

Profile of persons involved in traffic accidents in Romania

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Abstract: Background: Romania had in 2010 the highest fatality by traffic accidents in EU and the lowest progress in reducing the traffic deaths during the decade 2001 – 2010 (3% decrease).

Objective: Our study aimed to present the profile of persons involved in traffic accident in Romania during 2005– 2010.

Methods: A descriptive cross-sectional study was performed. The profile of persons involved in traffic accidents was analyzed globally and by subgroups, considering the injury type and the road user. The main data source was the electronic database of Road Police Directorate.

Results: Globally, 344467 persons were involved in traffic accidents during the study period, from which 4.7% died, 13.2% were seriously injured and 39.9% had slight injuries. 75% of the persons involved in traffic accidents were males. 9.1% of the victims were children, 83.8% were adults and 7% elderly. Globally, half of the persons wore safety equipments (seat belt, helmet and child safety seats)..

Conclusion: Too many persons are involved in traffic accident in Romania, and too many of them still die or are seriously injured, as a consequence of a traffic accident. The decreasing trend registered in European Union is not visible in our country. Undertaking the EU legislation is not enough for reducing the deaths and injuries by traffic accidents and a coordinated national strategy is necessary for halving the traffic deaths in the next decade, 2011 – 2020.

Key Words: traffic accidents, dead, severely injured, slightly injured, drivers, car occupants, pedestrians.

Traffic accidents are considered an increasing public health problem all over the world, killing 1.3 million people every year and injuring 20 – 50 million more [1]. There are many global and European policies and commitments for reducing the traffic accidents and their consequent societal and medical burden. The United Nations (UN) declared the decade 2011 – 2020 as Decade of Action for Road Safety [2].

A global action plan was launched in collaboration with World Health Organization (WHO),

aiming to save 5 million deaths and 50 millions serious injuries attributable to traffic accidents [3].

At European Union (EU) level, the Commission proposed to halve, until 2010, the number of deaths by traffic accidents registered in 2001 [4, 5]. Considering the 27 EU member states, this meant a decrease from 54,300 to 27,100 deaths. A reduction of 43% was achieved in 2010 (reaching to 30,900 deaths) and a new strategic document enforced the commitment to halve the number of deaths in the next decade (2011 – 2020) [6, 7].

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Romania had in 2010 the highest fatality by traffic accidents in EU (111deaths/100000 inhabitants), similar to Greece, Poland and Bulgaria, but almost double compared to the EU average (62/100000) [8].

Also Romania has registered the lowest progress in reducing the traffic deaths during the decade 2001 – 2010, with a decrease of only 3% [6]. As a new member state, Romania transposed all the EU regulations on road safety, but obviously this was not sufficient to reach the EU target of halving the traffic deaths until 2010. A better understanding of traffic accidents' causes and development of specific national actions are needed in the current decade, for reaching the target of halving the traffic deaths until 2020.

AIM

Our study aimed to present the profile of persons involved in traffic accident in Romania during 2005–2010.

METHODS

We used a descriptive cross-sectional approach. The main data source was the electronic Registry for Traffic Accidents (RTA) of the Road Police Directorate (the responsible authority for accident registering), available at request for research purposes [9]. We performed our analysis for the years 2005 – 2010, because the registry contains all accidents with victims, starting with the year 2005.

Conceptual framework. According to the Romanian legislation, the traffic accident is represented by any event taking place on a public road, involving at least one vehicle in movement and having as consequences death or injury of at least one person, or damage of at least one vehicle or other goods [10]. The accidents are classified as “severe”(if at least one person involved had a serious injury needing hospitalization, or died as a consequence of the respective accident) or “non-severe” (the victims had only slight injuries no needing hospitalization) [11].

Considering the injury type, the persons involved in traffic accidents are classified in four subgroups: fatally injured (dead), seriously injured, slightly injured and not injured [11-13]. The traffic death is considered using the 30-day definition (any person killed immediately or dying within 30 days of the road accident) [11-13]. Suicide and natural deaths are not included. The “seriously injured”

cases are represented by persons getting injuries (although not killed) in a road accident, needing hospitalization or even dying in more than 30 days [11-13]. Persons injured (although not killed) in a road accident, but with no need for hospitalization are classified as “slightly injured”. The not injured are those persons participating in the accident, which are not affected. Very slight differences were found between the RTA registration and the routine data reported to Eurostat [14]. In this paper the RTA data were used.

