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Analysis of road accidents in Poland over the last ten years

Rafał S. Jurecki, Marek Jaśkiewicz

Kielce University of Technology, Department of Motor Vehicles and Transport
25-314 Kielce, Al. Tysiąclecia Państwa Polskiego 7, e-mail: {rjurecki;mjaskiewicz}@tu.kielce.pl

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Abstract

The following paper presents an analysis of the number of accidents, injuries and deaths over the last years. Accident trends have been identified in Poland with reference to different seasons. It includes an analysis of statistical data on both the number of vehicles, type of accidents occurring on roads and their causes. The evaluation of the road accidents' effects has been carried out.

Analysis of number of accidents and injured

Increase of the number of cars in Poland is very significant [1]. Within 30 years the number of all motor vehicles registered in Poland increased from less than 3 million (in 1981) to 17 million (in 2010) (Fig. 1) [2].

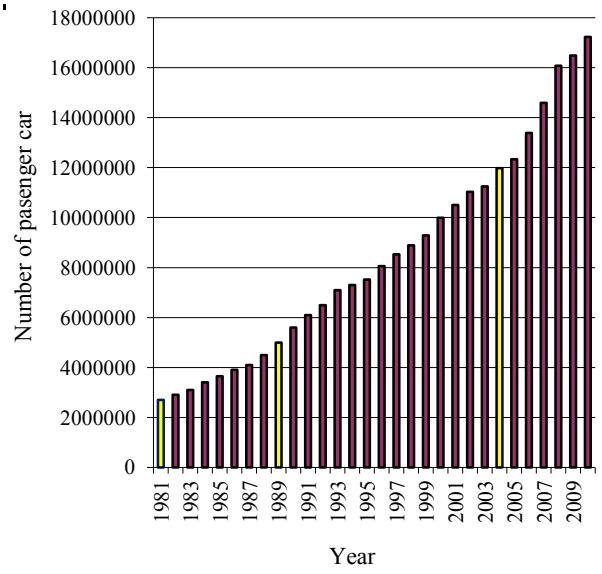

Fig. 1. Number of passenger cars registered in Poland in the years 1981–2010

Number of passenger cars in Poland increased from approximately 2.7 million units in 1981 to more than 17 million in 2009 – which is more than 6 times [2]. An important parameter describing the number of cars is an indicator, determining the number of cars per 1000 inhabitants. In 2010, the number of cars per 1000 Poles was over 450 [3] and has been approaching the European average. Its first significant increase occurred in 1989 just when there was a change of a political system in Poland. Another major impulse for a change in that indicator was 2004 – Polish accession to the EU [2]. At this period of time trade exchange was simplified and customs duties on cars imported from the EU was abolished. A very high growth rate of this indicator in 2005–2009 is worth observing. If such dynamics keeps its level for another few years, then in 2013–2014 anexpected value of this ratio would be at the level of 550–600.

If we apply the value of the above-mentioned indicator to the data from other countries, it follows from them that Poland is still in the group of countries with relatively low motorization rate [4]. In 2005 the EU average was 472, while in 2006, 466 (in Poland respectively values of 323 and 351). Poland in the year of joining the EU (2004) was the leading country concerning the dynamics in number of cars [5]. The size of the indicator in the new EU countries increases year to year, while in the "old EU" changes very little [4] or even decreases.

Number of road accidents in Poland in the years 1980–2010 underwent many changes (Fig. 2) [2]. At the turn of 1988–1991, i.e. in the first period after the change of a political system in Poland, it recorded first significant growth. Then, the number of accidents exceeded 50 thousand to reach in 1991

