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ROAD SAFETY IN THE EU: COMPARISONS IN THE PERIOD 2001-2016

Summary. This article presents traffic safety statistics in the area of the EU. Changes in the number of deaths and injuries and the number of accidents have been reported since 2001, given the initiatives taken since this year to implement safety improvement programmes. The statistics on traffic accidents and the number of deaths in each EU country are presented. The situation concerning Poland among the EU countries is also presented by creating a classification that takes into account additional reference factors.

Keywords: road traffic safety; statistics of accidents and fatalities

1. INTRODUCTION

Safety is one of the six main aspects of the negative impact of transport (the others being congestion, energy intensity, land use intensity, noise emissions and noise) [2-4,12,13]. In many EU documents and guidelines, attention is drawn to the need to improve transport systems in terms of improving safety. The EU's road safety objectives and strategies have been defined, among others, in the following documents: *Keep Europe Moving - Sustainable Mobility for Our Continent. Mid-term Review of the European Commission's 2001 Transport White Paper* [5], *Saving 20 000 Lives on Our Roads: A Shared Responsibility* and the *Report on the European Road Safety Action Programme: Halving the Number of Road Accident*

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Victims in the European Union by 2010 - A Shared Responsibility [6]. Changes in this area are visible across the EU, but there are still too many fatalities on the roads.

The article aims to highlight the changes made in order to improve road safety in the EU from 2001 to 2016. 2001 was chosen as the reference point for the actions taken in this regard, while 2008 was chosen as a stage when the implemented actions would be reviewed. As another eight years have passed since then, another summary in this respect is justified. Therefore, the statistics show the number of killed and injured people, and road accidents, while referring to the factors related to individual EU countries. In the second part of the article, countries are classified according to different factors, while the situation in Poland is presented.

2. ROAD SAFETY STATISTICS

Between 2001 and 2016, significant changes in traffic safety statistics are visible (Figs. 1-6 and Table 1). Significant improvements in safety have been observed in most EU countries. The largest decrease in the number of killed people is in Lithuania (72.8% in comparison with 2001). At the same time, the number of accidents (Spain, Bulgaria, Malta and Luxembourg) and injured people (Bulgaria, Malta and Luxembourg) has increased in several countries. The problem of improving safety is still valid.

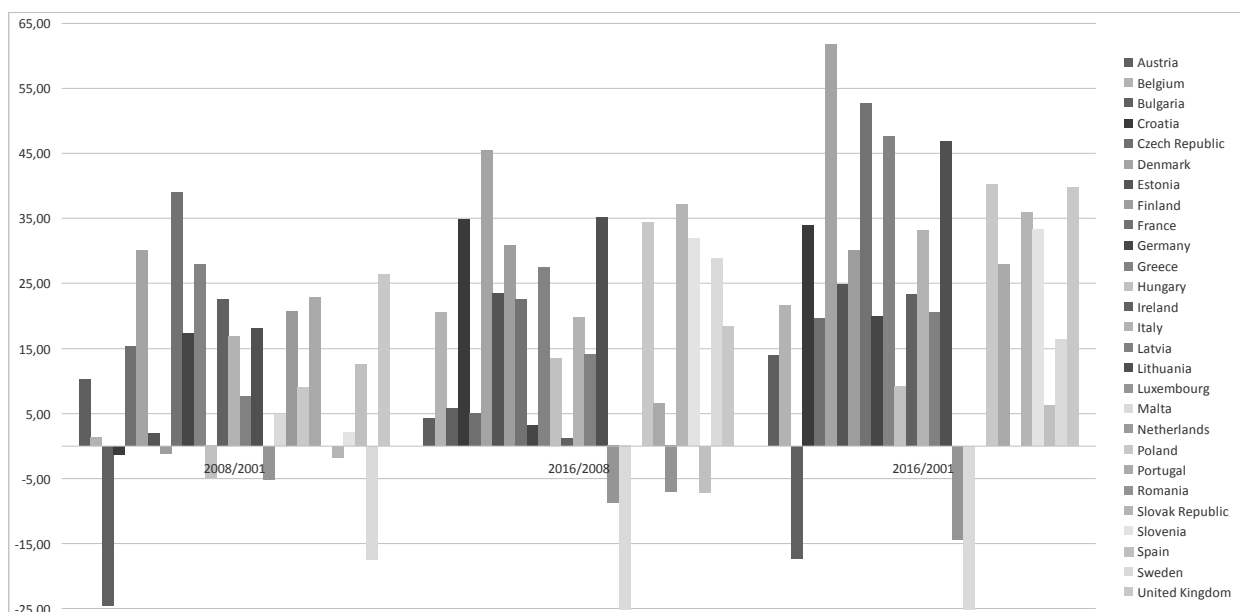


Fig. 1. Reduction in road injuries in EU countries in 2008 compared to 2001, 2016 compared to 2008, and 2016 compared to 2001 (in %); own research based on [7,9-11]