The profile of persons involved in traffic accidents was analyzed globally and by subgroups, considering the injury type and the type of road user. The injury types were those collected in the RTA (fatally injured/dead, seriously, slightly and not injured). The road users were classified according to the EU statistics in drivers (any person driving or riding any motorised vehicle or bicycle, including an animal), car occupants (person situated on or in a vehicle, who is not the driver) or pedestrians (person on foot) [11-13].

The following additional variables were considered: demography (gender, age), use of safety equipment (safety belt, helmet or child safety seat) and culpability, as it was registered by the Police. Four age categories were considered: children (<18), young adults (18 – 39), middle aged adults (40 – 64) and elderly (65+). The culpability was defined as primary (main rule violation causing the accident), secondary (additional rule violation) and no culpability.

Statistical analysis. The quantitative variables were assessed for normality and reported as means or medians. The categorical variables were analyzed as proportions. Comparisons were done between subgroups, using Chi-square test or odds ratio and confidence interval limits. The level of statistical significance was $p \leq 0.05$. All analyses were done using SPSS v. 17.0.

RESULTS

Trend and magnitude of the problem

During 2005 – 2010, 152183 traffic accidents (from which 34.8% severe accidents) and 344467 persons involved in traffic accidents were reported to the Police. Analysis of traffic accidents as number per year showed an increasing trend, with a peak in 2008 and a small decrease since then, for both severe and non-severe accidents and similar trend was found in number of victims (Table 1).

From the persons involved in traffic accidents, 4.7% (16255) died, 13.2% (45557) were seriously injured, 39.9% (137543) had slight injuries and 42.2% (145199) were not injured. For 87 persons died in 2005 (0.5% from the total deaths) data were not available, so these persons were excluded from all further analysis.

Table 1. Number of accidents and victims per year, Romania, 2005 - 2010.

	2005	2006	2007	2008	2009	2010	Total
No. of accidents	19842	21914	24678	29855	28626	27268	152183
Severe accidents	7211	7164	8505	10642	10218	9253	52993
Simple accidents	12631	14750	16173	19213	18408	18015	99190
No of victims	43381	49987	56314	67928	65050	61807	344467
Deaths	2629	2587	2800	3065	2797	2377	16255
Severely injured	5682	5777	7092	9400	9097	8509	45557
Slightly injured	16841	20347	22514	27509	26426	23906	137543

Data source: Registry for Traffic Accidents

Table 2. The general profile of persons involved in traffic accidents overall and by injury type.

Category	Variable	Overall (n=344467)	Dead (n=16168)	Seriously injured (n=45557)	Slightly injured (n=137543)	Not injured affected (n=145199)
Demographic	Males %	75	74.6	65.4	62.5	89.9
	Median age	33	44	37	30	33
	Children (%)	9.1	6.7	13.0	16.9	0.9
	Young adults (%)	54.5	37.4	41.3	49.3	65.5
	Middle aged adults (%)	29.4	35.7	31.7	25.9	31.3
	Elderly (%)	7	20.2	14.0	8.0	2.4
	Total (%)	100	100	100	100	100
Wearing safety equipment*	Yes (%)	50.2	21.5	30.1	34.2	75
	NO (%)	49.8	78.5	69.9	65.8	25
	Total (%)	100	100	100	100	100
Culpability	Primary (%)	43.7	55.2	44.8	37.7	48.1
	Secondary (%)	3.9	4	3.3	3	4.8
	No (%)	52.4	40.8	51.9	59.6	47.1
	Total (%)	100	100	100	100	100

*Safety equipments included seat belt, helmet and child safety seats

Profile by injury type

The general profile of persons involved in traffic accidents by injury type is summarized in Table 2.