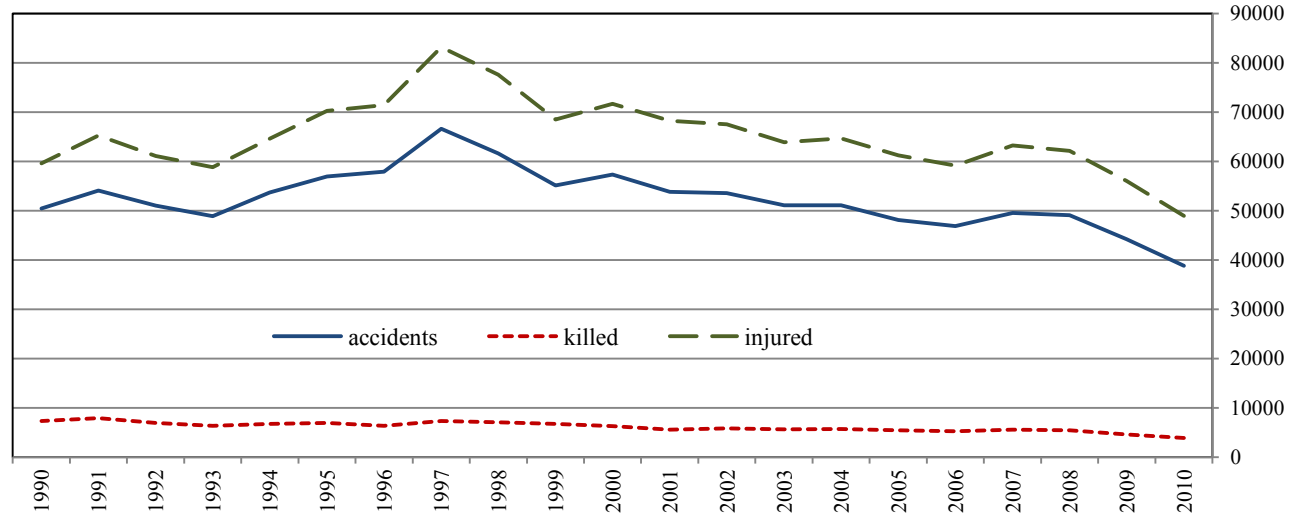

Fig. 2. Number of accidents, killed and injured persons in road accidents in Poland

the value of 54 thousand. After a slight decline in the number of accidents in the following years, in 1998 it hit an inglorious record – the number of accidents that year exceeded 66 thousand. In later years there was a decrease in accidents. These are the years after the association and Polish accession to the European Union. The exception are years 2007–2008, in which the downward trend was halted for a short period of time and the number of accidents increased slightly.

In 1991, on Polish roads up to 7901 people died and it is the highest score recorded in the history of the Polish automotive industry [2]. In 1997, the number of deaths decreased significantly to the value of 7080, despite the fact that in that year the number of accidents reached a record level. Next years was a drop in the number of deaths, but in the years 2008–2010 there was a slight increase again. In 2010, Poland noted a record low number of people killed – less than four thousand.

Trends in accident during the car

Trends in accidents in Poland is characterized by high volatility. The largest number of them falls especially on summer and early autumn. By analyzing both, the number of accidents and also the number of people killed and injured, it may notice that the year 1998 was the most tragic period in these respect.

A small number of accidents occur in the winter months November – March. The summer months June–September are characterized by a significant increase in their number. The month of September follows with a slight decrease in the number of accidents caused by the end of holiday trips. In October, a very changeable weather conditions and relatively early getting dark cause a marked increase in the number of accidents (Fig. 3). Similar conclusions can be drawn by analyzing how these values have changed in subsequent years [2]. What is interesting, number of accidents in particular months during the analysed period forms in a certain trend, in the winter months is the lowest, and it is the highest in summer. Here, it can therefore put another easy-to-prove thesis that the better the road conditions the higher the number of accidents. 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 24 hours a day was introduced in Poland.

If, in turn, we look at the chart concerning the number of people killed (Fig. 4), it can be seen that the most tragic in their number were the years 1998–1999. However, while noticeable is the slight upward trend from March, a significant surge is recorded exactly in the month of October [2]. Number of people killed achieves the greatest value during the year. This situation repeats itself every year. Where does such startling information come from? This may be due to worsening weather conditions (rain, drizzle, morning fog, snow), getting dark fast, to which the driver has not yet had time to get accustmed to, and in case of sunny days, the sun just over horizon glaring the drivers. It can be concluded that it is precisely in this period, the road and surroundings indicator has a much greater influence on the occurrence of an accident.

And in the winter months declining trend can be seen both, in the number of accidents and deaths. The worse driving conditions, the lower driving speed, the less number of accidents, and their possible consequences are less tragic.

