Parameters affecting seat belt use in Greece

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Abstract

The objective of this research is the exploration of seat belt use in Greece and particularly the identification of the parameters affecting seat belt use in Greece. A national field survey was conducted for the analytical recording of seat belt use. A binary logistic regression model was developed and the impact of each parameter on seat belt use in Greece was quantified. Parameters included in the model concern characteristics of car occupants (gender, age, position in the car), the type of the car and the type of the road network. The data collection revealed that in Greece, the non-use of seat belt on the urban road network was higher than on the national and rural road network and young and older men use seat belt the least. The developed model showed that travelling on a national road is negative for not wearing the seat belt. Finally, the variable with the highest impact on not wearing the seat belt is being a passenger on the back seats.

Keywords: seat belt; observation survey; binary logistic regression; elasticity

Introduction

Road traffic injuries are a major public health problem and a leading cause of death and injury around the world. Approximately 1.2 million people are killed each year in road crashes worldwide, with up to 50 million more injured (FIA, 2009). While it is important to prevent traffic crashes from happening, it is also important to take measures to mitigate the impact of crashes on people involved. Human beings are fallible and everyone can be involved in an accident so the importance of the - so-called “passive” - protection in crashes cannot be underestimated. The seat belt is the single most effective feature in the car to fulfill this role.

Since the 1960s, studies conducted throughout the world have shown conclusively that seat belts save lives, when worn and fitted correctly. A review of research on the effectiveness of seat belts found that their use reduces the probability of being killed by 40-50% for drivers and front seat passengers and by about 25% for passengers in rear seats. The impact on serious injuries is almost as great, while the effect on slight injuries is smaller at 20-30% (FIA, 2009). ETSC also reports that the use of seat belt reduces the risk of dying in a serious crash, which would normally lead to fatal injury, by about 50% (2007).

Universal seat belt use alone could prevent 6,000 deaths and 380,000 injuries every year in Europe. Yet despite the legal obligation to use safety restraints for both adults and children, usage rates still vary greatly across Europe. Seat belt wearing rates in front seats reach 95% or more in countries such as France, Germany, Sweden, the UK and the

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Netherlands while in Poland, Cyprus, Belgium, Slovakia, Hungary and Italy rates are 80% or lower. For rear seat passengers the disparities between countries are much bigger: from above 80% in Germany, Finland, UK, France, Spain and the Netherlands all the way down to under 30% in Cyprus, Malta and Latvia (ETSC, 2010). Generally, the usage rate of protective systems in the EU-27 remains unsatisfactory low and improved only marginally in the last years (Vis & Eksler, 2008).

A national law on seat-belts exists in all countries of the European Union since an EU directive on seat belts also exists. The law applies and is enforced on all occupants in all countries. Nevertheless, wearing seat belt rates are significantly different in various countries. The variation of wearing seat belt rates may be the result of the variation of enforcement level as well as of the compliance to the law in the different European countries. Experience has shown that road safety legislation without proper enforcement is unlikely to have the desired effect. In part, this is because road users do not always perceive the risks involved and the benefits to them of the protective measures contained in the legislation. For this reason, they do not always support laws designed to improve their own safety on the roads (FIA, 2009). Apart from that, wearing seat belt rates can be considered an overall indicator of the road safety culture in each country and it is well known that this differs a lot among the European countries. An overview of seat belt law and enforcement as well as analytical data on seat belt wearing rates in European countries for the year 2008, are shown in Table 1.

(Table 1)

In the United States, seat belts saved an estimated 15,147 lives in 2007, when the National Occupant Protection Use Survey (NOPUS) national belt use estimate was 82 percent (NHTSA, 2009). In 2010, seat belt use stood at 85 percent. The rate continued to be higher in States in which vehicle occupants can be pulled over solely for not using seat belts ("primary law" States) than those with weaker enforcement laws ("secondary law" States) (NHTSA, 2010).

Seat belts are secondary safety devices and are primarily designed to prevent or minimise injury to a vehicle occupant when a crash has occurred. The functions of seat belts are:

- reducing the risk of contact with the interior of the vehicle or reduce the severity of injuries if this occurs;
- distributing the forces of a crash over the strongest parts of the human body;
- preventing the occupant from being ejected from the vehicle in an impact;
- preventing injury to other occupants (for example in a frontal crash, unbelted rear-seated passengers can be ejected forward and hit other occupants).

