

TRANSPORT SAFETY IN ROAD TRAFFIC - THE CONDITION AND PREVENTIVE MEASURES AS ASSESSED BY THE RESPONDENTS

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Abstract: The article presents basic definitions related to road accidents and types of tests carried out in the field of road accidents. The effects of road accidents on participants, drivers as well as social and direct costs of road accidents were discussed. The correct conduct of people involved in a road accident (incident) was presented. In the research part, the most common causes of accidents in Poland were analysed. Particular attention was paid to the participation in accidents of participants under the influence of alcohol. The article ends with a discussion on the presented research results and the resulting conclusions as well as a proposal for preventive actions to reduce the number of road accidents.

Keywords: traffic safety, road incident, road accident, safety prevention

1. INTRODUCTION

Road safety concerns each of us, because we are all road users to a greater or lesser extent. Therefore, these issues should be a priority for the sake of our health and life. The additional inspiration for writing the article was my conducting the subject of Accidents and Catastrophes Expertise in the field of Occupational Safety and Hygiene at the second degree of master's studies. This course covers, among others, curriculum content relating to road safety issues and analyzes various road incidents, their causes and possible preventive measures to prevent them (Jamroz et al., 2019).

2. BASIC DEFINITIONS AND CONCEPTS IN THE FIELD OF ROAD ACCIDENTS

Traffic incident - a concept that has priority over all other terms. We can define a traffic incident as all incidents on the road - regardless of whether there are any casualties or serious material losses (Pawelec, 2020).

Road collision - a road incident involving only material losses, as a result of which people involved in it do not die or suffer injuries. This concept does not function under Polish law. In Polish law, a risk of road safety is classified as a collision. This is reflected in Art. 86 of the Code of Petty Offenses

Road accident - an incident occurring in land traffic, caused by an inadvertent breach of safety rules in force in this traffic, which resulted in the death of one of the participants or bodily injuries resulting in a violation of the activities of an organ of the body or health impairment lasting more than 7 days.

Disaster in land traffic - an event that disrupts sudden and dangerous land traffic, has specific, wide-ranging and severe effects involving a large number of people or property, and poses a threat to public safety (Wojtas and Szkoda, 2018).

3. TYPES OF ROAD ACCIDENT RESEARCH

Road accident research consists in analyzing the circumstances, location and damage to vehicles in order to determine the causes, course and effects of road accidents, thanks to which it is possible to identify the perpetrator of the event (Zheng et al., 2021).

The scope of expertise in the field of road accidents and automotive technology includes:

- analysis of the place where the road accident occurred, in particular the mutual location of vehicles, people and obstacles as well as the trajectory of vehicle movement;
- reconstruction of road accidents;
- reconstruction of the course of the event (time-spatial analysis of the accident);
- determining the speed of vehicles before the accident;
- determining the speed of the car at the moment of hitting a pedestrian;
- determination of collision speed;
- determination of the position of the vehicle at the commencement of the maneuver;
- establishing road visibility, including road illumination range;
- evaluation of the driving technique and tactics of the drivers;
- identification of the perpetrator of the accident and determination of whether it was possible to avoid it;
- computer simulation of the accident;
- technical analysis of the vehicle;
- determination of the influence of the technical condition of the vehicle on the occurrence and course of the accident;
- determination of the topography and extent of damage to the vehicle body resulting from a collision.

4. CONSEQUENCES OF TRAFFIC ACCIDENTS

Direct costs caused by road accidents:

- medical,
- loss of property (vehicle, cargo),
- administrative costs,
- loss of ability to work,
- changed quality of life
- legal problems,

The impact of injuries caused by a road accident:

- deterioration of the functions of the organs of the body,

- permanent disability,
- reduced quality of life,
- psychological consequences for the victims, often exacerbated by the feeling of "injustice",
- losing job or changing to a much worse job.

Situation of the victims' families:

- state of mourning, - loss of the sole or main host,
- resignation from work caused by long-term direct care or damage to the psyche.