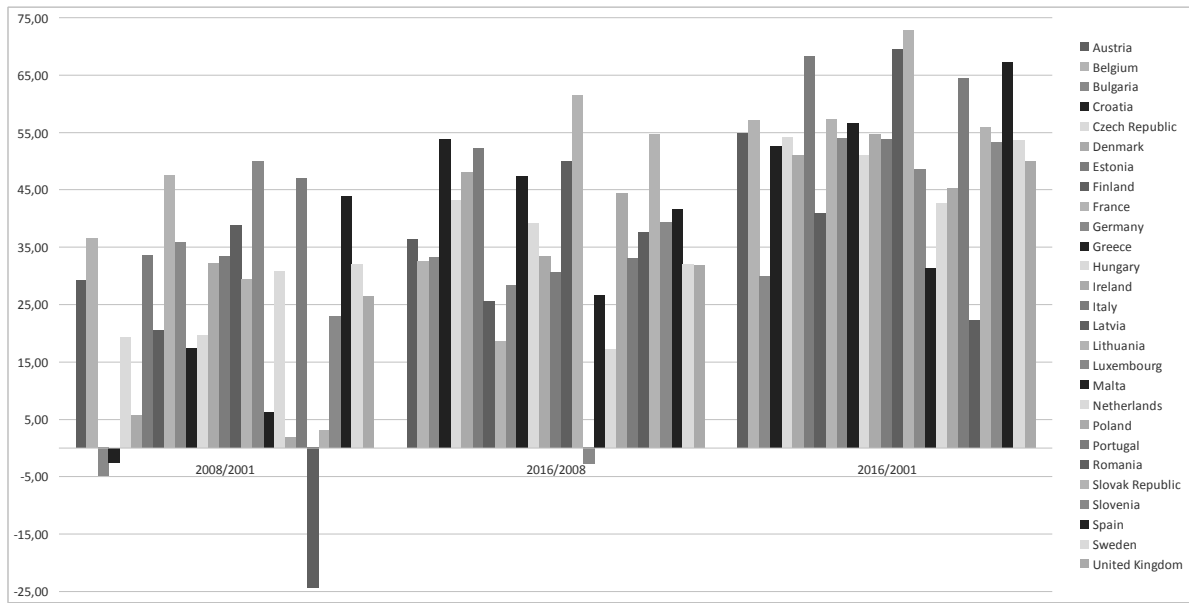


Fig. 2. Reduction in road fatalities in EU countries in 2008 compared to 2001, 2016 compared to 2008, and 2016 compared to 2001 (in %); own research based on [7,9-11]

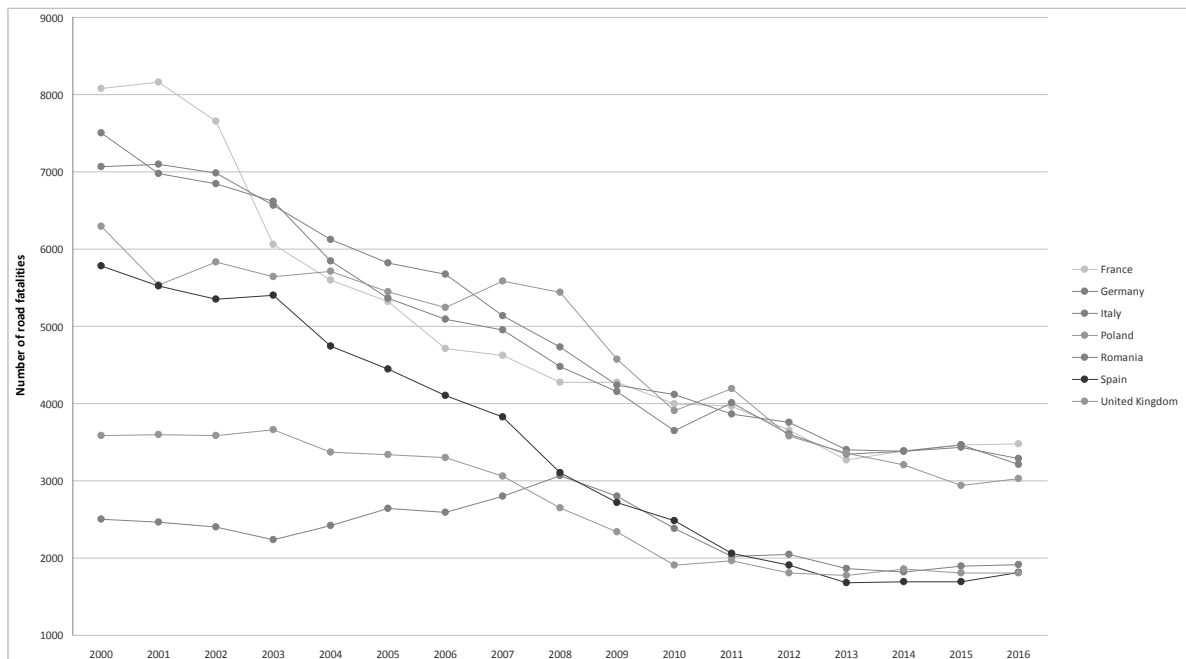


Fig. 3. Reduction in road fatalities for selected EU countries in the period 2000-2016 (in terms of the number of road fatalities); own research based on [7,9-11]