A belted occupant will be kept in their seat and thus will reduce speed at the same rate as the car, so that the mechanical energy to which the body is exposed will be greatly reduced. The chance of being killed or severely injured is about three times greater for occupants who are ejected during the crash. More detailed analyses indicate that seat belts are most effective in frontal impacts, in roll-over accidents and in run-off-the-road crashes, where the probability of being ejected is high if seat belts are not worn, as well as in lower speed crashes, which occur mostly in urban areas. However, the problem of lower seat belt wearing rates in urban areas persists (ETSC, 2005; FIA, 2009). The effect of seatbelts is also partly dependant on the collision speed. At very high speeds, the effect eventually declines to zero, but at lower speeds the effect is very large. This is why it is also important to wear seatbelts on urban roads. Seatbelts work better in preventing fatal injury than severe injury. This is because a fatal crash is closely associated with head injury and internal torso injury. It is mainly these types of injury that seatbelts prevent (SWOV, 2010).

"Data from Greece regarding seat belt use by drivers inside and outside urban areas and the severity of road accidents for the period 1998-2008 are shown in Table 2. Even though there is a significant percentage of unknown cases (decreasing over time), there is a clear increasing trend of seat belt use during the specific period. Inside urban areas, the percentage of drivers that were neither killed nor injured and used their seat belt is almost three times higher than the percentage of those who were not belted. Respectively, killed drivers that used their seat belt are half the number of those unbelted. Similar results are observed regarding seriously injured drivers. Outside urban areas, the results for cases with no death or injury and the cases with deaths are similar to the respective results inside urban areas mentioned above. However, when serious injuries are examined, the percentages of belted and unbelted drivers are almost the same. Generally, inside urban areas, drivers who were not killed or injured are much more than those killed or seriously injured while the corresponding difference is smaller outside urban areas. Respectively, outside urban areas, there is a greater difference between unbelted drivers who were not killed or injured and those killed or seriously injured than the respective difference inside urban areas. The above confirm the opinions expressed in the previous paragraph regarding the effectiveness of seat belts depending on speed."

(Table 2)

Numerous studies have shown that various socio-demographic, situational and psychological factors influence the likelihood of using a seat belt. Specifically, gender, age, road type, vehicle type and age, driving time, environmental conditions, traffic conditions, imitation, fear, experience, legality, perceived risk, discomfort, alcohol consumption are some of the factors that have been found to influence seat belt use (Chliaoutakis, Gnardellis, Drakou, Darviri & Sboukis, 2000; Cunill, Gras, Planes, Oliveras & Sullman, 2004; Kim & Kim, 2003; McCartt & Shabanova Northrup, 2004; Reinfurt, Williams, Wells & Rodgman, 1996; Şimşekoğlu & Lajunen, 2008).

The objective of this research is the exploration of seat belt use in Greece and particularly the identification of the parameters with an impact on the seat belt use on the urban and rural road network of Greece. The results of this analysis may be proved very useful for the identification of the problem and of the respective countermeasures, given that the non-use of seat belt is considered as one of the most important reasons behind the low road safety performance of Greece, in comparison with the other European countries (NTUA, 2005). On this purpose, a national field survey for the analytical recording of seat belt use was conducted. This survey was carried out on different days, during different hours of the day and on different types of road network and various user and vehicle characteristics were recorded. The analysis of the results was conducted through the development of a binary logistic regression model, allowing for the quantification of the impact of each parameter to the seat belt use in Greece.

Observation survey

The observational survey concerned the collection of data regarding seat belt use by drivers and passengers in private cars, in Greece. The method chosen for collecting seat belt use data was the on-site observation. The observational method was selected based on the international literature. It was expected that this method would give more accurate and reliable data since the real rate of seat belt use by the road users would be recorded instead of self-reported seat belt use.

The data that were recorded during the observational survey are:

- Driver's characteristics: Gender, estimated age (young 16-24, middle aged 25-54, older 55+) and seat belt use.
- Passenger's characteristics: gender, estimated age (young 16-24, middle aged 25-54, older 55+) and seat belt use.

- Vehicle's characteristics: cubic capacity (large car e.g. sedan/jeep or small car e.g. with three doors).
- Registry details: day, time and specific location.