Situation of non-injured drivers in accidents they have caused:

- an accusation of death or injury,
- depressive states resulting from a sense of guilt and the social atmosphere,
- financial burdens.

Situation of participants and witnesses who were not injured in the incident:

- psychological problems,
- burden of involvement in investigative and judicial procedures.

Social costs of road accidents:

- involvement of emergency services,
- traffic disruptions, downtime and material losses related to the accident, diagnostics and hospitalization of the victims,
- involvement of medical personnel in complex and multiple medical procedures,
- compensation and state aid for victims and their families,
- benefits and pensions (Thomas et al., 2018).

5. PROCEEDINGS DURING ROAD INCIDENTS

Direct participants of the event witnesses

In the event of participation in a road accident, the driver is obliged to stop the vehicle, ensure traffic safety at the scene and determine if there are any victims, and then:

- when there are no dead or injured, immediately remove the vehicle (or vehicles) from the scene of the accident so as not to endanger or obstruct traffic,
- place warning triangles or lights at an appropriate distance (according to the road traffic code) from the accident site on both sides,
- check for physical hazards (e.g. hazardous cargo, open flame, damaged power line, spilled fuel).
- turn off the ignition in all damaged vehicles and if necessary (there is a risk of fire) disconnect the battery,
- provide necessary assistance to accident victims and call appropriate services,
- not to undertake activities that could make it difficult to determine the course of the accident (catastrophe).

Other traffic participants should:

- follow the instructions of emergency services,
- stay away from the place of the accident or crash,
- do not block the access of special vehicles,

- turn off the air supply and close the windows if there is a suspicion of a leak of a dangerous substance,
- warn other road users.

6. RESULTS OF COMPARATIVE AND SURVEY RESEARCH

6.1. The causes of accidents

Now, the causes of accidents will be discussed in the light of the KGP statistical data and compared with the indications of the respondents.

This was to determine the possible convergence of the results or the correlation between them.

It should be emphasized that the discussed reasons belong to the formal and legal categories, i.e. if the driver skidded on a slippery surface and caused an accident, the reason is the speed not being adjusted to the traffic conditions (the slippery surface could only contribute).

For the purposes of this study, the causes of accidents were divided into three categories. Belong to them:

- causes of accidents caused by the fault of vehicle drivers,
- causes of accidents caused by pedestrians,
- causes of accidents due to technical malfunction of the vehicle.

6.2. Causes of accidents caused by the fault of vehicle drivers

Causes of accidents caused by drivers' fault In 2020, 20,999 accidents occurred due to the fault of vehicle drivers (which constitutes 89.2% of the total).

The chart compiles the results of official statistics and the corresponding answers of respondents. Approximately the results coincide, with the exception of the answer of "speed not adapted to traffic conditions". It can be concluded that the respondents admitted to the most common offense.

