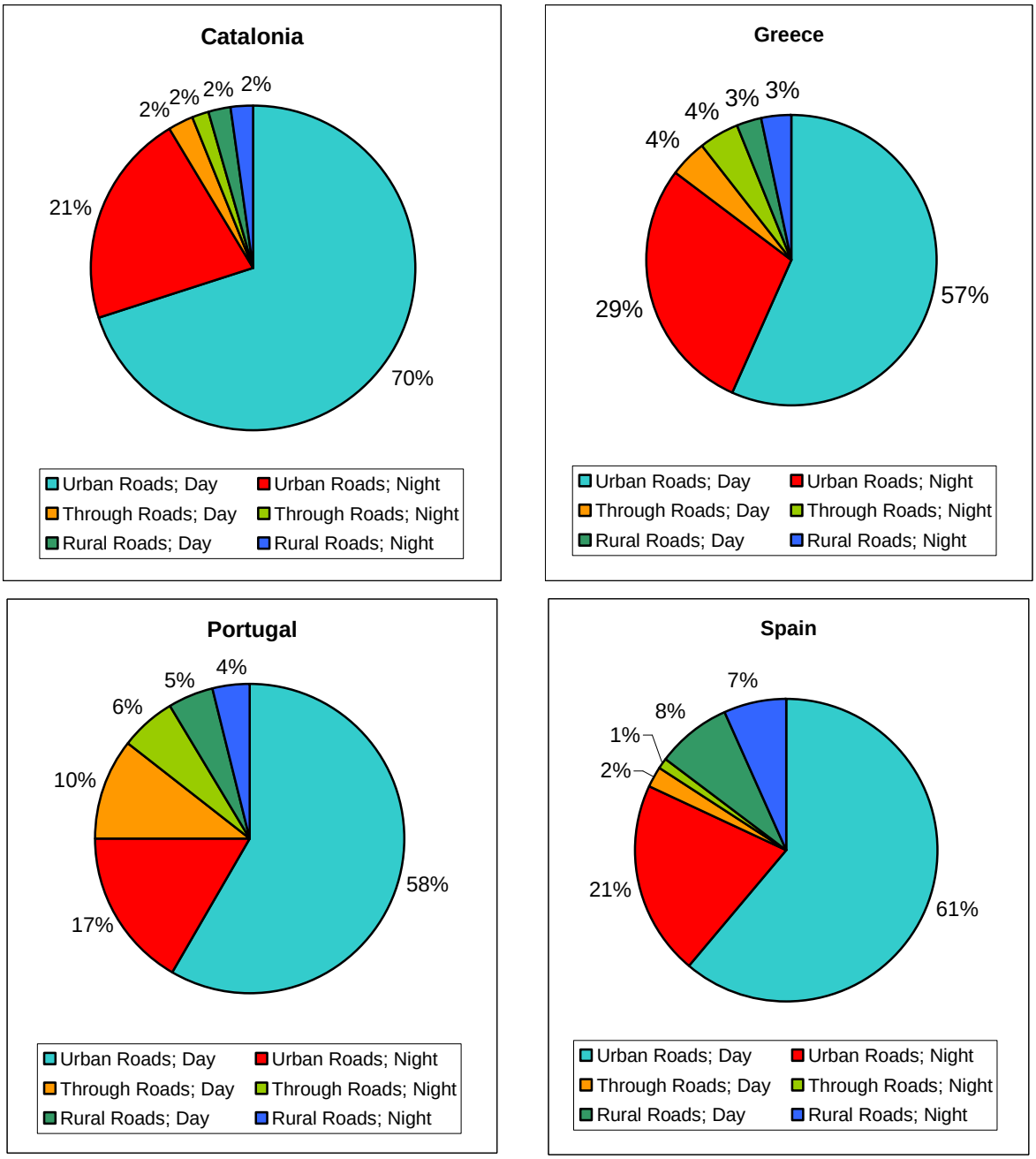

Figure 10 – Percentage of all pedestrian's casualties in rural roads, through roads and urban roads, according to lightning conditions for Catalonia, Greece, Portugal and Spain.

In terms of time variation, the percentage of pedestrian casualties observed on different days of the week (Figure 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.