Data were recorded in portable computers in which the relevant questionnaire was inserted using specialised software (Computer Aided Personal Interviewing - C.A.P.I.). Fourteen locations in cities as well as on the national and rural road network were selected in order to record the necessary road safety data in a representative manner through all Greece. In urban areas, observation locations were along several different types of roads in order to record car occupants behaviours in various road and traffic conditions (different speeds and flow levels). Similarly, observations on national road network were made along the two main arteries that lead to the capital (Athens) and the second largest city of Greece (Thessaloniki). As long as observations on rural road network are considered, these were made within the wider area of Larissa, one of the main cities of Greece where agriculture is the main professional activity and thus traffic volumes present the necessary variation. In addition, observation locations were selected based on expected traffic volumes in order to record occupant behaviour in different traffic conditions. Details on the observation locations are presented in the final deliverable of the relevant project (NTUA, 2009).

All observation locations are mandatory stopping spots for vehicles (traffic lights, stop signs or toll stations) to allow sufficient time for accurate observation of use/non use of seat belt and of the other necessary data. To ensure the random sampling the following procedure was adopted: At each location, observers choose and record the characteristics of the first private car on the right lane. Then, the second private car on the second lane is chosen etc.

The survey took place from April 3rd to April 18th in 2009. The study was conducted from Monday to Saturday and there were three different 4-hour shifts: from 10:00 to 14:00, from 14:00 to 18:00 and from 18:00 to 22:00. In total, 8.048 private cars with 11.914 occupants were recorded.

Special attention was given to the selection and training of the researchers. Most of the observers had previous experience in field studies. Regardless of previous experience, all observers attended an intense informational/educational training. The observers' work, during data collection, was supervised by a superintendent to a percentage up to 90%.

Seat belt use survey

Some basic characteristics of the sample of the survey are presented below. These characterisics concern the type of the car, the gender and the estimated age of the driver and the observation spot.

(Table 3)

Collected data were used for the calculation of seat belt use rates per gender and age of the driver, vehicle type, area type and other parameters that are presented below. In each case, the reliability was tested by calculating the error for a 95% interval, using the following formula:

$$E = K \sqrt{\frac{p \cdot q}{n}} \qquad (1)$$

where: E: error

K = 1.96: constant corresponding to a 95% interval (U distribution)

p: percentage of observations with specific characteristics

q = 1- p

n : number of observations

For the whole sample, the non-use seat belt percentage for drivers was 23% (±0.92%). Men drivers use the seat belt less than women drivers, with differences from 2% to 13% depending on age. The drivers that use seat belt the least, are young and older men.

(Table 4)

(Table 5)

People who drive small cars use the seat belt less.

During the survey, seat belt use by car drivers per day (working day or Saturday) and per hour of the day was also explored. It was found that seat belt use was increased in the afternoon (from 14.00 to 18.00) on all days. It is noted that the period between 18.00 and 22.00 on Saturday was not examined due to very few data. Analytical data can be found in the final deliverable of the relevant project (NTUA, 2009).

(Table 6)

In urban areas 28% of the drivers, 32% of the passengers on the front seats and almost four out of five passengers on the back seats do not use their seat belt. In rural areas, the non-usage rates are much lower for both drivers and passengers on the front seat (12% and 15% correspondingly). The rate for passengers on the back seats is better than the respective one in urban areas, but it remains high (72%). It is also noted that enforcement measures taken in the specific locations during the survey, may affect the observed rates of seat belt use.

Model development

In order to develop a statistical model which would describe the seat belt use in Greece, using the available data, several types of models were investigated. Binary logistic regression was finally selected for its simplicity and for its adequateness.

During the development of the binary logistic regression model, seven independent and one dependent variable were used. The independent variables and the respective categories for each one of them were: the car type (large or small), the road type (urban, national or rural), time interval (10.00-14.00, 14.00-18.00 or 18.00-22.00), the day of the week (working day or Saturday), the position of each car occupant (passenger on front seat, passenger on back seats, driver), the gender (male, female) and the age of each car occupant (16-24, 25-54, 55+ and 3-15) (ages less than 3 years old were not included in the study due to small number of data). The use of seat belt was examined as the dependent variable (yes or no). Since all independent variables are categorical and almost all have more than two categories each, dummy variables were used to contrast the different categories. For each variable a baseline category was chosen and all remaining categories were contrasted with the baseline. For each independent variable with k categories, k-1 dummy variables were used to investigate all the differences in the categories with respect to the dependent variable. The last category of each variable was used as the baseline category. The results of the binary logistic regression are shown in Tables 7 and 8.