The weather conditions in which accidents occur have been analysed. Figure 5 contains a summary

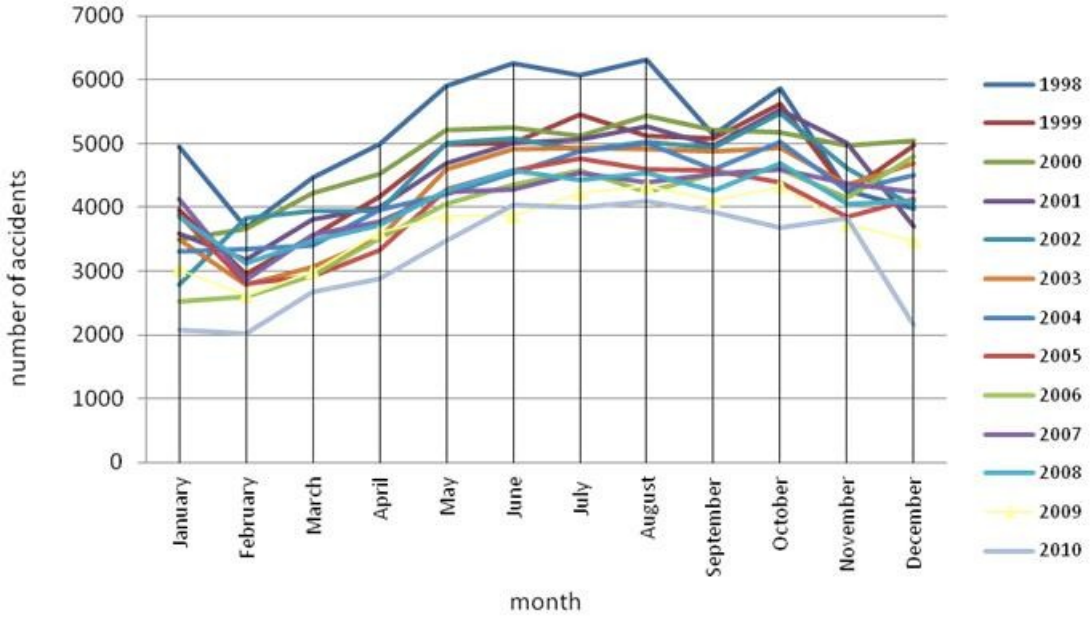

Fig. 3. Number of accidents in each month

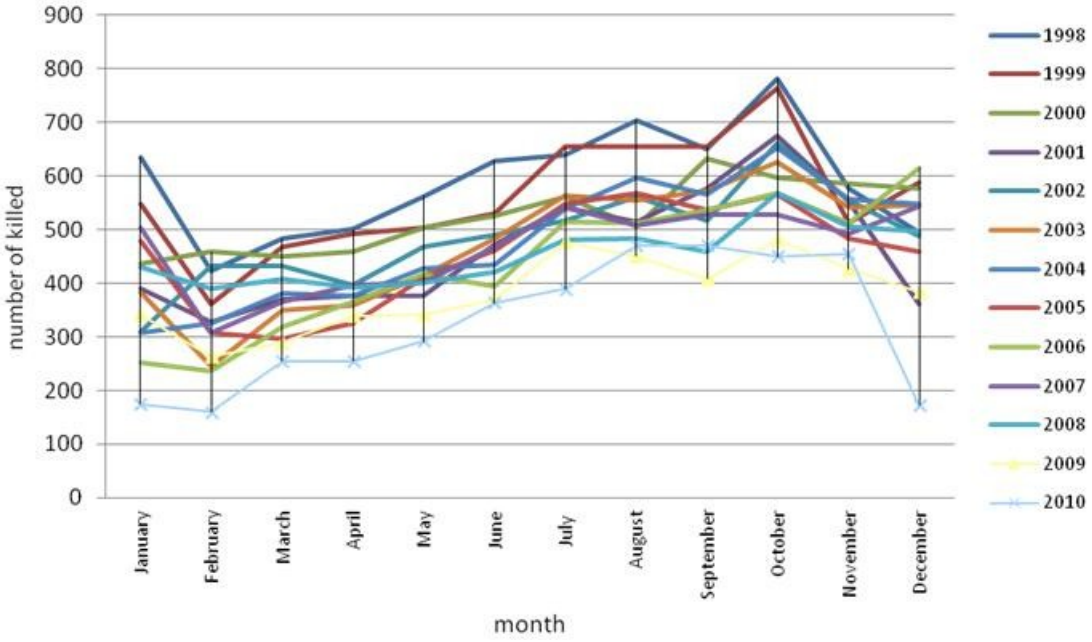

Fig. 4. Number of people killed in accidents in particular months

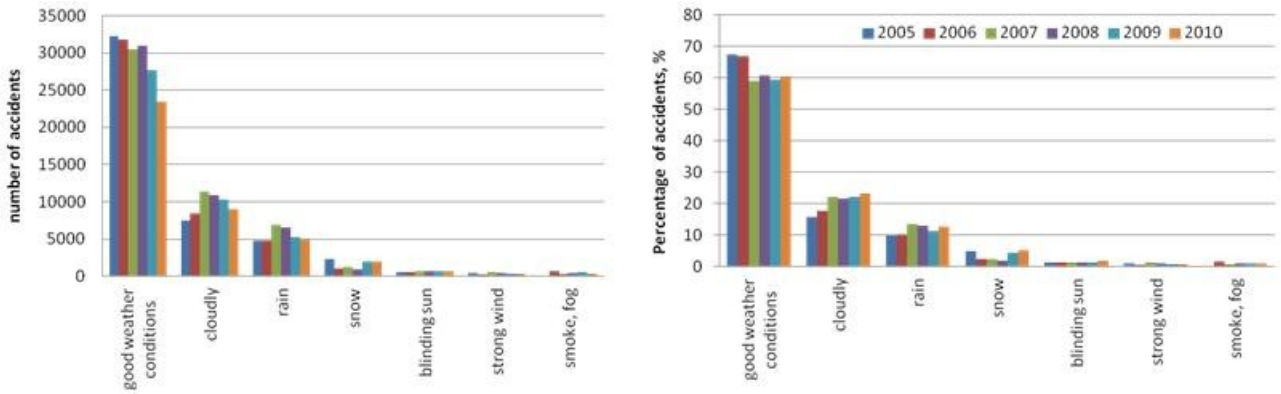

Fig. 5. List of accidents and their percentage specifying the conditions under which they occurred

of accidents, taking into account weather conditions in which they occurred and their percentage share. Analyzing the data in the graph can be said that good weather conditions unfortunately favour the formation of accidents. Over 80% of accidents arose because when the driving conditions were good or it was cloudy, but there was no precipitation. How to explain this phenomenon? The reasons may be many such as the better conditions, the more courageous drivers become, their vigilance is smaller and moving at higher speeds cause accidents with more serious consequences.

Similar charts apply to people killed in accidents (Fig. 6) [2]. Observing the percentage graphs (on the right) of shares we have the impression as if they were the same. How to explain such a big compatibility of these characteristics? It can certainly be argued that the percentage of accidents, the number of people killed and injured determined in individual months of the year, as was the case in relation to all-year-round values, show a high correlation. It is interesting that accidents are the least