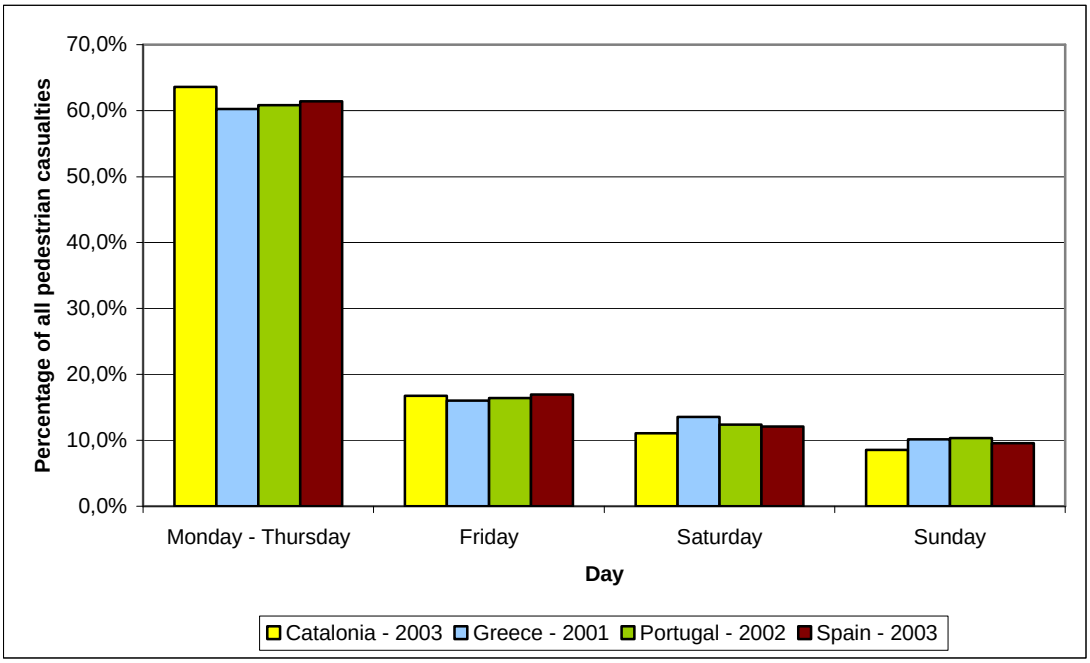

Figure 11 – Pedestrian casualties by day of week for Catalonia, Greece, Portugal and Spain.

The percent distribution of pedestrians killed on road accidents by hour of day, for the cases of Portugal, Greece and Catalonia (Figure 12), shows a bigger concentration in the period from 18:00 to 20:00 (over 25% in Portugal) and from 20:00 to 22:00 (15% in Greece), and also a local peak (10%) from 10:00 to 12:00 for Portugal and Greece, and (12,5%) from 12:00 to 14:00 for Catalonia. If only seriously injured pedestrians are considered (Figure 13), there is a more uniform distribution from 8:00 to 18:00, followed by a peak (20 %) for Portugal and Catalonia in the 18:00 to 20:00 period.

The percent distribution of pedestrian fatalities according to lightning conditions (day time and night time – Figure 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 cases of Spain and especially Catalonia those percentages correspond to day time, whereas for Greece and Portugal they correspond to night time.

