

THE ANALYSIS OF ROAD ACCIDENTS AND SELECTED ASPECTS OF POLISH ROAD SAFETY

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Abstract: The objective of the study is to conduct an analysis of road accidents and selected elements of the level of road transport safety in Poland. The paper accounts for factors that have an impact on the safety situation of the Polish roads, i.e. division into provinces (*województwa*), days of the month, times of the day, days of the week, and types of roads. The paper concludes by stating that road traffic participants being more responsible and more imaginative could reduce the number of accidents. Other key factors affecting road safety are the design, construction and maintenance of modern road infrastructure.

Keywords: road accidents, road safety.

1. Introduction

Road transport is crucial to the economy and social well-being of Poland. The characteristic features of road transport are: convenient access to destination, high flexibility, rapidness and timeliness with respect to accommodating customers' needs and service reliability (Kisperska-Moroń, and Krzyżaniak, 2009).

Road transport plays a major role in Poland due to the fact that a large number of loads are carried by trucks because of just-in-time logistics. What is more, there is extensive international traffic through Poland of vehicles carrying goods or people via the North-South and West-East transit corridors that pass through Poland. Indeed, according to the data of the Headquarters of the Border Forces, 12,435,345 vehicles, including 9,970,787 passenger cars, crossed external EU borders to enter Poland in 2018.

Road structure has always served its users as a foundation of comfortable and fast transport, which makes its durability and stability so important (Targosz, and Wiederek, 2019).

One of the most crucial issues Poland needs to tackle now is the continuously low level of road transport safety. Two causes are at fault for the situation. The first reason is an increase in

the number of passenger cars and truck and trailers. The second is too slow an improvement in road infrastructure (Caban et al., 2015). Statistic data demonstrate that we can observe increasing intensification of road traffic in Poland. This is further confirmed by the growing number of vehicles registered in Poland – the increase in the year 2018 was by ca. 40% when compared to the year 2010. This surge indicates society's growing mobility.

The State road infrastructure still requires large investment in the development and maintenance of the existing road network to a high standard in order to meet the needs of the market which result from growing goods exchange and ever increasing passenger traffic. Even though the state road network constitutes merely 4.7% of all public road networks, it carries over 60% of the country's traffic. Therefore, systemic improvement of the technical condition of the Polish state road network is required so that the basic limitations are eliminated and its expansion is feasible. The most important flaws of the Polish road network are, above all:

- lack of coherent network of motorways and express roads,
- non-conformity of roads to the requirement for 115 kN per axle, in accordance with the EU Accession Treaty,
- high intensity traffic, including lorries, affecting built environments found along road axis (State Road Construction Program for the years 2014-2023 (with a 2025 perspective).

A well-developed, modern network of motorways, express roads and carriageways preconditions the economic and social success of developed countries. In First World and Second World states, the increase in the development of such road types is highly accelerated. The phenomenon can also be observed in Poland, especially following Poland's accession into the EU (Targosz, and Wiederek, 2019). In accordance with GDDKiA, in the year 2018, in Poland, 421.4 km of new roads were made available to users. Nowadays, drivers have 3730.7 km of carriageways, including 1638.5 km of motorways and 2092.2 km of express roads to utilize.

Man ranks first when it comes to factors having a major impact on road traffic safety and is also a leading causative factor behind road accidents, for it is user behaviour indeed which has the most effect on road accidents, and researchers such as Klauer et al. (2006; Young, and Lenné, 2010), have demonstrated that the factor having the greatest impact on road safety is the human factor. The remaining factors (i.e. vehicle and road condition) are of minor importance.

According to a study conducted in the United States of America and in the United Kingdom, human-related errors accounted for as many as 93-94% of the total number of accidents, including 57-65% of all accidents caused by improper road user conduct alone and 30% of all cases where driver misconduct was one of two or three causes of the accident (Brożyna, 2017).

Yet another cause of road accidents is speeding. Next, it is alcohol abuse i.e. drunk drivers. Despite multiple prevention campaigns conducted amongst drivers and other road traffic participants, the Polish Police Headquarters recorded 22,268 cases of stopping drivers under the influence of alcohol, and 87,137 drunk drivers being charged in the year 2017. Such a high number of persons apprehended due to alcohol use continues to terrify and shows how unimaginative (i.e. 'stupid') drivers can be (Cybulska, and Krajewska, 2018). Other reasons for Poland's abysmal level of road safety are that penalties for traffic offences are low and there is a lack of awareness of road traffic participants with respect to the possible consequences of their behaviour (Staniewska, and Nonas, 2015). For example, according to a study conducted in the National Institute of Child Health and Human Development (NICHD), during ca. 10% of driving time, drivers did not have their eyes on the road because they were distracted by other activities (Klauer et al., 2014).