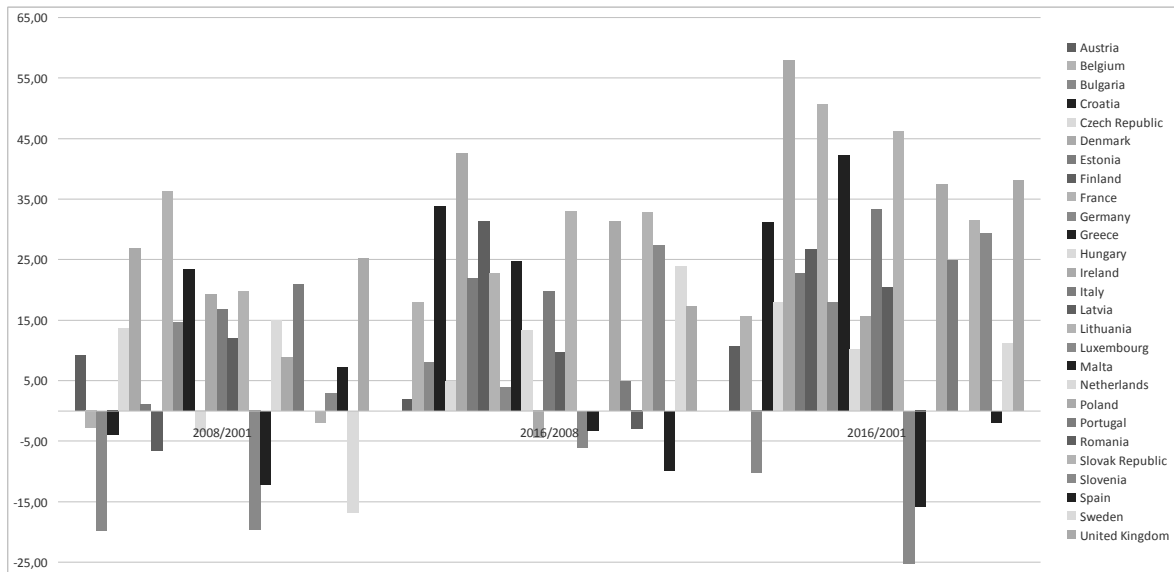


Fig. 4. Reduction in road accidents in EU countries in 2008 compared to 2001, 2016 compared to 2008, and 2016 compared to 2001 (in %); own research based on [7,9-11]

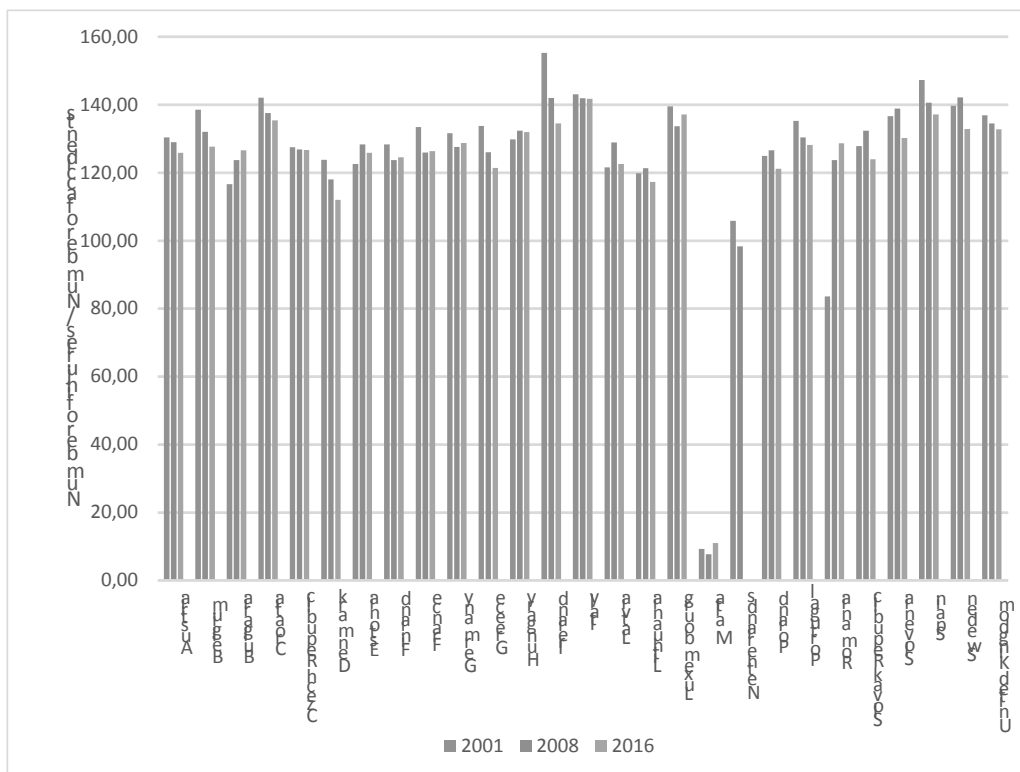


Fig. 5. Ratio of the number of injuries persons per 100 accidents in EU countries in 2001, 2008 and 2016; own research based on [11]

For the data collected, the total reduction in the number of road deaths in 2016 (in relation to 2001) reached 30,000 people. In all the countries analysed, there was also a decrease in the seriousness of accidents (the number of deaths attributable to traffic accidents; Fig. 6).