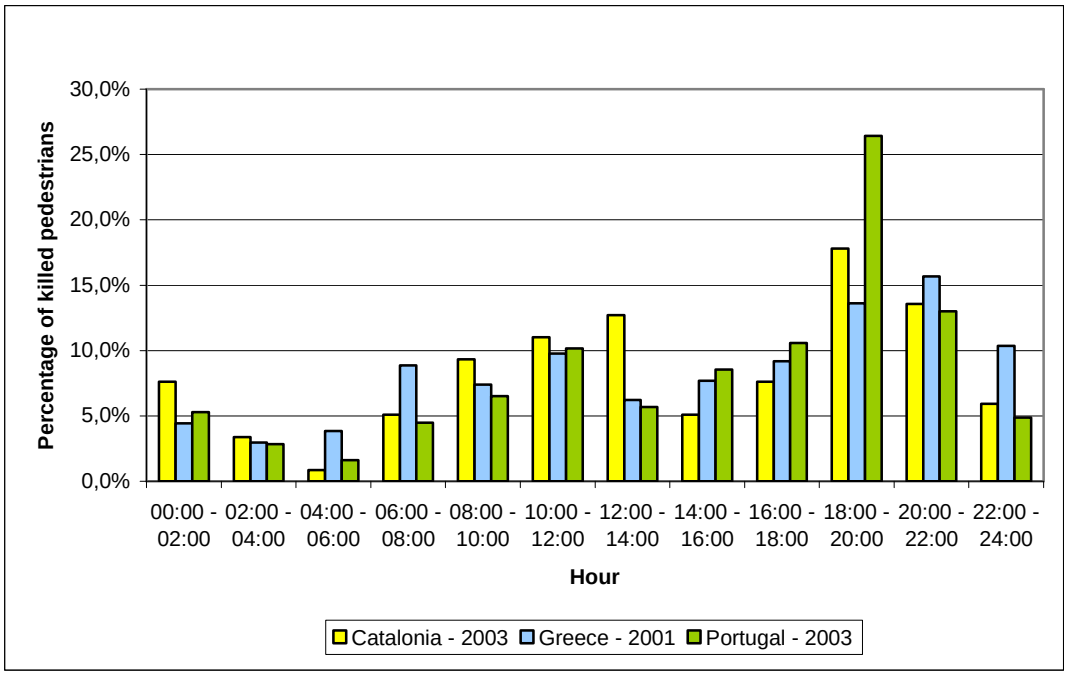

Figure 12 – Percentage of killed pedestrians by hour of day for Greece and Portugal.

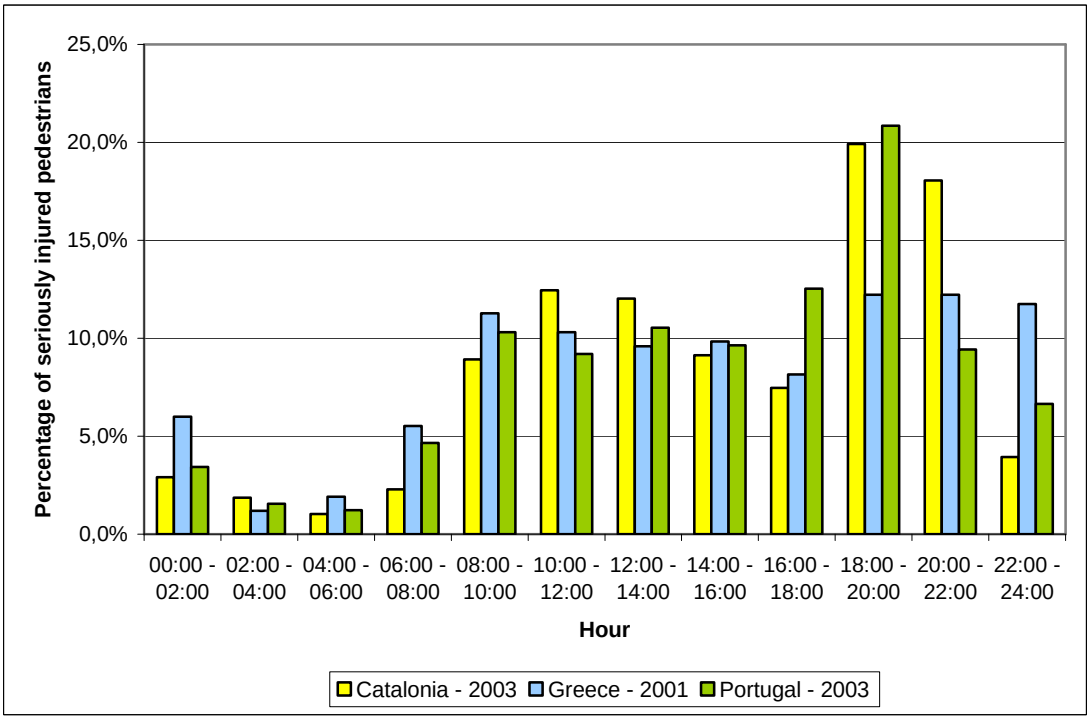

Figure 13 – Percentage of seriously injured pedestrians by hour of day.