In addition to human injury or losses, it is estimated that, on average, the annual cost arising from road accidents in every country is between 1.5% to as much as 2.55% of the GDP. The cost of accidents is also the most substantial part of all external costs generated by road transport (nearly 40%) (Jażdżik-Osmólska, 2018).

The study presents an analysis of road accidents and selected elements of the safety situation of road transport within Poland. The presented analysis was drawn up on the basis of existing reports on road traffic safety composed by the appropriate state authorities. Final data analyses were based on tabular-descriptive and graphic methods.

2. Road accidents in Poland and EU

An accident means any unintended breach of binding traffic safety regulations in land traffic that results in the death of one of the participants in the accident or bodily injury resulting in body organ impairment or health disorder lasting longer than 7 days. Road accident offences were penalised in Article 177 of the Penal Code aimed at the protection of traffic safety on the one hand, and human life and health on the other. Criminal liability for causing a road accident is possible if it has been established that a breach of traffic safety rules binding the offender under certain circumstances has led to the consequences defined in the Act. In order to portray the accident number tendency both in Poland and in the EU, the values have been compiled in Figure 1.

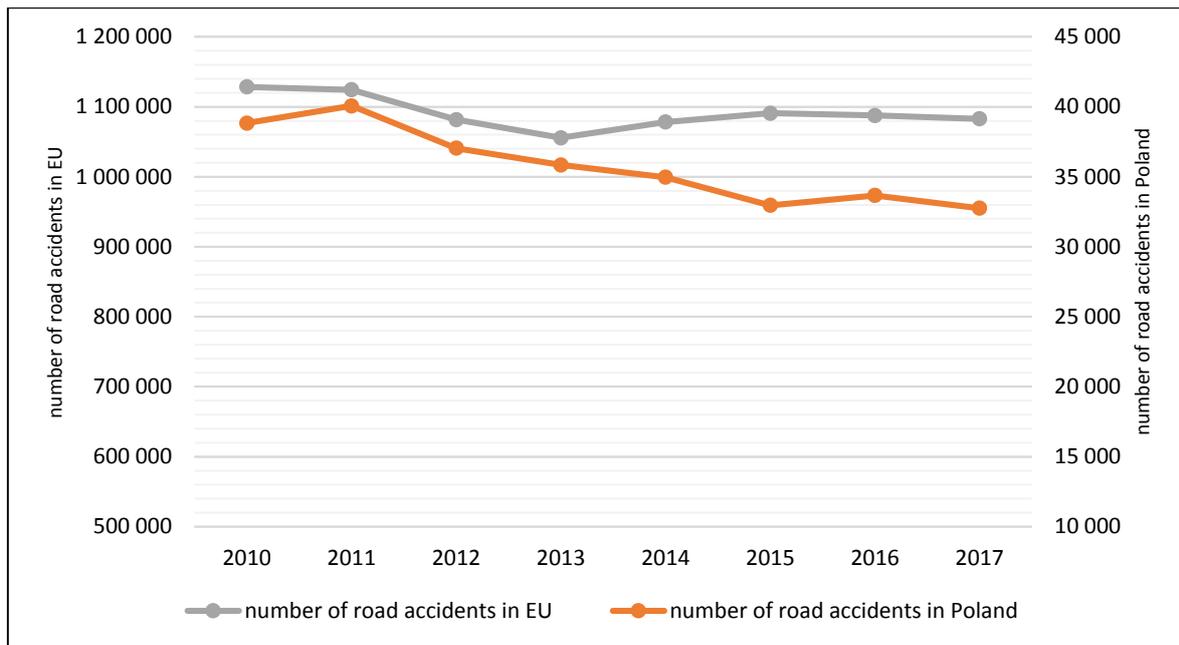


Figure 1. Number of road accidents in Poland and EU over the period 2010-2017. Own study compiled on the basis of the Polish Police Headquarters' report. Source: EPRS calculation based on CARE (EU road accidents database) or national publications as of December 2018.