in heavy traffic conditions during precipitation, fog. Because of good weather conditions, both, the number of people killed and injured prevails, and therefore fundamental changes to improve safety especially in such conditions should be made.

Of course, when analyzing these values it was necessary to bear in mind the characteristic climate of Poland, as in other countries, where other weather conditions dominate, these values may be different.

Accidents caused by drivers

It is worth looking at the types of accidents, which prevailed in the years 1999–2010 on Polish roads. Among the most common causes of accidents (Fig. 7), three stand out:

- traffic collision (43–48%);
- running down a pedestrian (25–37%);
- hitting a tree or another road object (about 10%).

These three types of accidents comprise total of almost 90% of all accidents. Hence, carried out road investments, may in future years significantly reduce their number. It is worth noting that the percentage share of accidents – the crash of vehicles in traffic shows a slightly upward trend (Fig. 8). A very high proportion of pedestrians involved in road accidents is worth noting as it is one of the highest in Europe. The reason for this may be reflective elements apart from the tragic mistakes of drivers, also serious deficiencies in the infrastructure: the lack of pavements, wide hard shoulders,

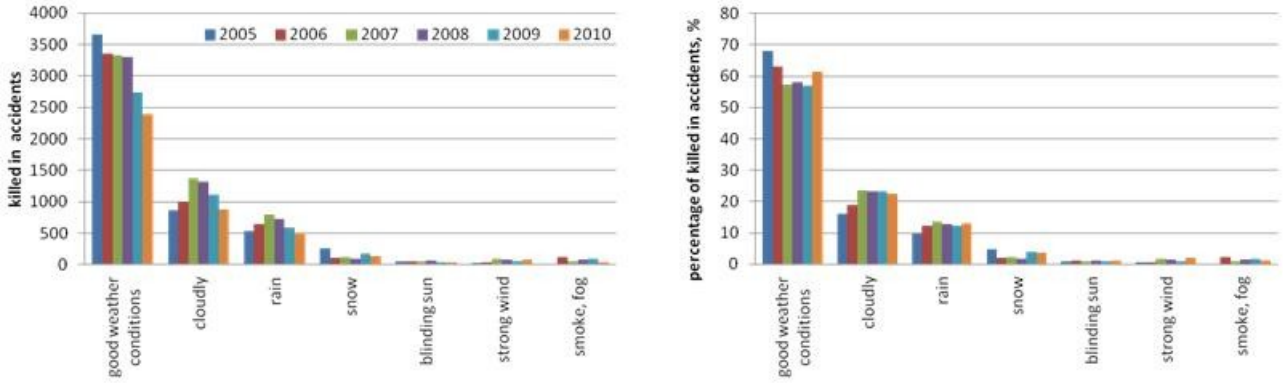

Fig. 6. Number of people killed and their percentage share depending on weather conditions