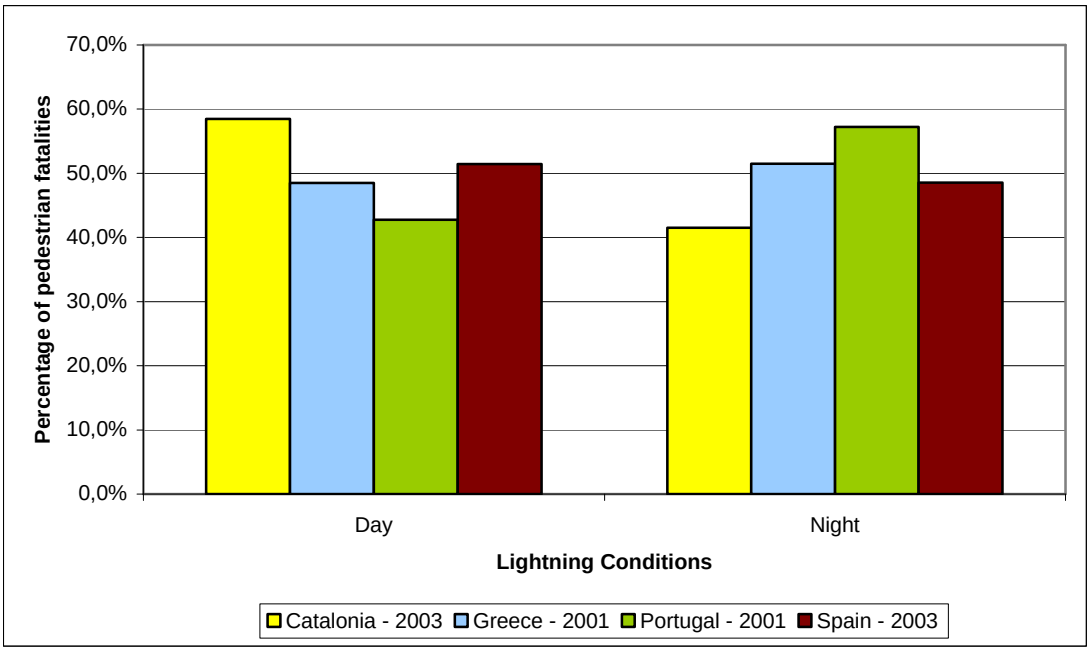

Figure 14 - Proportion of pedestrian fatalities by time of day for Catalonia, Greece, Portugal and Spain.

Although revealing an attitude rather than the actual behaviour, the responses given by drivers to a pan-European survey as SARTRE 3, in some questions related to the theme under consideration, may also give some complementary information, which should be interpreted with the necessary caution. As regards the responses on how much consideration should government give to different road user groups (including pedestrians), the percentage of drivers that responded “very much” (Figure 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 there exists for pedestrians, and maybe also that Governmental actions are far from being satisfactory in this field. In the case of cyclists their attitude probably is more related to the fact that the cyclist population is comparatively small. Apparently this is not the case in Greece where the risk for cyclists is more valuated.