The classification table (Table 7) shows that the model is mostly effective in predicting the use of seat belt. Although the correct percentage of non use prediction is significantly lower, the overall percentage remains satisfactorily high and higher than 65% which is a generally accepted percentage. Furthermore, the Likelihood Ratio Test criterion is met since $LRT = -2*(L(b)-L(0)) = 14{,}253.735 - 12{,}489.838 = 1{,}763.897 > 21.06 = x^2$ for 12 degrees of freedom and for a 95% interval. This indicates that the model is statistically preferred comparing to the one without the used variables and these variables are considered statistically significant.

(Table 7)

(Table 8)

The corresponding model is the following:

$$U = -2.515+0.423*x_1-0.894*x_2+0.483*x_3+0.822*x_4+0.723*x_5+0.965*x_6+0.472*x_7+3.237*x_8 \qquad (2)$$

where U : logit (not wearing seat belt)
x_1 : urban road
x_2 : national road
x_3 : gender (male)
x_4 : age 16-24
x_5 : age 25-54
x_6 : age 55+
x_7 : passenger on front seat
x_8 : passenger on back seat

In order to make possible the comparison of the impact of different variables on the non-use of seat belt, focus was given to the estimation of the responsiveness and sensitivity of the dependent variable with respect to changes in each independent variable. On this purpose, the elasticity of each dependent variable was calculated (Washington, Karlaftis & Mannering, 2003). Elasticity is useful because it is dimensionless unlike any estimated coefficient of regression parameter, which depends on the units of measurement of each parameter. In this way, it is possible to express quantitatively the impact of each independent variable on the dependent. In combination with the sign (±) of the coefficients it is also possible to identify whether an increase in each independent variable results in an increase or a decrease in the independent one.

Pseudoelasticity is used to calculate the elasticity of discrete variables and describes the change in choice probability when the discrete variable changes from one value to another (Shankar & Mannering, 1996; Chang & Mannering, 1999). The direct pseudo-elasticity, $E^{P(i)}_{x_{ink}}$, of the k-th variable from the vector x_n, denoted x_{nk}, with respect to the probability, P_{ni}, of person n experiencing outcome i is computed as (Ulfarsson & Mannering, 2004):

$$E^{P(i)}_{x_{ink}} = e^{\beta_{ik}} \frac{\sum_{i'=1}^{I} e^{\beta'_i x_n}}{\sum_{i'=1}^{I} e^{\Delta(\beta'_i x_n)}} - 1 \qquad (3)$$

where I is the number of possible outcomes, (β_{ixn}) is the value of the function determining the outcome, s_{ni}, after x_{nk} has been changed from zero to one whereas β_{ixn} is the value when x_{nk} = 0, x_n is a vector of K explanatory variables shared by all outcomes, β_i is a vector of estimated coefficients on the K variables for outcome i, and β_{ik} is the coefficient on x_{nk} in outcome i. Since equation (3) refers to each case (n), the calculated elasticity refers to the sensitivity of the specific case towards the change of the value of the variable and thus is a disaggregate elasticity. In order to calculate the aggregate elasticity which expresses the sensitivity of the sample towards the examined change, to the corresponding total change of the possibility of an outcome is calculated using the formula (Ben-Akiva & Lerman, 1985):

$$E_{x_{ik}}^{P(i)} = \frac{\sum_{n=1}^{N} P_n(i) E_{x_{ink}}^{P_n(i)}}{\sum_{n=1}^{N} P_n(i)} \qquad (4)$$

Consequently, the aggregate elasticity of the sample towards the examined change in a variable is the weighted mean of the individual elasticities based on the corresponding choice possibilities.

Apart from the elasticity (e_i) of each variable, the relevant elasticity (e_i^*) was also calculated. The relevant elasticity of each variable is calculated by dividing the elasticity of the examined variable by the elasticity of the variable with the lowest impact on the dependent variable. The elasticity and the relevant elasticity values for each one of the independent variables used in the model are also shown in Table 8.

Model application

The kind of impact that each independent variable has on the dependent variable can be identified by the sign (±) of the corresponding coefficient in the model. That means that variables with a positive sign contribute to the increase of not using the seat belt and a negative sign refers to a decrease of not using the seat belt. As it was found, the day of the week, time and the type of the car are not statistically significant variables and therefore were not included in the model.