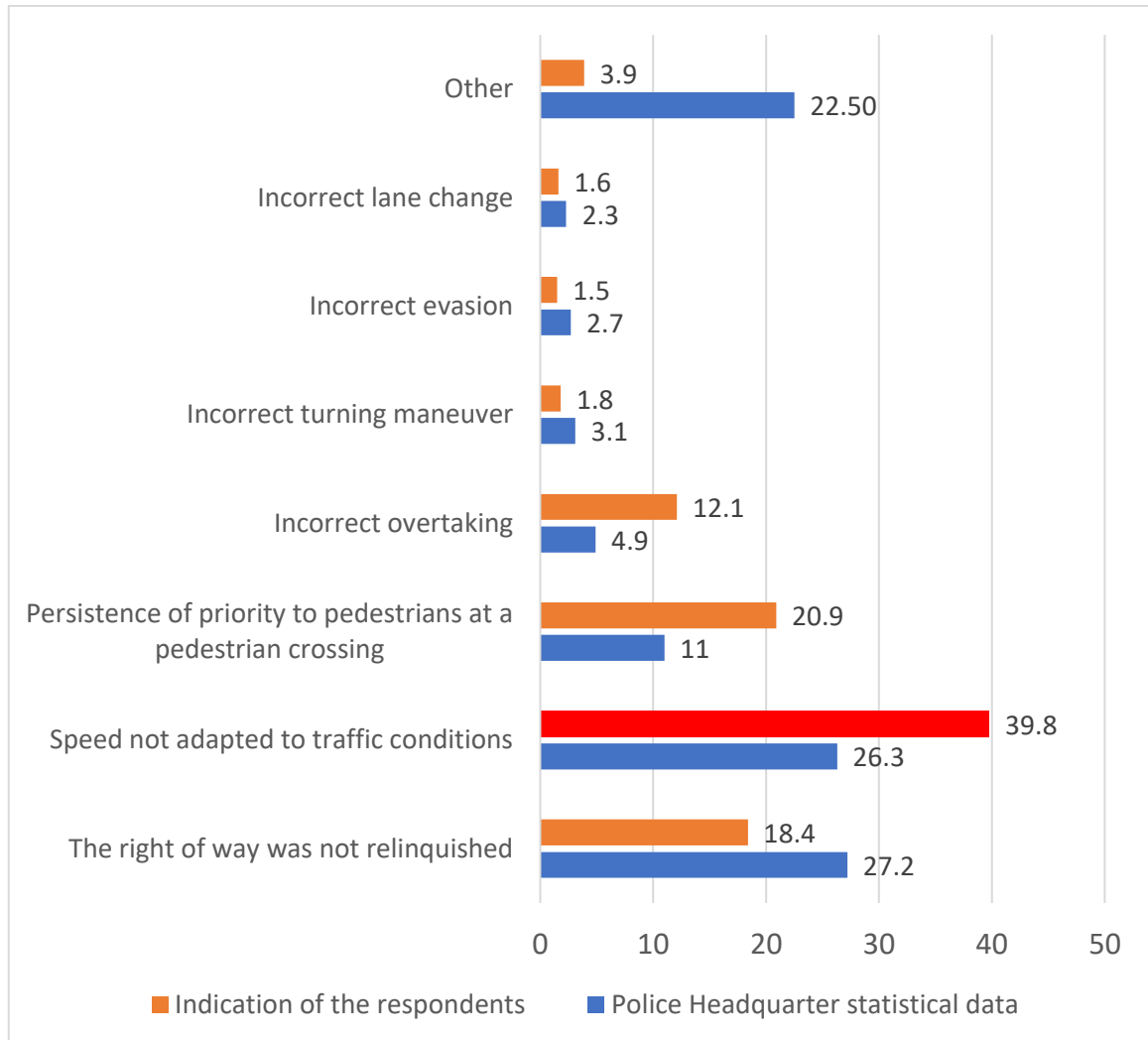


Fig. 1. Causes of accidents caused by the fault of vehicle drivers
 Source: Report of the Police Headquarters and author's own research

6.3. Causes of accidents caused by pedestrian

Another analysed group of perpetrators of road accidents were pedestrians. In 2020, they caused 5.9% of all accidents.

The chart 2 shows the results of official statistics and adequate answers of respondents. They show that most often pedestrian incidents occur as a result of intrusion into the road. The other answers are approximately convergent.