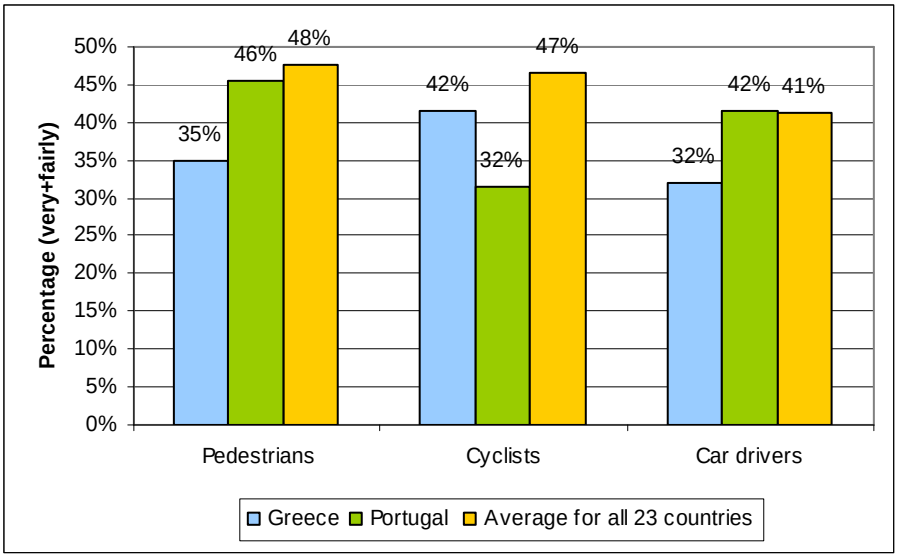

Figure 15 - How much consideration should government give to different road user groups (Sartre3).

The opinion expressed by divers of Portugal, Greece and Spain, in SARTRE 3, on how often they stop at crossings, giving way to pedestrians, show high percentages of positive ("always" and "very often") responses (Figure 16), all above the average obtained for 23 countries, especially in the case of Portugal (91%) and Greece (86%). Since these are two countries where pedestrians safety is a problem, as shown before, the explanation of this apparent contradiction, can be either in the side of the pedestrians (they might frequently cross the streets out of the crossings), or 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.).

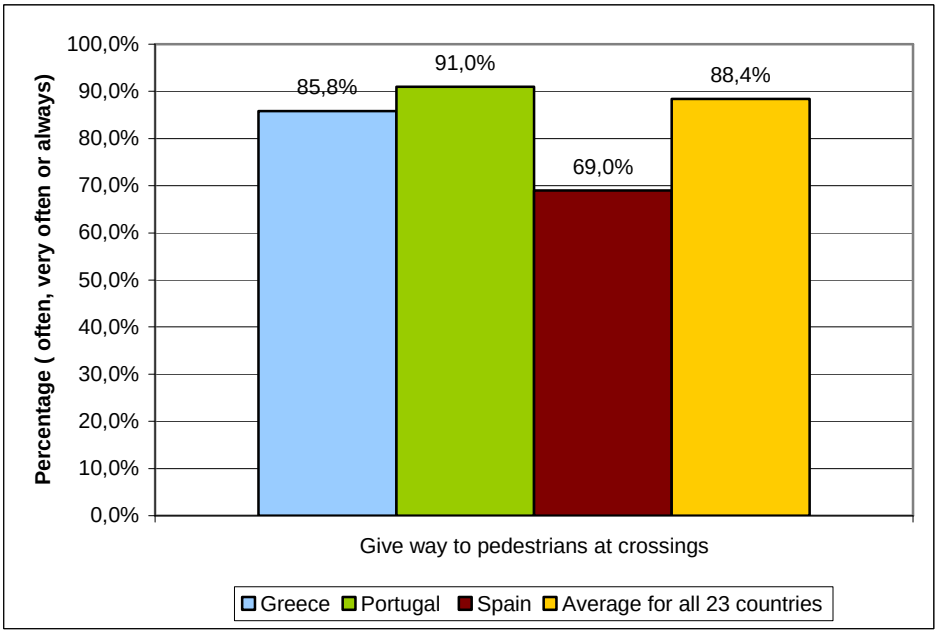

Figure 16 - Proportion of drivers giving way to pedestrians at crossings (Sartre3).

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 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 in speed limits and in criteria for their application, from country to country, the extent of excess speeds over the limit, the types and characteristics of roads within the adopted classification and levels of enforcement. Moreover, the same enquiry has shown that, in general, the responding drivers consider that the other drivers exceed the limits more often than themselves. The responses present higher percentages of drivers exceeding speed limits in main roads for Portugal and Spain, and in country roads for Greece. In all the three 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, which is referenced in the case study on speeds (LNEC, 2003), reveals much higher percentages of excessive speeds for all types of roads, which attain over 70% in through roads, and values well over 30% in minor urban roads, with 50 km/h limits. A conclusion is that drivers are usually not aware of how much they drive over the speed limits, especially in the cases where lower limits are applied, and these usually correspond to the zones with the highest number of pedestrian trips.