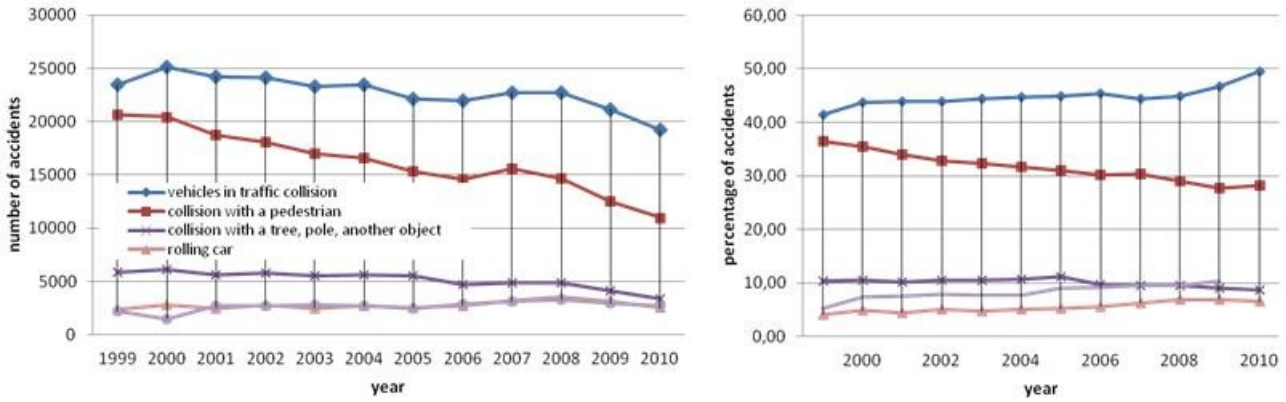

Fig. 7. Types of accidents in Poland [2] and their percentage share

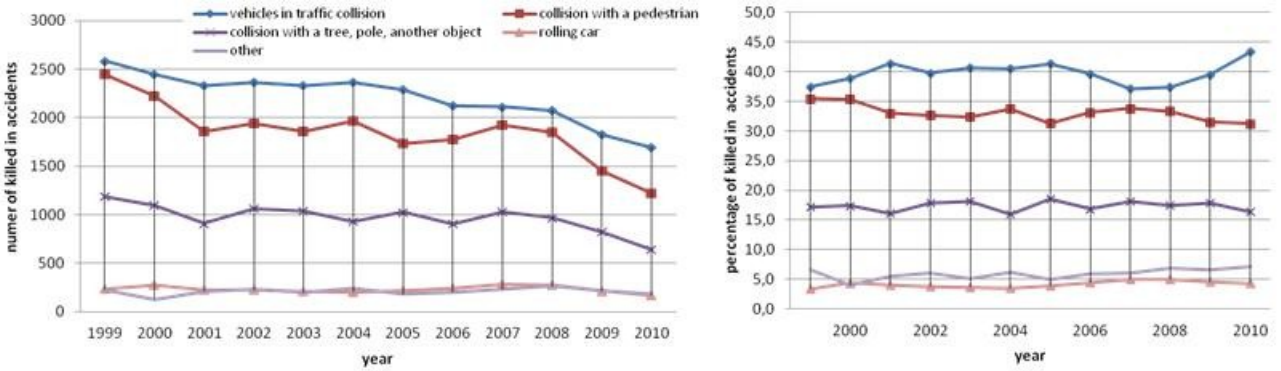

Fig. 8. Deaths in the different types of accidents and their percentage share

which residents of villages and small towns could use after dusk, the lack of habit of wearing reflective clothes after dark, poorly labeled or poorly visible pedestrian crossings, etc. However, while in the case of a collision of vehicles in traffic a small percentage increase has been recorded, in the case of pedestrian collisions there is a clear downward trend in the number of accidents. What could be the reason for its cause? Perhaps, part of the road projects have already cast for use raises safety, and perhaps, the reason for is increasing number of cars and that many people instead of walking choose to take a car.