Whether it is the EU or Poland, a downward trend in the numbers of accidents was observed over the period 2010-2017. The lowest level of the number of accidents in the EU was reported in 2013. In the years that followed, a slight increase in the number was noted, although the overall decreasing trend was preserved. In 2017, the number of road accidents in Poland was 16% less compared to the year 2010. Thus, the effects of actions promoting Polish road safety improvement are noticeable.

Despite the marked drop in the number of road accident in Poland and EU, the absolute figures remain alarming. Still, over the period 2010 and 2017, the number of fatalities on EU roads was reduced by approximately 19%, and the number of seriously injured by ca. 20%. In Poland, the figures were 27% and 19%, respectively (Figure 2, Figure 3). Throughout the analysed period, there was a drift compared to the preceding year. Nonetheless, the rate of changes in the long-term trend is too slow to reduce the main figure targets adopted in the National Programme of Road Security for the years 2013-2020, i.e. to limit the number of fatalities by 50% and the number of seriously injured by 40% (compared to the 2010 rates) by the year 2020.

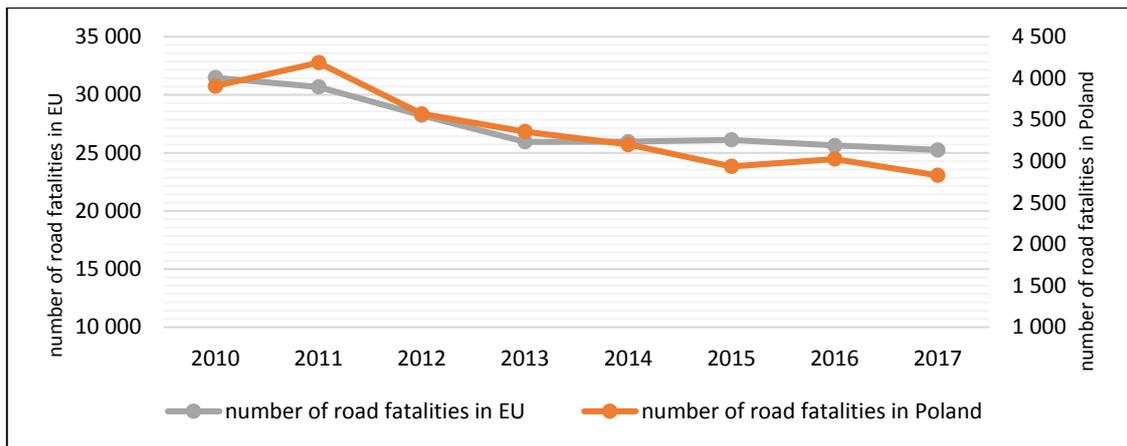


Figure 2. Number and trends of road fatalities in Poland and the EU over the period 2010-2017. Source: own study compiled on the basis of the Polish Police Headquarters' report. EPRS calculation based on CARE (EU road accidents database) or national publications as of December 2018.

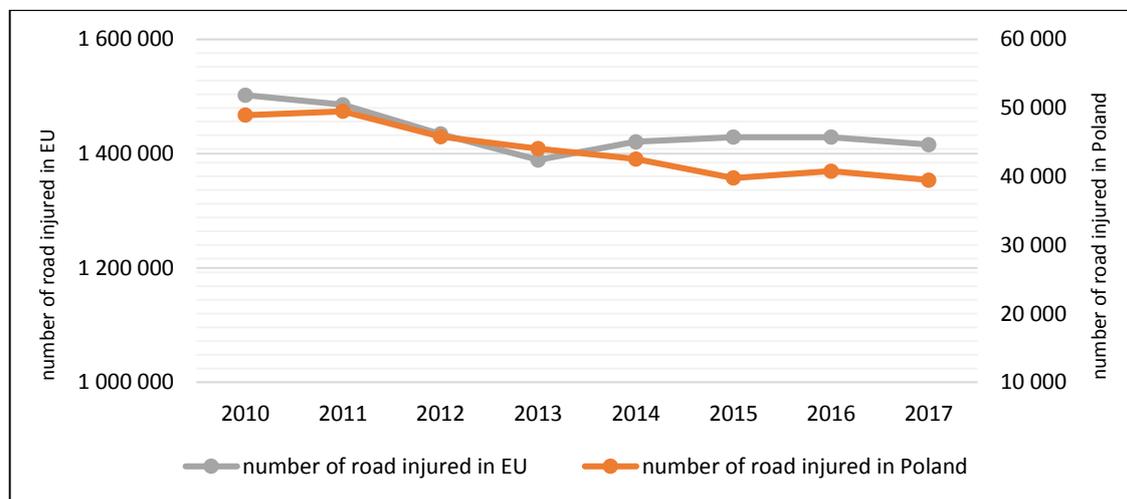


Figure 3. Number and trends of road injured in Poland and the EU over the period 2010-2017. Source: own study compiled on the basis of the Polish Police Headquarters' report. EPRS calculation based on CARE (EU road accidents database) or national publications as of December 2018.