Overall, 75% of the persons involved in traffic accidents were males, with median age of 33 years. 9.1% of all victims were children (31495), 83.8% were adults (288897) and 7% elderly (24074). Per type of injury, young and middle aged adults accounted the highest proportions in all subgroups, but highest proportions of children were found among slightly and seriously injured and highest proportions of elderly among dead and seriously injured. Very low proportions of children and elderly (0.9% and 2.4% respectively) were found among not injured.

Globally, half of the persons wore safety equipments. Among them, the highest proportion was seen in not injured (75%, possibly because they were mostly represented by drivers) and lowest (21.5%) in the dead subgroup. As regarding culpability, 43.7% of the subjects were primarily culpable for producing the accident, 3.9% had a secondary guiltiness and more than half of the subjects (52.4%) were not culpable. The

proportion on main culpable was the highest among the deaths subgroup. On another hand, 40.8% of the dead subjects and 51.9% from the seriously injured didn't have any culpability for the accident.

Profile by type of user

Overall, 62.6% (215713) of the persons involved in traffic accidents were drivers, 18.8% (64873) car occupants and 18.5% (63881) pedestrians in the study period. The profiles of road users are summarized in Table 3.

The huge majority of drivers involved in accidents were males (89.2%), but car occupants and pedestrians were almost equally balanced by gender.

By age categories, drivers were represented in majority by young (63.1%) and middle aged adults (30.8%). We found 2.4% and 3.6% of the drivers younger than 18 years (legally allowed for bicycles and mopeds), and over 65years respectively. Among the car occupants around 80% were adults. In pedestrians however, we found very high proportions of children and elderly: one of four and one of five pedestrians involved in accidents was younger than 18 or older than 65 respectively.

Table 3. Profile of persons involved in traffic accidents by road user.

Category	Variable	Drivers (n=215713)	Car occupants (n=64873)	Pedestrians (n=63881)
Demographic	Males (%)	89.2	49.5	52.7
	Females (%)	11	50.5	47.3
	Total (%)	100	100	100
	Median age	33	28	39
	Children (%)	2.4	15.3	25.8
	Young adults (%)	63.1	54.9	24.9
	Middle aged adults (%)	30.8	24.7	29.2
	Elderly (%)	3.6	5.1	20.2
Wearing safety equipments*	Yes (%)	68.2	39.0	NA
	No (%)	31.8	61.0	NA
	Total (%)	100	100	100
Culpability	Primary (%)	52.5	1.8	56.7
	Secondary (%)	4.3	0.7	5.5
	No (%)	43.2	97.5	37.7
	Total (%)	100	100	100

*Safety equipments included seat belt, helmet and child safety seats

According to the law, wearing safety equipments is compulsory for drivers (except bicyclists and persons riding animals) and car occupants. Two thirds of the drivers (68.2%) and 39% of car occupants wore safety equipments at the moment of the accident, but for car occupants this proportion varied widely to the occupied seat from 65.1% among those occupying the right front seat

Table 4. Profile of persons involved in traffic accidents by injury type and by type of user.