The share of the third group in terms of percentage of accidents that is collisions of vehicles into a tree or other object is immutable in recent years and remains at about 15%. The occurrence of such an accident can result from many causes. Firstly, it results from the lack of the habit of proper lighting of vehicles and other road objects (agricultural machinery, bicycles, construction work carried out, which are left on the side of cars) especially important during periods of limited visibility such as late autumn. Despite the need for a warning triangle, not all drivers know how and when to use it. Some European countries use a number of provisions that force drivers, for example, to possess and use reflective vests when a driver leaves the vehicle outside built-up areas. Secondly, the fact that a large share of this group of accidents are associated with the existing road infrastructure. There is often impossible to find a safe place while running off the road during a crash or other needs to stop. This results in risks associated with the necessity of occupying one of the lanes by a particular object and reducing traffic flow. Planting trees has been another issue widespread on Polish roads (inherited from the previous regime). Such solutions can be visually attractive and beneficial for environmental reasons but unfortunately are very high risky in case a driver runs off the road. The effect of such a collision is usually death or serious injury. Such a solution is not used on new parts of roads, and various types of protections are applied: barriers, road barriers, reflective warnings before running off, corresponding horizontal road markings etc.

The most common cause of accidents is a collision of vehicles in motion. Due to the imperfections of Polish roads which are dominated by the roadways with non-divided lanes, such collisions unfortunately entail tragic consequences.

Analyzing the number of people killed in accidents in relation to their type (Fig. 8), despite the apparent decline in the number of people killed, the shares of individual groups of accidents are almost constant and their sum is approximately 90–94%.

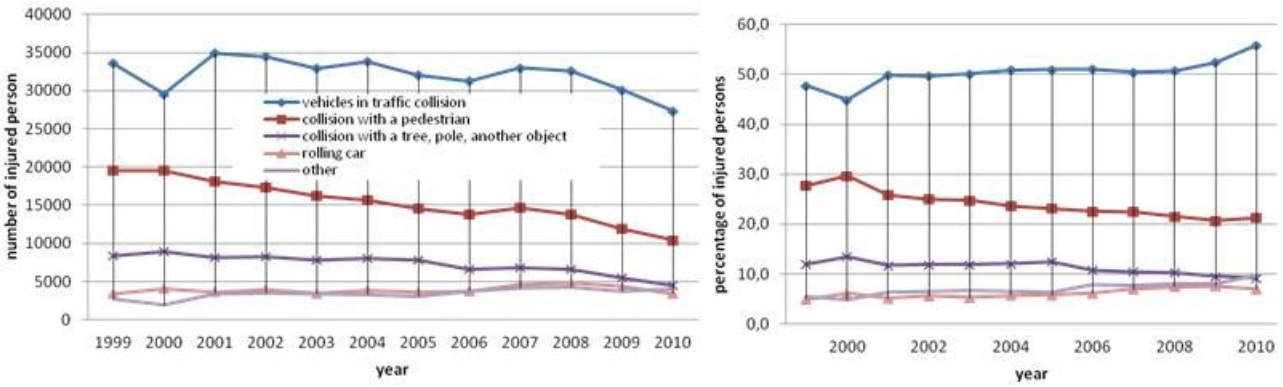

Fig. 9. The injured person in particular types of accidents [2] and their percentage share

Accidents involving vehicles in traffic collisions account for approximately 50% of all accidents and fatalities account for about 43% of all deaths. Attention needs to be paid on the group of accidents involving pedestrians. These accidents have a 28% share but fatalities account for almost 31% of all deaths.

If we examine the number of people injured (Fig. 9) at the turn of the last years we may observe a clear decreasing trend in the case of the wounded as a result of collisions on pedestrians or other road objects. In the event of a collision of vehicles in motion the share of people injured has not decreased and has maintained and even slightly increased.

Conclusions

Since the beginning of the automotive industry road accidents are inseparably associated with road traffic. The experience of other EU countries, in which significant progress has been achieved in the field of travellers' safety, shows that the current state of affairs in Poland in this area can and should be changed. Some actions have been taken for several years which aim at improving the situation and for just a few years great investment has been conducted to improve road infrastructure. In addition to the good, safe roads, traffic monitoring networks such as cameras and over-speed control devices, the fundamental change in the approach of the drivers themselves has to take place. Unfortunately, perhaps in order to achieve the latter goal, it will be necessary to introduce more stringent legal and administrative sanctions against persons who notoriously violate traffic regulations. One also cannot forget here about educational and preventive activities, which may also contribute to a significant reduction in the number of road accidents.

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