Road safety and the elderly in Europe

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Abstract

The objective of this research is the analysis of basic road safety parameters related to elderly people (> 64 years old) by the use of the EU CARE database with disaggregate data on road accidents, as well as of other international data files (Eurostat, IRTAD, etc.). Data for ten years and 19 EU countries on road accidents involving elderly people are correlated with basic safety parameters like the road user type, the road network type, the casualty age and gender as well as the day of the week, the time of the day and the season. This comparative analysis revealed a decrease of more than 30% in elderly fatalities in traffic accidents within the decade 1997 - 2006 and it was also shown that in most European countries the elderly - specifically those between 75 and 84 years old - are at greater risk of being killed in a road accident than the average person. Additionally, more than one third of elderly fatalities were pedestrians and also elderly people are proportionately more likely than middle-aged people to be killed in an accident in an urban road. Contrary to middle-aged people, elderly are mostly killed during the morning, with three-fourths of those during the week days. Specific countries with higher elderly accident fatalities for particular accident types were also identified. The analysis results allow for an overall picture of the safety level of elderly people in Europe, providing thus useful support to all decision makers working for the improvement of safety in the European road network.

Key-words : Elderly people; road accident data; road accident analysis; road safety.

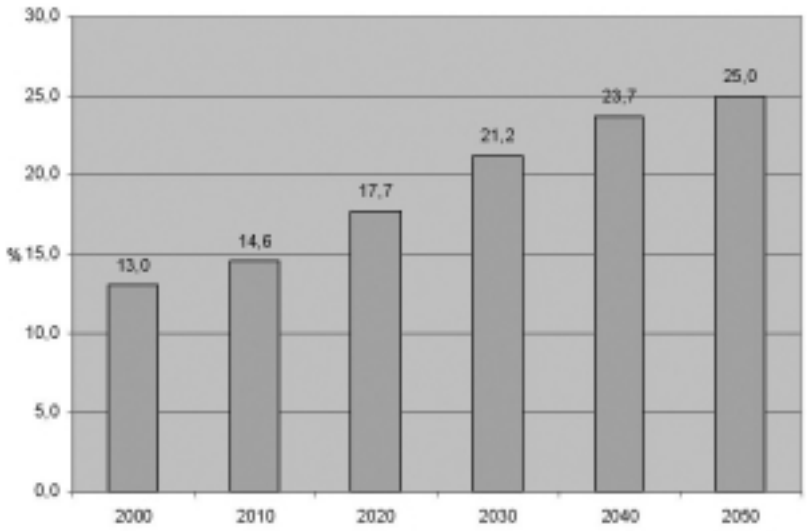
Introduction

Elderly people (> 64 years old) constitute part of the vulnerable road users group, as they have a higher risk of serious injury and fatality in traffic, mainly due to their greater physical vulnerability. Their frailty leads to an overrepresentation of their crashes in databases based on injury outcomes (Hakamies-Blomqvist et al, 2004), as they are more likely to be seriously injured than younger people.

More specifically, the accident rate per vehicle-km for the elderly drivers is higher, comparing to younger drivers, they go through more serious consequences for themselves by the accidents and they are responsible for most of the accidents in which they are involved (SWOV, 2005).

The number of people older than 65 years old is expected to almost double by 2050, while an even higher increase is expected for people over 80 years old within the same period (OECD, 2001). In the following Figure 1 the estimated proportion of people over 65 years old in all OECD countries can be seen for the period 2000 - 2050.

Figure 1 : Estimated proportion of the population over 65 years old in all OECD countries, 2000- 2050 (Source: OECD, 2001)



Similar rate increase is also expected by 2030 in the number of drivers older than 65 years old in the U.S.A., constituting 20% of the overall drivers' population (NHTSA, 2008).

Between 1997 and 2006 more than 58.000 elderly people were killed in traffic accidents in 14 European Union countries (KfV, 2008). This number represents about 19,0% of all traffic accident fatalities in those countries within the decade and even though the number of elderly fatalities has decreased over this period in these countries, the respective proportion to the overall number of fatalities is stagnating. Given the increased fatal crash risk of older adults, coupled with the continuing need for effective mobility and the expected increase of elderly drivers in the coming years, it is essential that traffic safety and mobility of older adults are further investigated and continuously monitored, allowing for the implementation of appropriate accident mitigation measures (NHTSA, 1993).