Category	Variable	Drivers					Car Occupants					Pedestrians				
		Dead	Seriously injured	Slightly injured	Not injured	Total	Dead	Seriously injured	Slightly injured	Not injured	Total	Dead	Seriously injured	Slightly injured	Not injured	Total
Demographic	overall (%)	2.8	7.3	23.1	66.9	100	6.3	19.9	72.6	1.2	100	9.4	26.6	63.7	0.3	100
	males (%)	2.9	7.4	22.3	67.4	100	7.5	20.5	70.2	1.8	100	11.9	26.9	60.8	0.3	100
	females (%)	1.7	6.5	29.5	62.4	100	5.1	19.4	74.9	0.6	100	6.7	26.2	66.9	0.2	100
	p-value	<0.001	0.001	<0.001	<0.001	NA	<0.001	<0.001	<0.001	<0.001	NA	<0.001	0.046	<0.001	<0.001	NA
	children	2.5	16.4	57.6	23.4	100	4.2	16.3	78.9	0.6	100	3.3	21.0	75.6	0.1	100
Wearing safety equipments*	young adults	2.2	6.2	22.1	69.4	100	6.0	19.2	73.5	1.3	100	5.8	21.9	71.7	0.5	100
	middle aged adults	3.4	7.8	21.0	67.9	100	7.3	22.9	68.4	1.3	100	12.6	30.0	57.2	0.2	100
	elderly	8.4	14.6	34.0	43.0	100	11.4	24.7	63.2	0.7	100	17.3	34.4	48.2	0.1	100
	p-value	<0.001	<0.001	<0.001	<0.001	NA	<0.001	<0.001	<0.001	<0.001	NA	<0.001	<0.001	<0.001	<0.001	NA
	Yes	1.6	5.8	19.0	73.7	100	4.5	20.2	73.7	1.6	100	NA	NA	NA	NA	100
Culpability	No	5.5	10.5	31.8	52.2	100	7.4	19.8	71.8	0.9	100	NA	NA	NA	NA	100
	p-value	<0.001	<0.001	<0.001	<0.001	NA	<0.001	0.239	<0.001	<0.001	NA	NA	NA	NA	NA	NA
	primary	4.1	9	25.5	61.3	100	7.8	20.8	45.2	26.3	100	11.6	27.4	60.9	0.2	100
	secondary	2.4	5.5	17.2	74.9	100	10.9	22.4	59.4	7.3	100	10.6	25.1	64.1	0.3	100
	No	1.3	5.3	20.7	72.8	100	6.3	19.9	73.2	0.7	100	6.1	25.6	68.1	0.3	100
	p-value**	<0.001	<0.001	<0.001	<0.001	<0.038	<0.449	<0.001	<0.001	NA	<0.001	<0.001	<0.001	<0.305	NA	

Chi² test

*Safety equipments included seat belt, helmet and child safety seats

**Comparison between primary culpables and no culpables.

(steering wheel on left part in all cars) to 16.8% (back right) and 14.8% (back left). 52.5% of drivers and 56.7% of pedestrians had the main culpability in the accident, but 97.5% of car occupants didn't have any culpability for the accident.

Details on the profile of drivers, car occupants and pedestrians, by type of injury are shown in Table 4.

The proportion of deaths was the lowest among

deaths combined with significantly higher proportion of slightly injured and not injured in car occupants.

Among drivers, 61.3% of those having the main culpability were not affected, but only 26.3% of main culpable car occupants and 0.2% of main culpable pedestrians. The probability to die was significantly higher in those having the main culpability compared to non culpable for all the types of road users.

Table 5. Probability of different injuries by road user.

Injury probability/ road user	Drivers	Car occupants	Pedestrians	OR(CI) ¹	OR (CI) ²	OR (CI) ³
Dead	2.8	6.3	9.4	0.427 (0.410, 0.445)	0.276 (0.266, 0.286)	0.646 (0.620, 0.673)
Seriously injured	17.3	19.9	26.6	0.315 (0.307, 0.323)	0.225 (0.219, 0.23)	0.713 (0.695, 0.732)
Slightly injured	23.1	72.6	63.7	0.113 (0.111, 0.116)	0.171 (0.167, 0.174)	1.506 (1.471, 1.542)
Not injured	66.9	1.2	0.3	168.1 (156.5, 180.6)	770.3 (661.6, 896.9)	4.583 (3.875, 5.419)

OR (CI)¹ comparison: Drivers - Car occupants

OR (CI)² comparison: Drivers - Pedestrians

OR (CI)³ comparison: Car occupants - Pedestrians

drivers (2.8) and increased more than twice and three times in car occupants and pedestrians (6.3 and 9.4 respectively). Similarity was shown for proportion of seriously injured (7.3, 19.9 and 26.6 in drivers, car occupants and pedestrians respectively). Furthermore, proportion of not injured was very low among pedestrians and car occupants (0.3 and 1.2) and very high among drivers (66.9).

Females had generally a significantly lower probability to die or to be seriously injured or not injured and a significantly higher probability to be slightly injured compared to males. Significant differences were found by age category among subgroups of injuries in all types of road users. Very low proportions of not injured were found in car occupants and pedestrians for all age categories and reversely, much higher proportions of not injured were seen in drivers, for all age categories, but especially in young (69.4) and middle aged adults (67.9). The elderly accounted the highest proportion of deaths among all types of road users (8.4, 11.4 and 17.4 in drivers, car occupants and pedestrians respectively).