2.1. Analysis of causes of road accidents

Road accidents in Poland may be assessed in terms of numerous factors: accident area, participating vehicles, weather conditions, time of the day, time of the month, etc. (Brożyna, 2017, p. 49). The following factors were taken into account in the research study: province (*województwo*), month, day of the week, time of the day/night, type of the road and offenders (Figure 4, Tables 1-3, Figures 5 and 6).

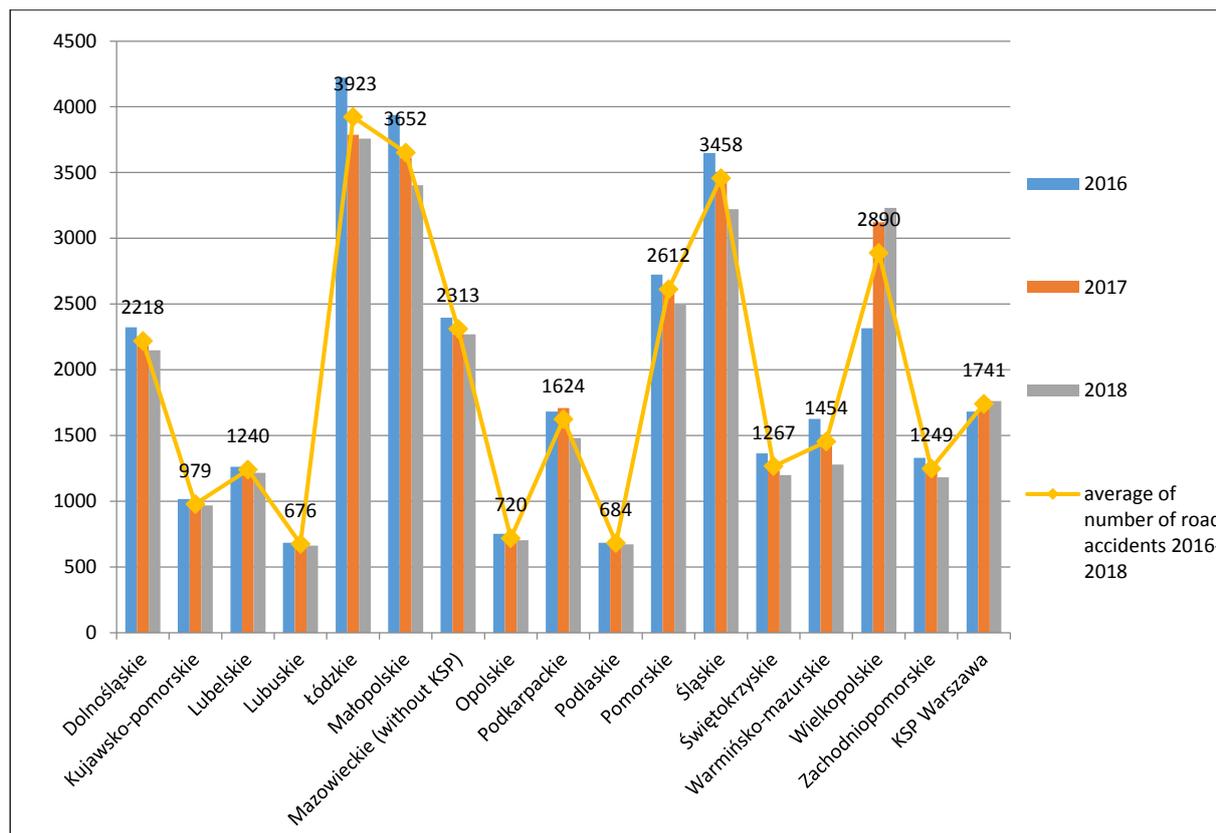


Figure 4. Number of accidents by province over the period 2016-2018. Source: own study compiled on the basis of the Polish Police Headquarters' report.