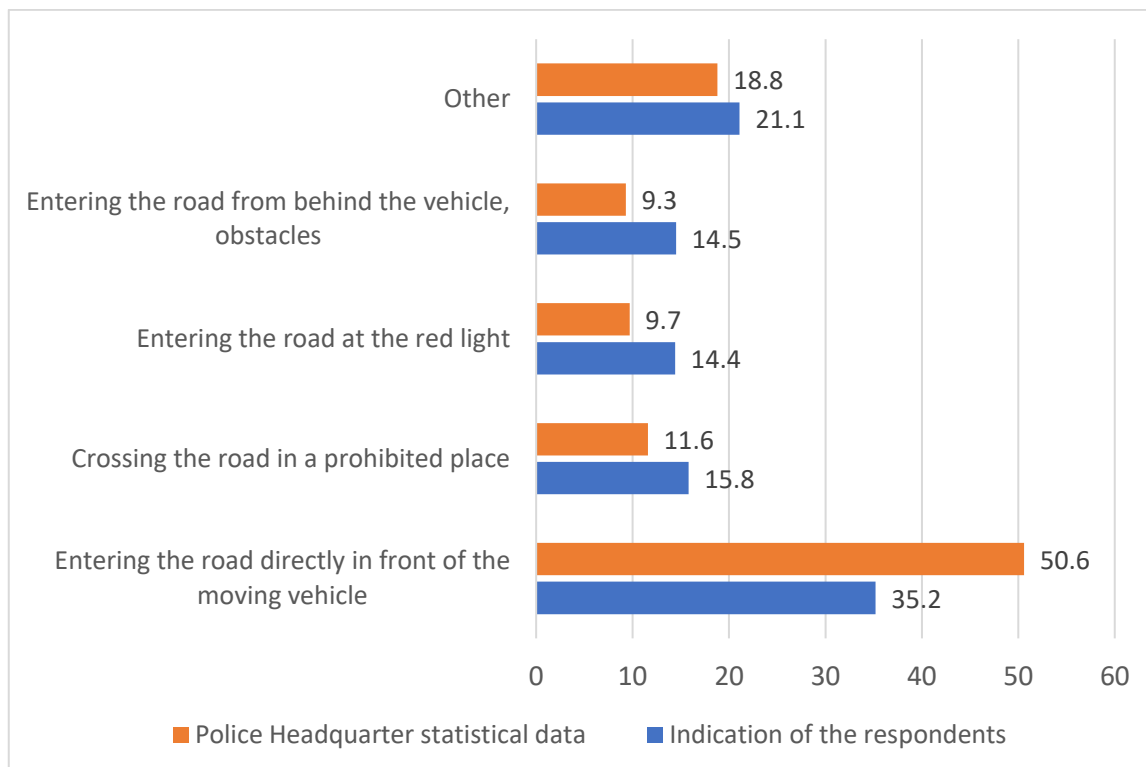


Fig. 2. Causes of accidents caused by pedestrian
Source: Report of the Police Headquarters and author's own research

6.4. Causes of accidents due to technical malfunction of the vehicle

In 2020, 64 road accidents were recorded, which accounts for approximately 0.3% of all accidents where the direct cause was a technical failure of the vehicle.

It should be noted that technical defects are also revealed during the inspection of vehicles on the scene, although they did not have a direct impact on its occurrence. However, they could have contributed indirectly to the events that took place.

7. ROAD ACCIDENTS INVOLVING ROAD USERS UNDER THE INFLUENCE OF ALCOHOL

Alcohol in the human organism causes:

- deterioration of motor coordination,
- reduction of the reaction speed,
- visual acuity deterioration,
- visual field limitation,
- incorrect evaluation of the distance (Thomas et al., 2018).

It is obvious that these symptoms are making driving safely an impossible thing.

In 2020, road users (drivers, pedestrians, passengers) under the influence of alcohol participated in 2,540 road accidents, which accounts for 10.8% of all accidents.

In 2020, traffic participants under the influence of alcohol caused 2015 accidents, which accounts for 8.6% of the total.

In relation to the total number of accidents caused by drivers, drivers under the influence of alcohol accounted for 7.9%.

Drivers of vehicles **under the influence of another stimulant** were the perpetrators of 106 accidents, in which 43 people were killed and 141 injured and 229 collisions.