Among those wearing safety equipments we found significantly lower proportion for each type of injury in drivers and significantly lower proportion of

DISCUSSION

A huge number of persons, equivalent to 1.6% of the Romanian population were involved in traffic accidents during the study period, two third of them as drivers. More than half of these persons suffered injuries of different severity (from fatal to slight injuries). Lowest probability to die and to be seriously injured was seen in drivers, and highest in pedestrians, with significant difference among groups (Table 5).

The pedestrians accounted almost double proportion of road fatalities in Romania compared to EU (37% versus 20% respectively) [15].

Males accounted for 75% of persons involved in traffic accidents. They had almost equal proportion to females among car occupants and pedestrians, but they accounted for 90% of the drivers. Also 75% of the deaths occurred in males, which is consistent to other reports [1, 16] and males had a significantly higher probability to die or to be severely injured compared to females, even they were drivers, car occupants or pedestrians.

By age category, more than half of the persons involved in traffic accidents were young or middle aged adults (54.5% and 29.4% respectively), but we also found children (9.1%) and elderly (7%). Half of the children and elderly were pedestrians (52.3 and 53.5%

Table 6. Proportion of road users in each age categories.

	Drivers		Car occupants		Pedestrians		Total by age group	
	No	%	No	%	No	%	No	%
Children	5129	16.3	9902	31.4	16464	52.3	31495	100
Young adults	136172	72.5	35621	19.0	15904	8.5	187697	100
Middle aged	66541	65.8	16023	15.8	18636	18.4	101200	100
Elderly	7871	32.7	3327	13.8	12877	53.5	24075	100

respectively), but most of young and middle aged adults were drivers (72.5 and 65.8% respectively) (Table 6). The elderly accounted the highest proportion of deaths in all road user groups.

Wearing safety equipments was associated to a significantly lower probability to be injured in both drivers and car occupants (no significance for serious injuries in car occupants), but wearing safety equipments was more common in drivers and car occupants from the right front seat; car occupants from the rear seats had around 4 times lower proportion of wearing safety belts.

In relation to culpability, more than half of those involved in traffic accidents didn't have any guilt for the accident. The proportion of non-culpable was the lowest in dead subgroup and increased in seriously and slightly injured. However, 40.8% of those dying and 51.9% of those getting a severe injury in a road accident didn't have any guilty for the accident, which is a very alarming finding and a strong argument for enforcing the rules.

We didn't consider the causes of traffic accidents, the vehicle type, the type of road, seasonality or weather condition in our analysis, which is a limitation of the study. We also didn't differentiate the type/severity of serious injuries or their long term consequences, that may have a wide variation (from death after more than 30 days or permanent disability to complete recovery).

CONCLUSION

The number of traffic accidents registered in Romania had an increasing trend until 2008 and has

started to decrease since then, but didn't reach yet the values from 2005. A similar trend was shown in victims, only the number of deaths being slightly lower than in 2005. Overall, too many persons are involved in traffic accident in Romania, and too many of them still die or are seriously injured, as a consequence of a traffic accident. The decreasing trend registered in European Union is not yet visible in our country.

Most of the persons involved in traffic accidents are males and young adults; also more than half of those involved in traffic accidents are drivers. By reverse, most vulnerable are pedestrians, among whom a quarter are children and a fifth are elderly.

Despite all the awareness actions on the protection provided by safety equipments and despite the obligations stipulated by law, still too less people wear these equipments, especially among the car occupants from the rear seats. Last, but not least, almost half of those involved in traffic accidents doesn't have any culpability.

All these figures show that only undertaking the EU legislation in our country is not enough for reducing the deaths and injuries by traffic accidents. A coordinated national strategy is necessary for halving the traffic deaths in the next decade, 2011 – 2020. There was an attempt to promote a national road safety strategy as a government decision [15]. Finalizing and assuming such a document by the Government would create a coherent framework to control the road safety as a public health problem.

All the authors had equal contribution.

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