The analysis of Figure 4 reveals that during last three years (2016-2018), the least average of number of accidents were recorded in the Podlaskie, Opolskie and Lubuskie Provinces. The biggest average number of accidents, in turn, was noted in the Łódzkie, Małopolskie and Śląskie (Silesian) Provinces.

Table 1.

Structure of number of road accidents by months 2016-2018

	2016	2017	2018
January	6,04%	5,50%	6,63%
February	6,31%	5,52%	5,63%
March	6,23%	6,51%	6,28%
April	7,47%	7,11%	8,33%
May	9,29%	8,68%	9,66%
June	9,63%	9,95%	9,41%
July	9,83%	9,90%	9,56%
August	10,00%	9,85%	9,32%
September	9,36%	9,14%	9,49%
October	9,16%	10,05%	9,95%
November	7,87%	8,69%	7,24%
December	8,81%	9,11%	8,52%
Total	100%	100%	100%

Source: own study compiled on the basis of the Polish Police Headquarters' report.

Table 1 shows that most accidents are recorded in the autumn and summer months. The latter might be the effect of increased traffic intensity due to a holiday period. The former could be attributed to weather conditions, which immediately translate into road conditions and because of Poland's Day of the Dead.

Jurecki and Jaśkiewicz (2012) noted that the better the road conditions, the higher the number of accidents. Still many accidents could be avoided by greater driver awareness. In order to improve driving safety during the summer months, in addition to severe speed controls, for example, in 2007, the obligation to drive with headlights on 24 hours a day was introduced in Poland.

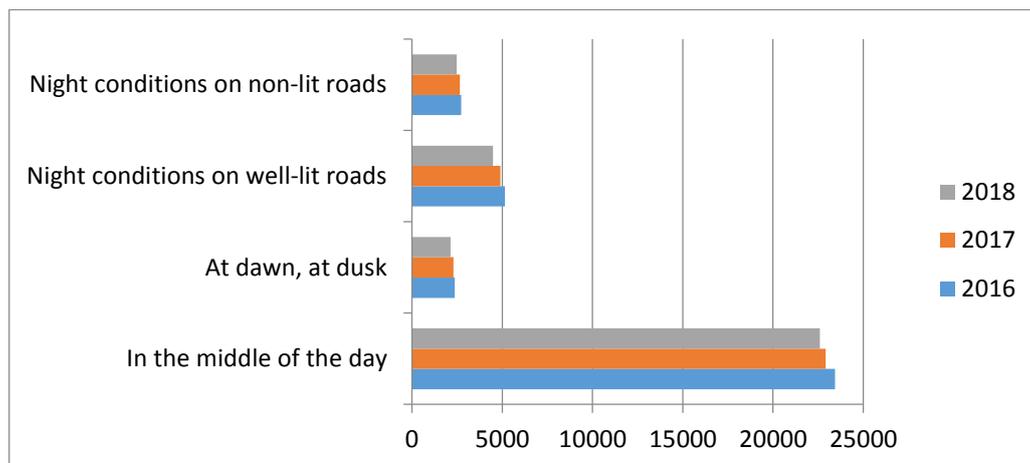


Figure 5. Number of accidents at different times of the day/night over the period 2016-2018. Source: own study compiled on the basis of the Polish Police Headquarters' report.

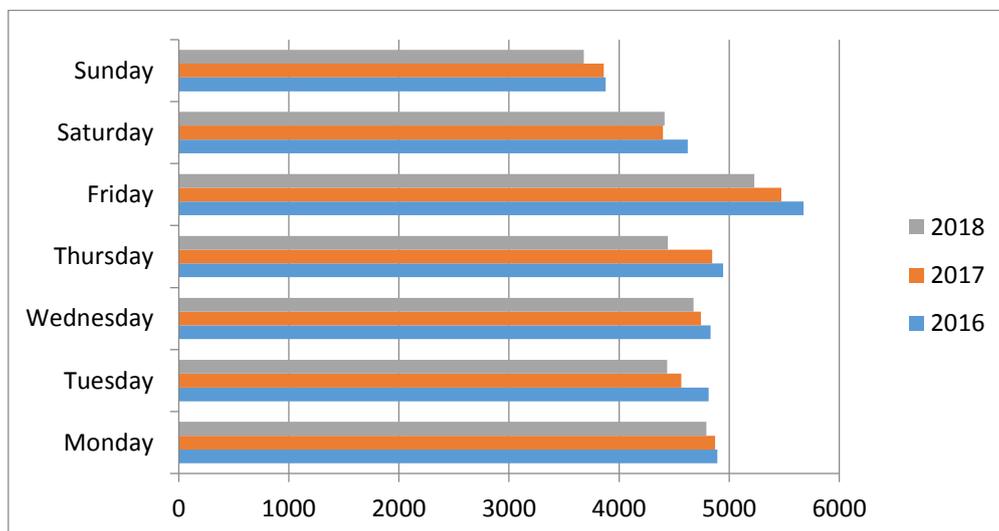


Figure 6. Number of accidents by days of the week 2016-2018. Source: own study compiled on the basis of the Polish Police Headquarters' report.