The objective of this research is the macroscopic analysis of basic road safety parameters related to elderly people (> 64 years old), using data from the EU CARE database with disaggregate data on road accidents, together with data from other international data files. Data for ten years and 19 EU countries on road accidents involving elderly people are correlated with basic safety parameters like the road user type, the road network type, the casualty age and gender as well as the day of the week, the time of the day and the season.

The analysis results will allow for drawing an overall picture of the safety level of elderly people in Europe, providing thus useful support to all decision makers working for the improvement of safety in the European road network.

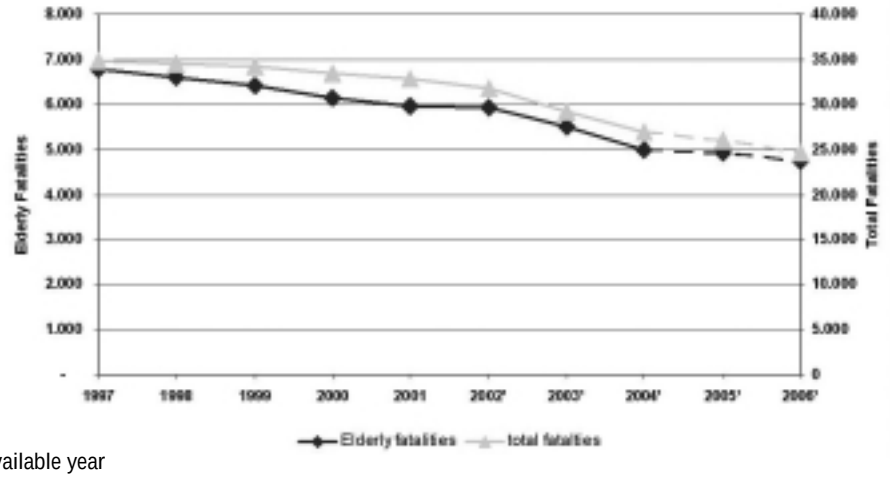
Elderly people road safety in the EU countries

The research literature confirms conventional knowledge about the effects of aging on cognitive, perceptual, and motor abilities. These specific characteristics of elderly people and the changes in their abilities definitely affect their road safety level. Age-related changes in vision make it more difficult for older adults to accommodate to darkness, recognize objects under low lighting conditions, recover from glare, and search their environment. Making decisions becomes more difficult, as does changing a course of action once a commitment has been made, and memory deteriorates. On the other hand, experience and judgment are qualities that can contribute to compensating for slowed responses and sensory deficiencies. Evidence shows that most older drivers are aware of their changing abilities and adapt accordingly, making shorter trips and driving substantially less at night, in heavy traffic, and in bad weather.

In order to assess the safety level of elderly people at an EU level, analyses of related accident data maintained into the EU CARE database can be performed. CARE is the Community database on road accidents resulting in death or injury, consisting of data with high level of disaggregation, contrary to most other existing international databases. This structure allows maximum flexibility and potential, with regard to analysis of the information available.

In order to monitor the evolution of the elderly people safety level in Europe, accident trends for the decade 1997 - 2006[1] were considered. According to the following Figure 2 there was a decrease of more than 30% in elderly fatalities in traffic accidents in 2006, compared to the 6.793 fatalities in 1997, slightly higher than the respective decrease of 29% in the total number of fatalities in the 14 European Union countries (all except Germany) within the same decade.