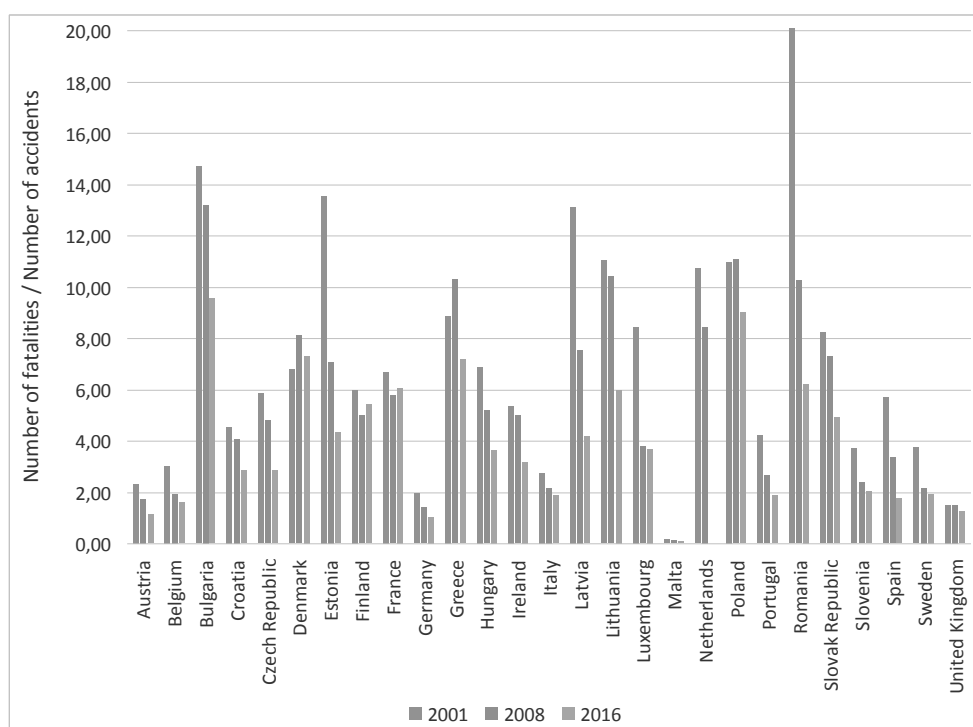


Fig. 6. Reduction in road accidents in EU countries in 2008 compared to 2001, 2016 compared to 2008, and 2016 compared to 2001 (in %); own research based on [11]

Table 1 shows changes in the number of deaths in terms of population in each EU country. In 2016, these values were, respectively, for the number of injuries in the range 0.57-5.57, for the number of killed in the range 0.03-0.08, and for the number of accidents in the range 0.50-4.43.

Tab. 1
Road safety in EU countries in relation to the number of inhabitants: comparison for 2001, 2008 and 2016

Country	Number of injuries per 1,000 inhabitants			Number of fatalities per 1,000 inhabitants			Number of accidents per 1,000 inhabitants		
	2001	2008	2016*	2001	2008	2016*	2001	2008	2016*
Austria	7.00	6.07	5.57	0.12	0.08	0.05	5.36	4.71	4.43
Belgium	6.35	6.02	4.53	0.14	0.09	0.06	4.61	4.56	3.54
Czech Republic	3.30	2.74	2.57	0.13	0.10	0.06	2.55	2.16	2.03
Denmark	1.58	1.08	0.57	0.08	0.07	0.04	1.28	0.91	0.50
Estonia	1.76	1.79	1.39	0.14	0.10	0.05	1.36	1.40	1.11
Finland	1.62	1.60	1.07	0.08	0.06	0.05	1.24	1.30	0.86
France	2.51	1.46	1.09	0.13	0.07	0.05	1.91	1.16	0.86
Germany	6.01	4.98	4.83	0.08	0.05	0.04	4.56	3.90	3.75
Greece	2.42	1.72	1.28	0.17	0.14	0.08	1.81	1.36	1.05
Hungary	2.37	2.53	2.23	0.12	0.10	0.06	1.82	1.91	1.69
Ireland	2.64	1.76	1.68	0.11	0.06	0.04	1.79	1.24	1.25
Italy	6.55	5.28	4.11	0.12	0.08	0.05	4.62	3.72	2.90
Latvia	2.50	2.48	2.36	0.22	0.15	0.08	2.04	1.93	1.93
Lithuania	2.05	1.82	1.30	0.20	0.16	0.07	1.72	1.50	1.11