An examination of Figure 5 demonstrates that road accidents are most frequent in the middle of the day, which is the result of significantly heavier traffic than at other times of the day or night. Moreover, the analysis of the conditions at night indicate that more accidents happen on

well-lit roads. In the analysed period, Figure 6 shows that the most road accidents occurred on Fridays and the least on Sundays.

Table 2.

Structure of number of accidents by road type over the period 2016-2018

Road type	Years		
	2016	2017	2018
Motorway	1,23%	1,46%	1,37%
Express road	0,81%	1,12%	1,28%
Dual carriageways	13,82%	14,44%	13,94%
One-way street	3,13%	3,27%	3,70%
Single carriageway	81,01%	79,71%	79,71%

Source: own study compiled on the basis of the Polish Police Headquarters' report.

On the basis of the analysis of data presented in Table 2, it was determined that the most accidents were recorded on single carriageways, which accounted for approximately 80% of all accidents. The investigation into the individual years covered by the research also revealed a downward trend. The least number of accidents were noted on express roads, i.e. ca. 1.2% of all accidents.

In accordance with the data of the Polish Police Headquarters, the main causes of accidents on single carriageways are: failure to give way, maladjustment of speed to traffic conditions, failure to give way to a pedestrian at a pedestrian crossing, failure to maintain safe distance between vehicles and incorrect overtaking.

The major reasons behind the accidents occurring on dual carriageways are: failure to give way, maladjustment of speed to traffic conditions, failure to give way to a pedestrian at a pedestrian crossing, failure to maintain safe distance between vehicles.

Table 3.

Structure of number of road accidents by perpetration over the period 2016-2018

Accident perpetration	2016	2017	2018
Driver's fault	86,39%	86,57%	87,00%
Pedestrian's fault	7,27%	7,26%	6,69%
Passenger's fault	0,42%	0,40%	0,37%
Participation in fault	1,07%	1,13%	1,20%
Other causes	4,84%	4,65%	4,75%

Source: own study compiled on the basis of the Polish Police Headquarters' report.

The analysis of data presented in Table 3 demonstrates that most accidents were the fault of drivers (ca. 86.5% of all accidents). The next group contributing to accidents were pedestrians (ca. 7% of all accidents).

As per the information provided by the Polish Police Headquarters, the main causes of accidents by perpetration are: failure to give way, maladjustment of speed to traffic conditions, failure to give way to a pedestrian at a pedestrian crossing.

3. Summary

The issue of the road traffic safety situation continues to be an urgent and topical subject for multiple countries. Over the recent years, Polish road safety has improved considerably. Nonetheless, the number of fatalities and casualties is still too high. That is why, for many years, road safety has been a crucial element of a number of investment programmes and actions undertaken with a view to improving travelling conditions.

Statistical data demonstrate that even though the number of accidents, injured and fatalities has been falling across the European Union, the situation in Poland remains unsatisfactory. One negative factor affecting the insufficient decrease in the number of road accidents and casualties is the increasing quantity of motor vehicles on Polish roads. The growing availability of passenger cars and motorcycles results in rising figures of poorly skilled, yet overconfident drivers behind the wheel.

Most accidents were reported in provinces featuring high populations and increased traffic density. The analysis of the various times of the day reveals that the largest number of accidents was recorded in daytime. Given the road types, it can be said that the greatest number of accidents was reported on single carriageways, whereas least accidents occurred on highways (motorways). The conducted analysis also shows that most accidents occur on Mondays and Fridays, when the traffic is heaviest.

Despite improvements in the condition of Polish roads and the fact that more and more cars are fitted with proper safety systems, it is the human being – the road traffic user – who is to blame for the situation on the roads. Another crucial factor affecting road safety is the construction and maintenance of modern road infrastructure, for example, same level pedestrian crossings instead of pedestrian over-passes.

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