Figure 2 : EU-14 Fatalities evolution, 1997-20061 (Source: CARE, 2008)

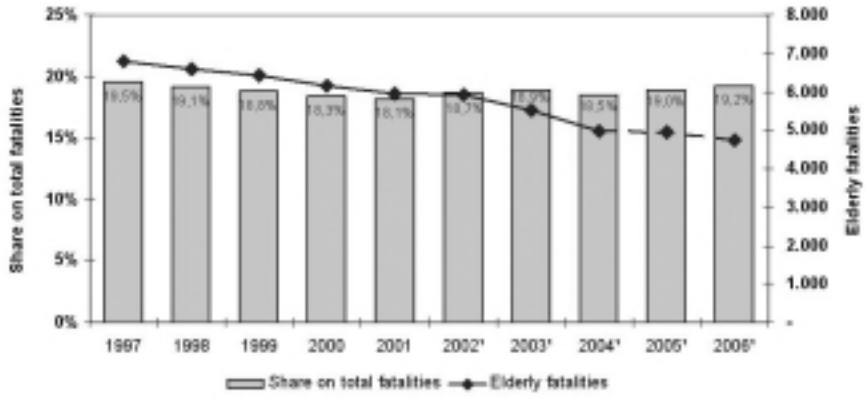


[1] or last available year

The annual decrease rate for the elderly fatalities is similar or higher to the rate of the overall fatalities, with the exception of 2002, where the decrease in the number of overall fatalities was six times higher than the respective decrease in the number of elderly fatalities (3,4% comparing to 0,6% for the elderly fatalities).

It is also worth noting that although the number of elderly fatalities in the EU-14 countries has decreased over the last decade, their percentage of the total number of fatalities is stagnating, as can be seen in the following Figure 3.

Figure 3 : Number of elderly fatalities and their proportion on total fatalities in EU-14, 1997-20061 (Source: CARE, 2008)



The following Table 1 provides an overview of the changes in the number of elderly fatalities split by country. It can be seen that in Italy more elderly people are killed in road accidents than in any other of the examined EU countries (1.165 elderly persons killed in 2006[1], 26% more than France, the country with the second higher figure). It can also be seen that in 2006 there is a slight increase in the number of elderly fatalities in Belgium, Austria, Greece and Denmark, comparing to 2005.

Table 1: Elderly fatalities by country, 1997-2006[1]

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
BE	237	260	233	238	264	210	240	201	186	193
DK	132	123	117	134	102	103	99	80	70	72
EL	406	445	415	428	385	340	322	317	322	327
ES	900	890	910	849	867	835	817	746	719	667
FR	1.494	1.587	1.443	1.370	1.393	1.361	1.120	962	1.014	921
IE	66	80	71	44	47	60	53	-	-	-
IT	1.548	1.379	1.391	1.365	1.276	1.394	1.266	1.165	-	-
LU	9	7	7	10	7	5	-	-	-	-
NL	266	227	242	235	222	213	221	-	-	-
AT	212	208	225	190	186	211	197	177	151	156
PT	441	365	340	342	320	304	304	230	222	215
FI	123	104	96	106	96	99	96	97	91	71
SE	171	148	173	154	147	139	118	139	104	95
UK	788	771	758	679	652	655	658	589	616	583
EU-14[1]	6.793	6.594	6.421	6.144	5.964	5.929	5.517	4.982	4.939	4.744
% yearly change[1]	-	-2,9%	-2,6%	-4,3%	-2,9%	-0,6%	-7,0%	-9,7%	-0,9%	-3,9%

Source: CARE Database / EC
Date of query: July 2008

[1] or last available year

However, as in road safety analysis, exposure data is often used to calculate risk estimates, those being defined as the rate of the number of accidents (or casualties) divided by the amount of exposure of a population over a time period (Hakkert and Braimaster, 2002, Hauer, 1995), data from other international databases such as OECD/IRTAD, Eurostat etc. (i.e. population etc.) were also used. The calculated risk figures may be used for different purposes, but their main objective is to enable the comparison of safety performance among different units, populations or countries.

In Table 2 the fatality rates of elderly and middle aged people (45-64 years old) are compared with the fatality rate of the overall population. The ratios of elderly to middle-aged and of elderly to all fatalities clearly indicate that the elderly are at greatest risk of being killed in a road accident than for the middle-aged and the overall population in almost all EU-19 countries and it is worth noting that some of the countries with the best overall road safety records, such as Sweden, Finland, The Netherlands and Denmark, have rather high proportions of elderly fatalities.