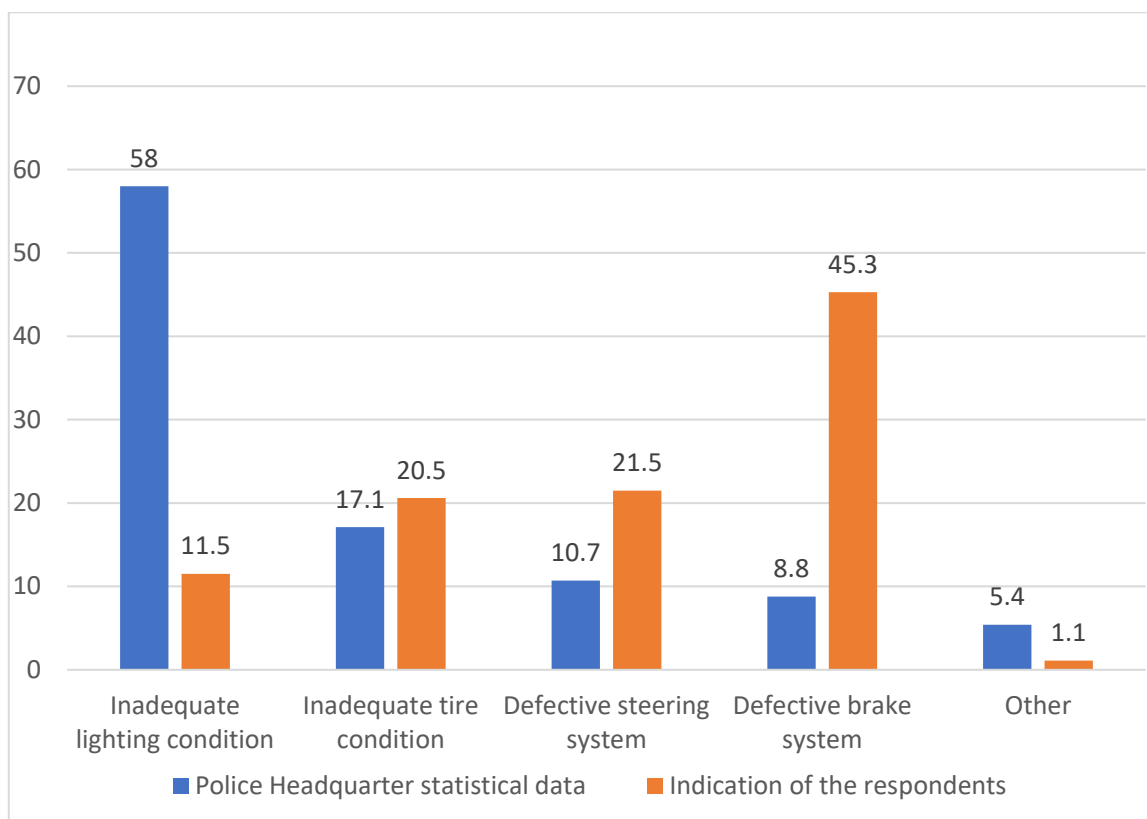


Fig. 3. Types of technical defects found in vehicles involved in road accidents
Source: Report of the Police Headquarters and author's own research



Fig. 4. Road accidents involving road users under the influence of alcohol in years 2011-2020
Source: Report of the Police Headquarters

7. Number of road accidents and proposals for preventive measures

The number of road accidents in last ten years in Poland, as can be seen in the chart 5, has a downward trend. With regard to the number of road accidents in other EU

countries, Poland is in one of the last positions. Undoubtedly, this is optimistic information. However, the rate of deaths per 100 accidents is disturbing. Poland and Bulgaria are the EU countries with the highest rate of deaths per one hundred accidents. The European countries where this ratio is the lowest are Germany and Austria.