Luxembourg	2.67	2.54	2.37	0.16	0.07	0.06	1.75	1.90	1.73
Netherlands	0.69	0.53		0.07	0.05	0.04	0.65	0.54	
Poland	1.78	1.63	1.07	0.14	0.14	0.08	1.41	1.29	0.89
Portugal	5.48	4.15	3.95	0.16	0.08	0.06	4.10	3.18	3.08
Slovak Republic	2.02	2.05	1.28	0.12	0.11	0.05	1.52	1.55	1.03
Slovenia	6.36	6.14	4.10	0.14	0.11	0.06	4.62	4.42	3.15
Spain	3.66	2,85	3,02	0.14	0.07	0.04	2.46	2.03	2.20
Sweden	2.51	2.85	1.89	0.07	0.04	0.03	1.78	2.00	1.43
UK	5.46	3.85	2.98	0.06	0.04	0.03	4.00	2.86	2.24

* Data for Ireland, Luxembourg, Portugal and the UK are from 2015 (in the entire paper)

3. COMPARING POLAND WITH OTHER EU COUNTRIES IN TERMS OF ROAD SAFETY FACTORS

In Poland, road safety measures have implemented over a long period. The report, *Traffic Safety in Poland*, from 1992 is considered one of the major steps in this regard [1], leading to related initiatives at various levels. According to the GAMBIT 2000 (Integrated Road Safety Programme, which was implemented in 2001, the aim was to reduce the number of traffic fatalities to 3,500 people a year by 2010, and 2,800 people per year by 2013 [8]. Unfortunately, Poland failed to achieve these goals, although it must be admitted that the number of people killed in Poland has decreased significantly.

In 2016, Poland ranked fourth among EU countries in terms of the number of road deaths (Fig. 7). This represents major progress because, for many years, it was in first place. It should be noted that improved safety is evident, despite the increase in road density (Fig. 8) and the number of passenger cars per 1,000 inhabitants (Fig. 9).

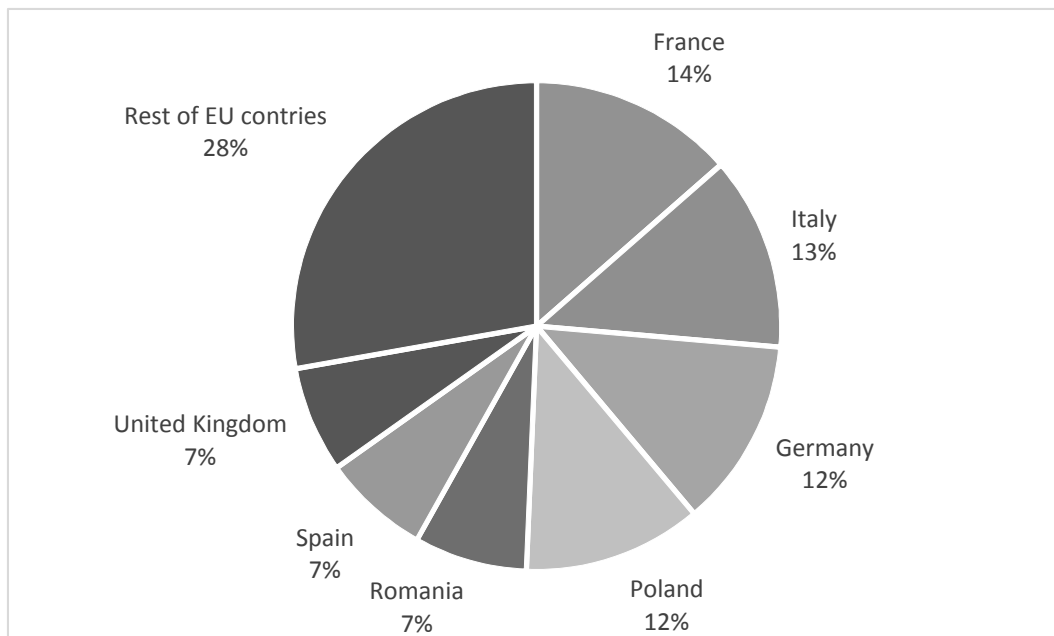


Fig. 7. Distribution of road fatalities in EU countries in 2016 (in %); own research based on [11]