Table 2. Fatalities per million inhabitants of the middle-aged and the elderly by country 2006[1]

	Fatalities per million inhabitants (fatality rate)			Comparisons	
	Middle-aged	Elderly	Total	Eldery/ Middle-aged	Elderly/Total
BE	87	107	101	1,23	1,05
CZ	102	118	56	1,16	2,09
DK	44	87	56	1,98	1,54
EE	178	141	152	0,79	0,93
EL	105	158	149	1,51	1,06
ES	82	91	93	1,10	0,97
FR	60	90	75	1,51	1,21
IE***	52	112	79	2,14	1,42
IT**	70	100	95	1,42	1,04
LU****	77	75	131	0,97	0,57
HU	156	135	129	0,87	1,04
MT	0	18	27	-	0,66

	Fatalities per million inhabitants (fatality rate)			Comparisons	
	Middle-aged	Elderly	Total	Eldery/ Middle-aged	Elderly/Total
NL***	45	94	63	2,09	1,50
AT	85	113	88	1,33	1,28
PL*	149	183	143	1,23	1,28
PT	88	118	92	1,35	1,29
FI	61	83	64	1,36	1,30
SE	46	60	49	1,32	1,23
UK*	39	58	55	1,49	1,06
EU-19	77	100	89	1,31	1,13

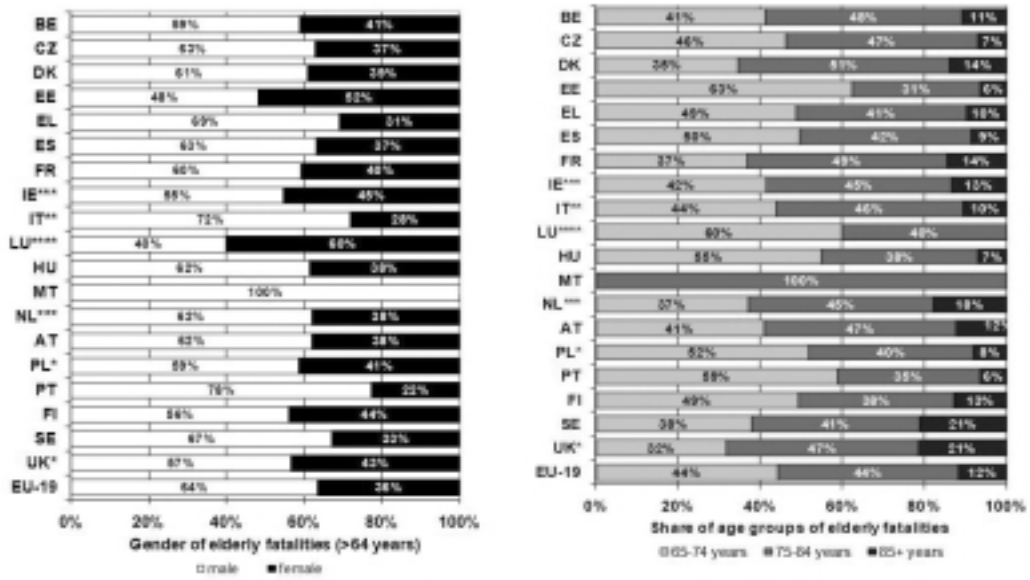
*	Data from 2005 (UK=GB 2006+NI 2005)	*** ****	Data from 2003 Data from 2002	Source: CARE Database / EC Date of query: July 2008
**	Data from 2004			2008Source of population data: EUROSTAT

Additionally, it is evident that fatality rates both for the elderly and for the middle-aged, vary significantly between the Member States. In 2006 Poland and Greece have the highest rates of fatalities per million inhabitants for elderly (183 and 158 respectively), with the average rate being approximately 100 for the EU-19 countries.

According to the results of a more detailed analysis by age groups and gender presented in the following Figure 4, it can be seen that almost 90% of all elderly fatalities are aged between 65 and 84 years old and approximately two thirds of elderly people killed in road accidents in the 19 EU countries in 2006[1] are men, with Estonia being the only country (apart from Luxemburg, due to small numbers) in which women constitute more than half of the elderly fatalities (52%). In general, older women are much more likely to stop driving than are men of the same age, giving "lack of confidence" as their main reason for quitting (NHTSA, 1993).