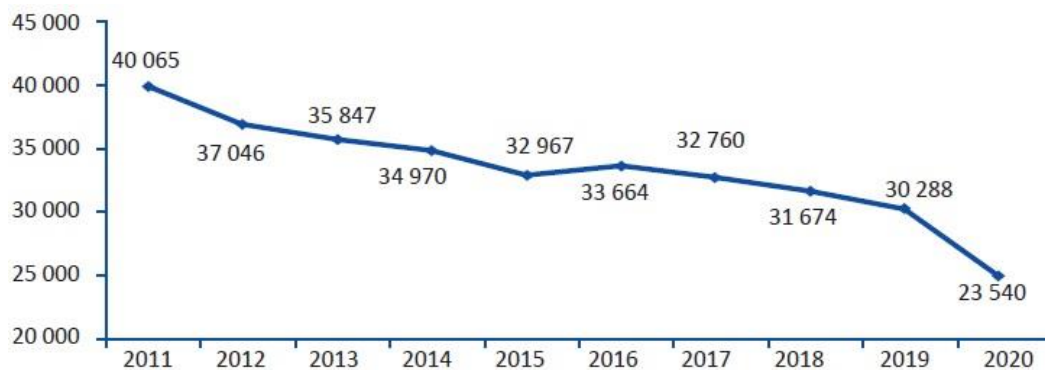


Fig. 5. Number of road accidents in 2011 - 2020 in Poland
Source: Report of the Police Headquarters

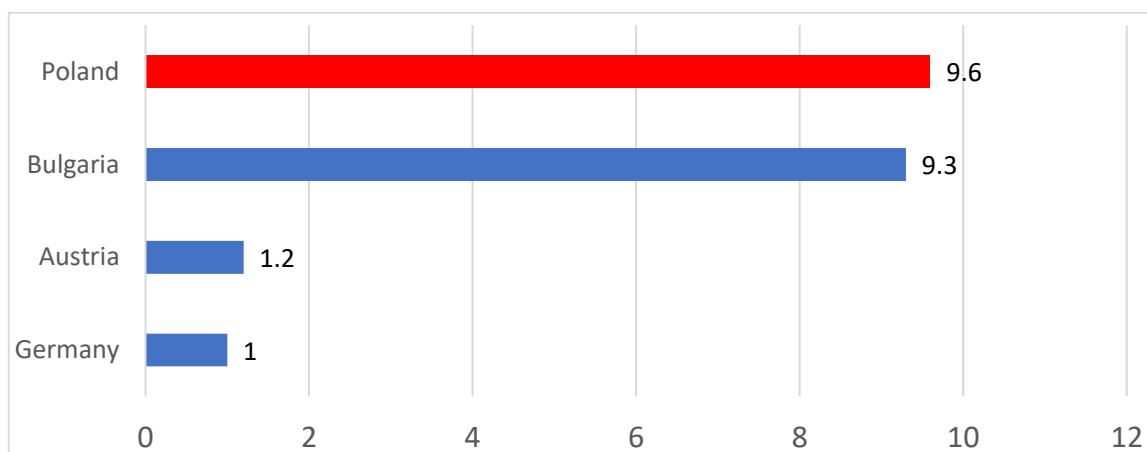


Fig. 6. Rate of deaths per 100 accidents (in 2019 year)
Source: Report of the Police Headquarters

As preventive actions to improve road safety, respondents indicated as the most important: transport education (52%), stricter penalties (43%) and improvement of road infrastructure (38%). The least indications were the technical condition of vehicles (25%), the intensification of roadside inspections (18%) and media campaigns (12%).

8. CONCLUSIONS

Among the factors that have a decisive impact on road safety (man - road - vehicle as a causative factor of accidents), the first place is definitely the person. It is the behavior of particular groups of road users that generally influences the occurrence of road accidents.

The main "sin" of Polish drivers is consciously exceeding the speed limit. The second most important cause of accidents is recklessness and lack of imagination on the part

of both drivers and pedestrians. The most common technical fault of vehicles on Polish roads is the improper condition of lighting.

Table 1
Preventive actions improving road safety

Type of action	Indication [%]
Education about traffic	52
Tightening of penalty	43
Road infrastructure	38
Technical condition of vehicles	25
Intensification of roadside checks	18
Media campaigns	12

Source: Author's own research.

In conclusion, I would like to introduce you Proposals for future research directions. Among many, the most important ones were selected to improve road safety. These are:

- Influence of the amount of the vehicle's liability insurance (OC) premium (for novice drivers and drivers guilty of road accidents);
- A system of training and improvement of driving technique and the problem of social consent to:
 - driving without authorizations (e.g. after the loss of driving licence),
 - driving under influence of alcohol,
 - driving with excessive speed.

I hope that my article will give you a moment of reflection, which will contribute to improving road safety.

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