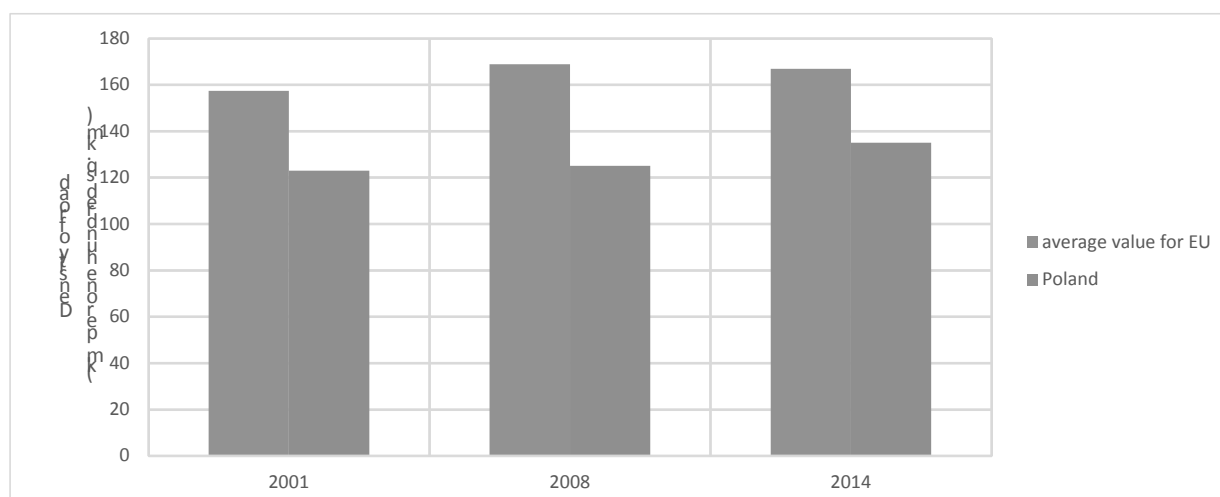


Fig. 8. Road density in all EU countries and in Poland in 2016; own research based on [11]

Tables 2-16 present various classifications for EU countries depending on the criteria in the field of road safety. As can be seen from the list in Tables 4 and 10, Poland was ranked fifth in terms of reducing the number of injuries and sixth in terms of reducing the number of accidents among EU countries. Unfortunately, the reduction in the number of deaths is no longer so high (Table 7), having reached 45.32% in 2001 (compared with 2001), while the maximum value for this statistic is 72.80%.

Tab. 2
Classification of EU countries in relation to a reduction in road injuries in 2008, compared to 2001 (in %)

France	38.90
Denmark	30.03
Greece	27.82
UK	26.34
Portugal	22.90
Ireland	22.51
Netherlands	20.66
Lithuania	18.09
Germany	17.33
Italy	16.75
Czech Republic	15.37
Spain	12.47
Austria	10.21
Poland	8.94
Latvia	7.59
Malta	4.77
Slovenia	2.08
Estonia	1.84
Belgium	1.31

Tab. 3
Classification of EU countries in relation to a reduction in road injuries in 2016, compared to 2008 (in %)

Denmark	45.50
Slovak Republic	37.13
Lithuania	35.24
Croatia	34.82
Poland	34.35
Slovenia	31.86
Finland	30.84
Sweden	28.90
Greece	27.53
Estonia	23.48
France	22.55
Belgium	20.56
Italy	19.81
UK	18.37
Latvia	14.05
Hungary	13.53
Portugal	6.54
Bulgaria	5.81
Czech Republic	4.98

Tab. 4
Classification of EU countries in relation to a reduction in road injuries in 2016, compared to 2001 (in %)

Denmark	61.87
France	52.68
Greece	47.69
Lithuania	46.95
Poland	40.22
UK	39.87
Slovak Republic	35.96
Croatia	33.93
Slovenia	33.28
Italy	33.25
Finland	30.00
Portugal	27.94
Estonia	24.89
Ireland	23.30
Belgium	21.60
Latvia	20.57
Germany	19.83
Czech Republic	19.58
Sweden	16.42

Finland	-1.21
Croatia	-1.37
Slovak Republic	-1.85
Hungary	-5.05
Luxembourg	-5.18
Sweden	-17.55
Bulgaria	-24.65

Austria	4.21
Germany	3.03
Ireland	1.02
Spain	-7.21
Luxembourg	-8.80
Malta	-46.93

Austria	13.99
Hungary	9.16
Spain	6.16
Luxembourg	-14.43
Bulgaria	-17.41
Malta	-39.92