Especially people between 75-84 years old have the highest average fatality rate of all elderly people (157 fatalities by million inhabitants), followed by the oldest group aged 85+ (143). Additionally, the fatality rate of people between 65 and 74 years old is higher (109) than the respective one fatality rate of the overall population (89 fatalities per million inhabitants). One of the most important reasons for the lower risk for people of 85 and more years old is certainly the reduced mobility in this age group.

Figure 4: Elderly fatalities by age group, by gender and by country 2006[1] (Source: CARE, 2008)



Road safety parameters of the elderly people in the EU countries

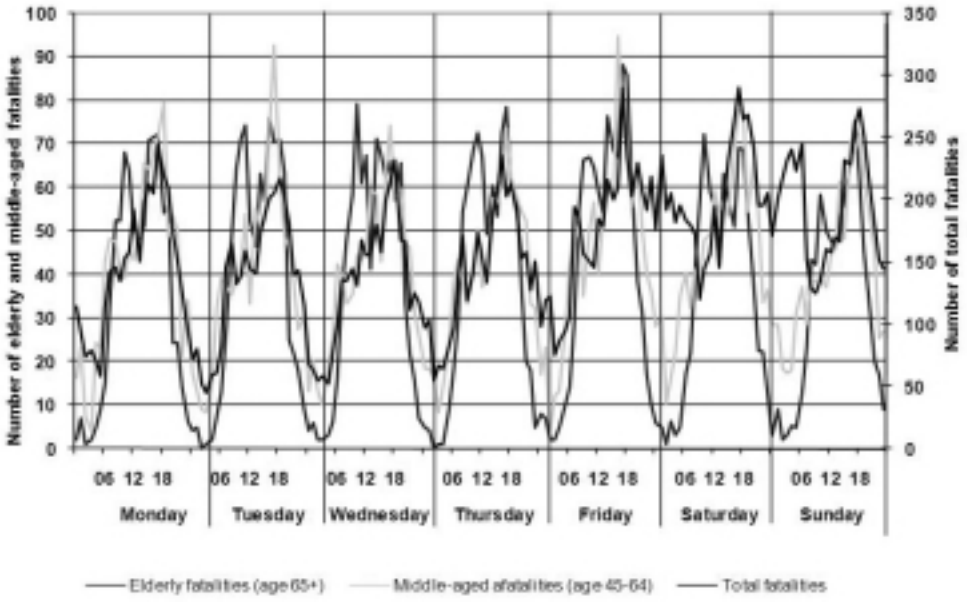
The analysis of the distribution of elderly road accident fatalities according to the mode of transport showed that more than one third (2.300 persons) of the fatalities across the 19 European countries in 2006[1] were pedestrians, with the highest proportions being in Poland (apart from Malta and Luxemburg) and the lowest in The Netherlands and Sweden. Another interesting outcome of the analysis was that while on average elderly fatalities account for 19% of all road accident fatalities across Europe, nearly 40% of the overall pedestrian fatalities are people aged more than 64 years old.

According to the analysis performed the elderly compared to middle-aged people, have a lower share of fatalities on motorways and on rural roads (4% and 43% respectively, comparing to 8% and 58%), but a higher share on urban roads (47% of the elderly fatalities occur in urban road network, comparing to 30% of the middle-aged people). This is a result of the elderly mobility pattern, as in general they have lower mobility than other age groups and are mainly pedestrians. Poland and Hungary are the countries with the highest proportions of the elderly fatalities in urban areas (more than 65% of the elderly fatalities).

Day of week and time of the day were also considered. Nearly 85% of elderly fatalities in the 19 EU countries in 2006[1] occurred between 8 a.m. and 8 p.m. and while the numbers generally decrease after 8 p.m., they stay high (over 13% of the respective fatalities) during evening hours in southern countries like Greece and Spain as well as in Estonia and Ireland.

As Figure 5 indicates, middle-aged people are more often killed in road accidents during evening and night hours, having higher fatality numbers on Tuesdays and Fridays, whereas more elderly people (three out of four) are killed in road accidents during the week days (Monday to Friday), with a morning and an afternoon peak, as they have very low fatality numbers during the night hours.