The results shown in Table 8 permit the comparison of the possibility of not wearing the seat belt for the different categories of each used dependent variable. Specifically, "urban road" which contrasts with "rural road" has an exp(B) of 1.526 which means that when travelling on an urban road the possibility of not wearing the seat belt is 1.526 higher than when travelling on a rural road, having allowed for the car type, time, the day of the week, the position in the car, gender and age. Respectively, when travelling on a national road it is 0.409 times likely not to wear the seat belt than when travelling on the rural network, having allowed for the same parameters.

In the same way, the results regarding gender show that a man is 1.621 times more likely than a woman not to wear his seat belt, taking into account the rest of the examined parameters.

As far as age is considered, it was found that a car occupant between 16 and 25 years old has a 2.275 times higher possibility not to wear a seat belt, comparing to a car occupant between 3 and 15 years old. Accordingly, middle aged car occupants have a 2.060 times higher possibility not to wear a seat belt comparing to the reference category. Finally, older car occupants have the highest possibility not to wear a seat belt comparing to car occupants between 3 and 15 years old since the exp(B) for this age category was calculated 2.624. It must be noted that again these results apply when the road type, the car type, time, the day of the week, the position in the car and the gender are also taken into account.

The results of the last examined parameter, the position in the car, showed that the possibility of a passenger on the front seat not to wear the seat belt is 1.603 higher than this of a driver having allowed for the road type, the car type, time, the day of the week, age and gender. On the other hand, the possibility of a passenger on the back seat not to wear his seat belts is 25.450 times higher than that of the driver, taking into account again the rest of the examined parameters.

Based on the elasticity calculations, the impact that each independent variable has on the dependent variable can be further explored. The elasticity values show that the independent variable with the highest impact on the dependent one is being a passenger on the back seats. This variable has a 9.00 larger impact than being on an urban road, on not wearing the seat belt. More specifically, travelling on a national road has a 1.47 greater impact than travelling on an urban road on not wearing the seat belt. Furthermore, being 16 to 24 years old has a 1.10 larger impact than being 25 to 54 years old on not wearing the seat belt. Similarly, being older than 55 years old has a 1.32 larger impact than being between 25 and 54 years old on not wearing the seat belt. Comparing the impact of the specific position of the car occupant on not wearing the seat belt showed a great difference with being passenger on the back seats having 8.40 higher impact than being a passenger on the front seat. Generally, the elasticity values show that the type of the road and the gender of the car occupant have lower impact on not wearing the seat belt comparing to the age of the car occupant and the position in the car.

Conclusion

The use of seat belt has proved to be an effective measure for the reduction of deaths and injuries in road accidents (FIA, 2009). Even though the parameters that affect seat belt use are widely examined, actual data on seat belt use are systematically collected on a constant basis in very few countries worldwide. The objective of this research was the exploration of seat belt use in Greece and particularly the identification of the parameters with an impact on the seat belt use at the urban and rural road network of Greece. On this purpose, a national field survey for the analytical recording of seat belt used was conducted.

The collected data were also used for the exploration of the parameters that affect seat belt use. On this purpose, binary logistic regression was applied to the collected data and the best binary logistic model developed was chosen. The examination of each parameter was based on the comparison of the exp(B) value between the reference and each one of the other categories of each variable.

As it was found through the survey, 23% of the drivers, 26% of the passengers on the front seats and 77% of the passengers on the back seats do not use the seat belt. This very low percentage of seat belt use by the back seats passengers may be attributed to the fact that car passengers in Greece believe that back seat passengers are safer than those in front (partly true) and they do not need so much the seat belts. In addition, insufficient enforcement by the Police of back seat belt wearing as well as total lack of campaigns on this specific issue in Greece may also result in these very low percentages. This finding is new as previous research did not make any distinction between front and back seat occupants. Consequently, more research on this issue, taking into account car occupants views and other characteristics may reveal more reasons for this very low level of back seat belt wearing.