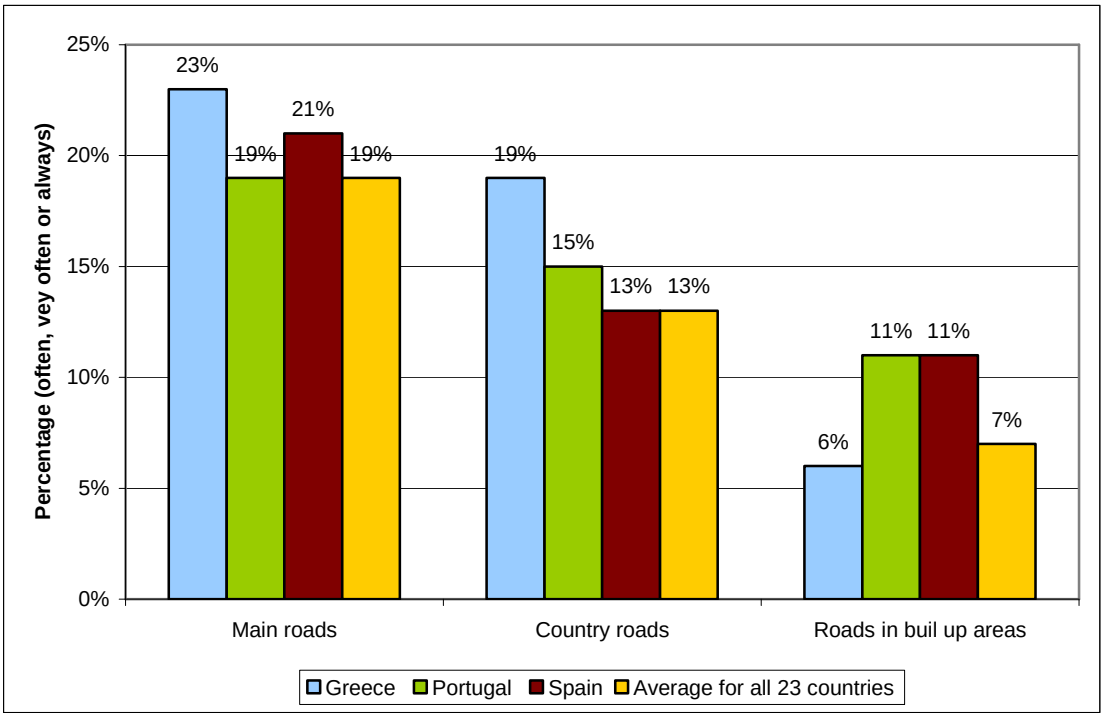

Figure 17 - Frequency of exceed speed limit on different types of roads (Sartre3).

5. Interventions to reduce the risk

Pedestrian behavior, driver behavior 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 at a nationwide 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 has 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 racks 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 awareness on pedestrian related dangers have been organized, in Greece, from time to time, on a nationwide 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, so as 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 walking. In the period from September 30th to October 2nd 2003, a campaign was carried out in order to underline the necessity of behaving more efficiently as pedestrians (crossing streets at intersections with or without traffic signals, etc).

It is interesting to comment on existing legislation on pedestrians’ behaviour and 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 signalized 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.

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 is normal practice 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.

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 infrastructural 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 fatalities and for pedestrian injuries. However the trends point to a convergence towards similar present rates, especially in the cases of killed and seriously injured. The current rates are still, for the three countries and the autonomous region, well over those shown by the SUN countries, especially Sweden and the Netherlands (less 75% fatalities per million population), revealing that pedestrians are an important issue within the context of road safety in the three these countries and region from southern Europe.

The rates for Portugal since 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 bigger reduction in rate during this period. These differences may partly be explained by a later application in Portugal of measures directly or indirectly improving pedestrian safety, than in the other three cases.

The still high current rates presented by the three countries and the autonomous region, and also the stabilization 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.

7. Conclusions and specific recommendations

As a general conclusion it can be stated, for the cases of the three countries and the autonomous region from southern Europe, 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 safety rates may decrease to values already attained by other European countries, such as the SUN countries.

Specifically in the case of Portugal, it is clear that the 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. But also in general, in urban road environments, integrated actions must be implemented, with more attention given to the needs of vulnerable road users, such as the older.

As regards Greece, it is important that information aspects 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.

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 in the case of certain young age groups, and solutions found for their decrease.

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