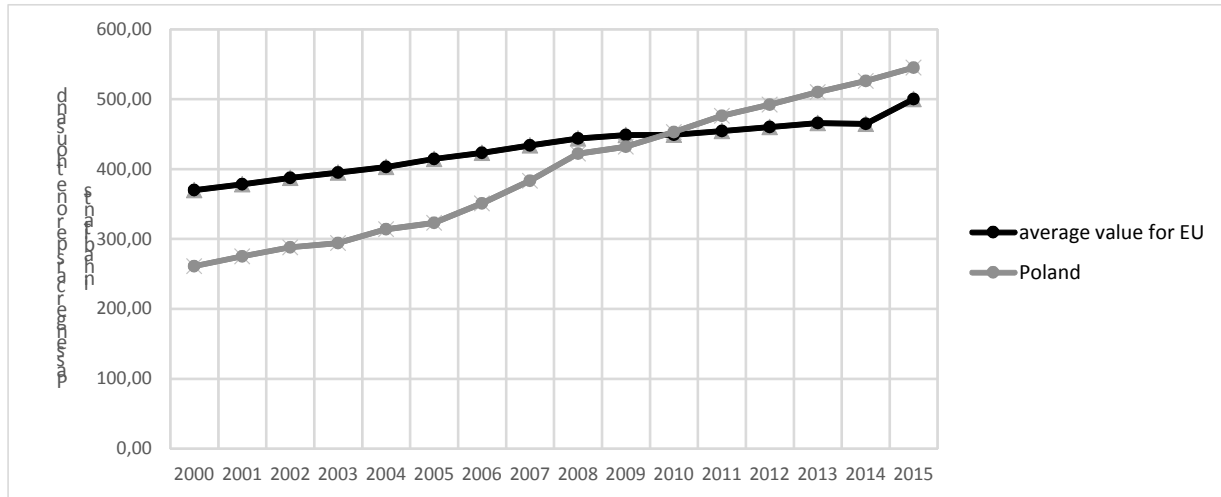


Fig. 9. Passenger cars per 1,000 inhabitants in EU countries and in Poland in 2000-2016; own research based on [11]

Tab. 5
Classification of EU countries in relation to a reduction in road fatalities in 2008, compared to 2001 (in %)

Luxembourg	50.00
France	47.61
Portugal	47.04
Spain	43.81
Latvia	38.88
Belgium	36.47
Germany	35.83
Estonia	33.67
Italy	33.41
Ireland	32.12
Sweden	31.90
Netherlands	30.75
Lithuania	29.32
Austria	29.12
UK	26.49
Slovenia	23.02
Finland	20.55

Tab. 6
Classification of EU countries in relation to a reduction in road fatalities in 2016, compared to 2008 (in %)

Lithuania	61.52
Slovak Republic	54.62
Croatia	53.77
Estonia	52.27
Latvia	50.00
Denmark	48.03
Greece	47.46
Poland	44.34
Czech Republic	43.22
Spain	41.61
Slovenia	39.25
Hungary	39.06
Romania	37.59
Austria	36.38
Ireland	33.33
Bulgaria	33.27
Portugal	32.99

Tab. 7
Classification of EU countries in relation to a reduction in road fatalities in 2016, compared to 2001 (in %)

Lithuania	72.80
Latvia	69.44
Estonia	68.34
Spain	67.19
Portugal	64.51
France	57.39
Belgium	57.13
Greece	56.60
Slovak Republic	56.00
Austria	54.91
Ireland	54.74
Czech Republic	54.20
Germany	54.05
Italy	53.73
Sweden	53.69
Slovenia	53.24
Croatia	52.55

Hungary	19.61
Czech Republic	19.34
Greece	17.39
Malta	6.25
Denmark	5.80
Slovak Republic	3.04
Poland	1.75
Croatia	-2.63
Bulgaria	-4.95
Romania	-24.54

Belgium	32.52
Sweden	31.99
UK	31.80
Italy	30.52
Germany	28.39
Malta	26.67
Finland	25.58
France	18.67
Netherlands	17.20
Luxembourg	-2.86

Denmark	51.04
Hungary	51.01
UK	49.86
Luxembourg	48.57
Poland	45.32
Netherlands	42.66
Finland	40.88
Malta	31.25
Bulgaria	29.97
Romania	22.27

Tab. 8
Classification of EU countries in relation to a reduction in road accidents in 2008, compared to 2001 (in %)

France	36.20
Denmark	26.83
UK	25.22
Greece	23.32
Portugal	20.95
Lithuania	19.69
Ireland	19.24
Italy	16.78
Netherlands	14.91
Germany	14.58
Czech Republic	13.62
Latvia	11.96
Austria	9.05
Poland	8.82
Spain	7.20
Slovenia	2.84
Estonia	1.01
Slovak Republic	-1.98
Belgium	-2.92
Hungary	-3.62
Croatia	-4.00
Finland	-6.67
Malta	-12.23
Sweden	-16.88
Luxembourg	-19.77
Bulgaria	-19.91

Tab. 9
Classification of EU countries in relation to a reduction in road accidents in 2016, compared to 2008 (in %)

Denmark	42.59
Croatia	33.80
Lithuania	33.01
Slovak Republic	32.85
Poland	31.37
Finland	31.26
Slovenia	27.33
Greece	24.73
Sweden	23.89
France	22.78
Estonia	21.99
Italy	19.72
Belgium	17.88
UK	17.31
Hungary	13.28
Latvia	9.63
Bulgaria	7.97
Portugal	4.94
Czech Republic	4.87
Germany	3.89
Austria	1.80
Malta	-3.31
Ireland	-4.50
Luxembourg	-6.04
Spain	-9.88

Tab. 10
Classification of EU countries in relation to a reduction in road accidents in 2016, compared to 2001 (in %)

Denmark	57.99
France	50.73
Lithuania	46.20
Greece	42.29
UK	38.17
Poland	37.43
Italy	33.18
Slovak Republic	31.52
Croatia	31.15
Slovenia	29.39
Finland	26.68
Portugal	24.85
Estonia	22.78
Latvia	20.44
Germany	17.90
Czech Republic	17.83
Ireland	15.60
Belgium	15.49
Sweden	11.05
Austria	10.70
Hungary	10.15
Spain	-1.96
Bulgaria	-10.36
Malta	-15.94
Luxembourg	-27.00

Tables 11-13 show the indicators related to road safety in EU countries for 2016. Only in one case (Table 12) is Poland in the first 10 among EU countries.