Among drivers, the highest rates of non use were found for young (16-24 years old) and older (55+) men, a fact attributed to the lower perception of seat belt usefulness of these two car occupant categories. The use of the seat belt on the urban road network was found lower comparing to the national and rural road network. It is also noted that on the urban road network, the percentage of seat belt use by the passengers on the back seats reaches only 19%. Both findings may be attributed to the lower speeds observed in the urban network and the respective lower risk perception by the car occupants.Regarding the car type, drivers of large cars use the seat belt more than those of small cars. The examination of seat belt use on different days of the week and in different hours of the day showed that seat belt use is increased in the afternoon on all examined days.

The results of this study are quite compatible to those of previous research regarding seat belt use in Greece (Petridou & Hellenic Road Traffic Police Department, 1998; Skalkidou et al, 1999; Petridou, Skalkidou, Ioannou, Trichopoulos and the Hellenic Road Traffic Police, 1998; Chliaoutakis, Gnardellis, Drakou, Darviri & Sboukis, 2000). The comparison with data from these previous studies showed that during the last decade a net improvement (ranging from 12% to 55%) of seat belt wearing in all types of roads and car occupants is observed.

According to the developed model being on a national road is negative for not wearing the seat belt. The statistical results showed that the possibility not to wear the seat belt is lower on the national road network comparing to travelling on the rural network and higher on the urban network comparing again to the rural one. As far as the gender of the car occupant is considered, men are more likely than women not to wear the seat belt. Regarding age, older car occupants (55+ years old) are the most likely not to wear their seat belt comparing to children (3-15 years old), followed by young car occupants between 16 and 24 years old and middle-aged car occupants (25-54 years old). Finally, depending on the position in the car, there is a great difference in the possibility of not wearing the seat belt between passengers on the front seats and passengers on the back seats.

The exploration of the elasticity value of each independent variable showed that the variable with the highest impact on not wearing the seat belt is being a passenger on the back seats. Generally, the type of the road and the gender of the car occupant are parameters with lower impact than the age of the car occupant and the position in the car.

The results of this research revealed the role of basic parameters for the use of seat belt, which can be useful information for decision makers designing the national road safety policies. The enactment and the surveillance of laws that make seat belt use obligatory in combination with information campaigns are measures that can increase the use of seat belts (FIA, 2009; Skalkidou et al, 1999). The examined parameters can be more useful for the design of policies and countermeasures.

On the occasion of this study, certain basic limitations regarding roadside observational surveys of seat belt use were identified. For example, information on other factors that could affect seat belt use, such as occupant characteristics, traffic volumes and speed variations cannot be collected with accuracy. As such, the influence of those factors on seat belt use rates could not be determined within the scope of this study. A more specific limitation that may affect accuracy of observational surveys for seat belt use is the fact that under traffic congestion conditions, car occupants tend not to use their belts. Furthermore, the behavioral details of drivers and passengers, which could provide justification for adjustments in driver behavior in the presence of passengers, could not be determined either and were not included in the model specification. Additional data collection that may allow for a much fuller understanding of the effect of car occupants' characteristics, level of traffic and possibly, training and public information programs on seat belt use can provide further insight into the issue of seat belt use. Consequently, further research comprising more parameters, more complete data and exploration of alternative and/or more complex models could be proved beneficial for the identification of future road safety trends and needs.

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Table 1: Overview of seat belt legislation, enforcement and wearing rates (ETSC, 2010; WHO, 2009)

Country	Seat belt law exists	The law applies to all occupants	Enforcement is apllied to all occupants	Seat belt wearing rate for drivers and passenger in front (%)	Seat belt wearing rate for passengers on back seats (%)
Austria	yes	yes	yes	87	65
Belgium	yes	yes	yes	80	-
Bulgaria	yes	yes	yes	-	-
Cyprus	yes	yes	yes	-	-
Czech Republic	yes	yes	yes	88	56
Denmark	yes	yes	yes	92	79
Estonia	yes	yes	yes	96	67
Finland	yes	yes	yes	88	82
France	yes	yes	yes	98	-
Germany	yes	yes	yes	97	-
Greece	yes	yes	yes	77	21
Hungary	yes	yes	yes	71	42
Ireland	yes	yes	yes	90	78
Italy	yes	yes	yes	-	-
Latvia	yes	yes	yes	83	-
Lithuania	yes	yes	yes	-	-
Luxembourg	yes	yes	yes	-	-
Malta	yes	yes	yes	-	-
Netherlands	yes	yes	yes	95	81
Norway	yes	yes	yes	92	-
Poland	yes	yes	yes	80	50
Portugal	yes	yes	yes	-	-
Romania	yes	yes	yes	-	-
Slovakia	yes	yes	yes	71	-
Slovenia	yes	yes	yes	88	57
Spain	yes	yes	yes	85	81
Sweden	yes	yes	yes	95	74
Switzerland	yes	yes	yes	88	65
UK	yes	yes	yes	95	88