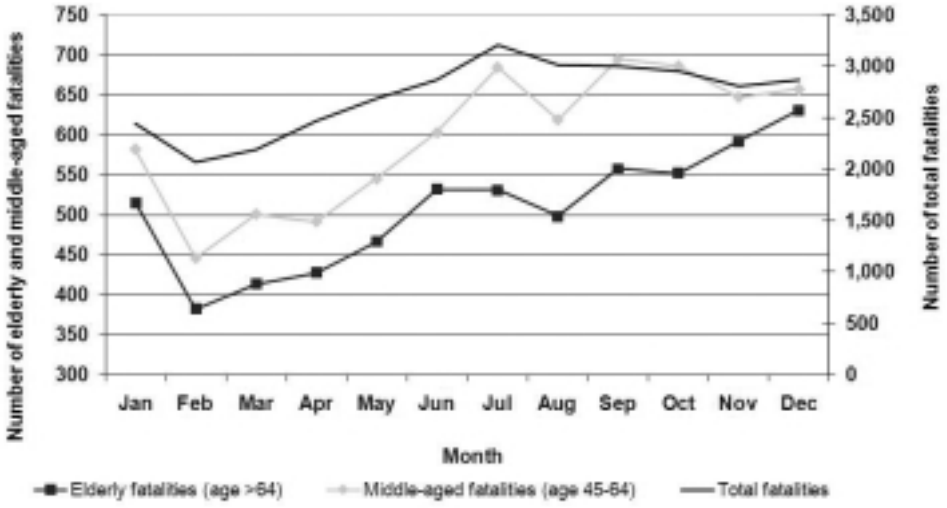
Figure 5: Middle-aged (45-64 years old), elderly (>64 years old) and overall fatalities by day of week and time of day in EU-19 2006[1] (Source: CARE, 2008)



Finally, with reference to the seasonal distribution of the elderly fatalities, in most EU countries more elderly people are killed in road accidents during the winter times, with the exception of Greece where the highest number of elderly fatalities is observed during summer (from July to September).

In the following Figure 6 the distributions of elderly and middle-aged fatalities by month are compared with the overall fatalities distribution in 19 European countries. During the period from February to April the lowest proportions of fatalities are observed for all three age ranges, however, the peak for elderly fatalities is in December, whereas for the middle-aged and the overall fatalities the peak is in September and July.

Figure 6 : Middle-aged, elderly and total fatalities by month in EU-19, 2006[1] (Source: CARE, 2008)



Conclusions

The various road safety parameters examined revealed a different impact on the elderly safety level, comparing to other age groups, due to the specific physical characteristics but also to the different behaviour of the elderly road users (Vardaki, 2008).

Elderly drivers are not really a threat for the other road users. The increased number of road accidents with serious injuries and fatalities for elderly people is due to their increased frailty, as well as to their reduced driving ability attributed to limited driving and physical impairment (NTUA, 2009). We could say that elderly drivers have a higher risk for road accidents, which is though balanced by the reduced exposure (driving) and the lower speeds (Breker et al, 2003).

Analysis of elderly people road accident data derived from the Community CARE database for the decade 1997 - 2006[1] showed a significant decrease in elderly fatalities in 2006 compared to 1997, slightly higher than the respective decrease in the overall road accident fatalities. CARE accident data were also combined with exposure data (population), allowing the more accurate comparison of the calculated rates between EU countries. According to the results of the analysis, in most European countries the elderly - specifically those between 75 and 84 years old - are at greater risk of being killed in a road accident than the average person. Additionally, more than one third of elderly fatalities were pedestrians and also elderly people are proportionately more likely than middle-aged people to be killed in an accident in an urban road.

Within this research it was demonstrated that analyses using disaggregate data could lead to results which do not always coincide with analyses using aggregate data. The CARE disaggregate data may be proved very useful for these more detailed analyses, especially when multi-country comparisons are aimed. However, at a next phase, analyses using statistical models are also necessary for the identification of the combined correlation of the parameters with an impact on elderly road safety and the underlining reasons behind the elderly casualties.

Acknowledgment

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