Tab. 11
Classification of EU countries in relation to the number of road injuries per 1,000 km² of the country surface in 2016

Malta	5,379.75
Belgium	1,687.99
Germany	1,109.94
Italy	844.33
UK	800.46
Austria	587.23
Luxembourg	521.27
Portugal	444.08
Slovenia	419.76
Czech Republic	350.70
Spain	279.50
Croatia	257.91
Hungary	235.80
Romania	165.95
Slovak Republic	141.55
Poland	133.14
France	114.73
Ireland	114.63
Greece	105.31
Bulgaria	84.52
Denmark	75.20
Latvia	74.71
Lithuania	60.14
Sweden	45.82
Estonia	42.25
Finland	19.38

Tab. 12
Classification of EU countries in relation to the number of road fatalities per 1,000 km² of the country surface in 2016

Malta	34.81
Belgium	21.01
Netherlands	18.43
Luxembourg	13.92
Italy	11.12
Poland	9.88
Germany	8.97
Romania	8.02
Czech Republic	7.91
UK	7.44
Hungary	6.52
Slovenia	6.45
Portugal	6.43
Bulgaria	6.38
Greece	6.24
Slovak Republic	5.61
France	5.49
Croatia	5.42
Austria	5.24
Denmark	4.92
Spain	3.60
Lithuania	3.06
Ireland	2.72
Latvia	2.54
Estonia	1.45
Finland	0.84

Tab. 13
Classification of EU countries in relation to the number of road accidents per 1,000 km² of the country surface in 2016

Malta	49,063.29
Belgium	1,322.17
Germany	862.24
UK	602.87
Italy	595.67
Austria	466.77
Luxembourg	380.12
Portugal	346.46
Slovenia	322.41
Czech Republic	276.95
Spain	203.79
Croatia	190.46
Hungary	178.73
Romania	128.99
Slovak Republic	114.24
Poland	109.94
France	90.85
Greece	86.78
Ireland	85.26
Denmark	67.14
Bulgaria	66.76
Latvia	60.95
Lithuania	51.28
Sweden	34.49
Estonia	33.57
Finland	15.56

Tables 14-16 refer to the number of dead and injured, as well as the number of road accidents in relation to the number of registered vehicles in the country. With respect to the number of killed, Poland ranks fifth (for 2016). However, among the countries analysed in relation to the number of injuries and accidents, Poland was significantly below the average.

Tab. 14
Classification of selected EU countries in relation to the number of road injuries per 1,000 passenger cars in 2015

Austria	10.07
Belgium	9.23
Germany	8.84
Slovenia	8.01

Tab. 15
Classification of selected EU countries in relation to the number of road fatalities per 1,000 passenger cars in 2015

Hungary	0.20
Lithuania	0.19
Greece	0.16
Czech Republic	0.15

Tab. 16
Classification of selected EU countries in relation to the number of road accidents per 1,000 passenger cars in 2015

Austria	8.07
Belgium	7.18
Germany	6.87
Slovenia	6.06

Italy	6.62
Hungary	6.53
UK	6.22
Spain	6.01
Czech Republic	5.58
Sweden	4.21
Luxembourg	3.62
Lithuania	2.86
Greece	2.76
France	2.23
Finland	1.97
Poland	1.92
Denmark	1.35

Poland	0.14
Belgium	0.13
Slovenia	0.11
France	0.11
Austria	0.10
Luxembourg	0.10
Italy	0.09
Finland	0.08
Netherlands	0.08
Germany	0.08
Denmark	0.08
Spain	0.08
UK	0.06
Sweden	0.06

Hungary	5.11
UK	4.69
Italy	4.68
Czech Republic	4.46
Spain	4.37
Sweden	3.15
Luxembourg	2.64
Lithuania	2.42
Greece	2.24
France	1.78
Finland	1.59
Poland	1.59
Denmark	1.22

4. CONCLUSION

The actions taken by individual EU countries during the past 16 years have brought about improved road safety. A reduction in the number of road deaths is clear across all countries. However, compared to initial expectations, the improvement in road safety is progressing too slowly. That said, the Polish situation, compared to other EU countries, has improved. Poland is no longer among the three worst countries with the highest number of deaths during the year. However, the classification of countries according to different factors demonstrates the need for more intensive efforts in this regard.

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