Table 2: Drivers involved in road accidents per area type and accident severity in Greece for years 1998-2008 (Source: EL.STAT. Processing: NTUA)

		Seat belt used											Total 1998-2008			
Area type	**Accident severity**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Seat belt used**	**Seat belt not used**	**unknown**	**Total number**
Inside urban area	**Driver not killed or injured**	22%	27%	26%	33%	39%	39%	36%	39%	41%	48%	51%	35%	11%	54%	113,603
	Driver killed	3%	6%	8%	10%	12%	15%	14%	13%	16%	15%	17%	12%	27%	61%	2,485
	Driver seriously injured	8%	9%	9%	11%	11%	14%	18%	12%	16%	19%	18%	12%	19%	69%	4,775
	Driver slightly injured	12%	15%	14%	19%	22%	24%	22%	22%	25%	32%	35%	21%	13%	66%	60,008
Outside urban area	**Driver not killed or injured**	25%	29%	29%	33%	40%	43%	43%	42%	47%	55%	56%	37%	12%	51%	32,157
	Driver killed	13%	16%	17%	15%	23%	23%	28%	29%	27%	31%	30%	22%	37%	41%	5,614
	Driver seriously injured	20%	25%	23%	26%	30%	33%	34%	29%	34%	32%	34%	27%	28%	44%	6,305
	Driver slightly injured	27%	30%	30%	35%	42%	42%	45%	44%	45%	51%	53%	37%	21%	42%	29,371

Table 3. Distribution (%) of the characteristics of the survey sample

Car type		Driver's Gender		Driver's Age			Area type	
Large	**Small**	**Men**	**Women**	**Young 16-24**	**Middle aged 25-54**	**Older 55+**	**Urban**	**Rural**
48.6%	51.4%	74.2%	25.8%	8.9%	77.8%	13.3%	70.5%	29.5%

Table 4. Distribution (%) of non-use of seat belt by car drivers, per gender and age

	Men				Women				Total	Error
	16-24	**25-54**	**55+**	**Total**	**16-24**	**25-54**	**55+**	**Total**		
Non use of seat belt by the driver	29%	25%	29%	26%	27%	16%	16%	17%	23%	±0.92%

Table 5. Distribution (%) of non-use of seat belt by drivers, per car type

	large	small	Total	Error
Non use of seat belt use by the driver	23%	24%	23%	±0.93%

Table 6. Distribution (%) of non use of seat belt per area/ road type and position in the vehicle

	Urban area			Rural area			Total		
	Driver	**Passenger in front**	**Passenger back**	**Driver**	**Passenger in front**	**Passenger back**	**Driver**	**Passenger in front**	**Passenger back**
Non use of seat belt	28%	32%	81%	12%	15%	72%	23%	26%	77%
Error	1.17%	2.10%	3.32%	1.29%	2.22%	4.91%	0.93%	1.60%	2.78%

Table 7. Classification table

	Predicted		
	Seat belt		
Observed	**use**	**non use**	**Percentage correct**
Use of seat belt	8313	198	97,7
Non use of seat belt	2660	743	21,8
Overall percentage			76,0

Table 8. Binary logistic regression results

variable	B	Significance	Exp(B)	e_i	e_i*
working day	0.000	0.998	1.000	-	-
time 10.00-14.00	0.068	0.259	1.071	-	-
time 14.00-18.00	0.027	0.651	1.027	-	-
large car	-0.057	0.212	0.945	-	-
urban road	0.423	0.000	1.526	0.30	1.00
national road	-0.894	0.000	0.409	0.44	1.47
gender (male)	0.483	0.000	1.621	0.34	1.13
age 16-24	0.822	0.000	2.275	0.58	1.93
age 25-54	0.723	0.000	2.060	0.53	1.77
age 55+	0.965	0.000	2.624	0.70	2.33
passenger in front	0.472	0.000	1.603	0.32	1.07
passenger back	3.237	0.000	25.450	2.70	9.00
constant	-2.515	0.000	0.081	-	-