

CAUSES ANALYSIS OF SERIOUS ROAD ACCIDENTS IN ROMANIA

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Abstract: Improving road safety is a priority at both international and national level, and reducing deaths and injuries in road accidents has been set as a goal by both the United Nations and the European Union. Romania is still in first place in the number of road accidents in Europe per one million inhabitants. Road safety is a multidisciplinary field strongly influenced by road education, law enforcement and road infrastructure. Thus, the analysis of the main causes of serious road accidents helps to understand the actions that must be taken to combat them by the responsible institutions. Also, the responsible application of the law on traffic on public roads and by ensuring the prevention and monitoring of road traffic helps to reduce serious road accidents.

Keywords: Road accident, road safety, road mobility

1. INTRODUCTION

The general economic-social progress is closely related to the evolution of road transport, a fact that determines the continuous increase in traffic values, simultaneously with the diversification of the categories of public road users. The major advantages of increasing road mobility are, however, overshadowed by the negative consequences that traffic accidents have on society, which cause the loss of an impressive number of human lives, great suffering and huge material damages every year. Road safety, especially in the context defined above, is becoming one of the most important areas. The governing bodies of the European Union set the objective of reducing by 50% by 2030 the number of dead people and serious injuries in road accidents on European roads, towards the creation of a "European road safety area". As a result, the issue of road safety is an area of strict topicality, especially in our country where, despite all the efforts made by the authorities and the positive results obtained in recent years, the degree of road risk still remains above the European average, at an appreciable distance from the states at the top of the ranking from this point of view [1]. For a good knowledge of traffic

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phenomena in order to increase road safety, the analysis of the factors that influence road safety is of particular importance.

2. ROAD SAFETY

By definition, road safety represents the totality of actions and measures aimed at improving human behaviour, vehicles and road infrastructure, leading to the safe movement of all categories of public road users, by reducing the risk of involvement in road accidents and reducing their consequences. From a conceptual point of view, road safety involves the interdependence of the action of the following main factors (Figure 1) [1-4]:

- *Man* - is responsible for more than 90% of traffic accidents, through "mistakes" committed in traffic, more or less on purpose (distracted driving, drunk driving, speeding, running red lights and stop signs, reckless driving, aggressive driving, fatigue);
- *The vehicle* - which, in the more than 130 years since its appearance, has been continuously improved, both in terms of design and technical performance, but especially in terms of passive safety means (seat belts, airbags, headrests, child restraint systems), but also of active safety (anti-lock/assisted brakes, stability control, adaptive headlights, parking sensors, automatic lighting, etc.);
- *Road infrastructure* - is the one that largely contributes to the reduction of road risk through configuration, carrying capacity, signalling and safety equipment (lighting, separation of traffic flows, arrangement of intersections, pedestrian crossings and cycle tracks);
- *The road traffic regulation and control system* - it is composed of the legal framework (all the normative acts with incidence in the matter) and the law enforcement forces (the number and staffing of traffic policemen);
- *Information technology* - which is the basis of the development of intelligent transport systems (ITS) will allow the collection and instant processing of a huge volume of data obtained from the numerous sensors on board, but also from those of the road infrastructure, with which the car will be in constant communication, thus allowing safe, economical and comfortable driving. In this regard, the major manufacturers have already taken important steps, equipping their series models with advanced driving assistance equipment (ADAS), "alcoholock" devices designed to combat driving under the influence of alcohol or to detect and signal the installation of the state of fatigue;
- *Weather conditions* - represent, despite technical progress, a variable that influences road safety, through the important effects they can have on road adhesion (dry, wet or slippery), visibility (fog or precipitation), road holding (gusts of strong wind) or on the human body (indispositions during rainy weather or favouring the installation of fatigue or its accentuation during hot periods).

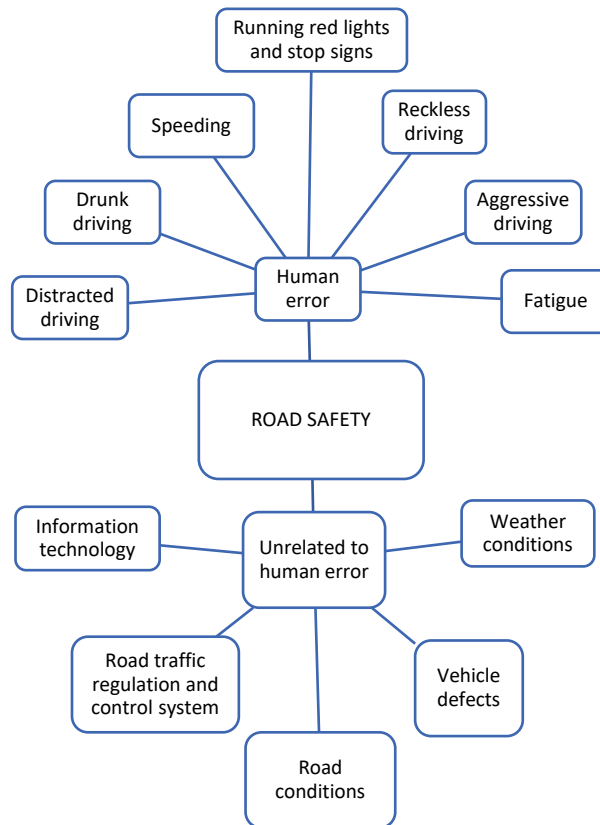


Fig. 1. Crash factors

In order to gain a much clearer understanding of the various aspects that influence overall road safety performance, the European Commission has developed, in cooperation with Member States' experts, a first set of eight key road safety performance indicators (KPIs), directly related of preventing death and serious injury in road accidents, which determines a country's performance (Figure 2) [5-7]:

1. speed limit compliance (direct cause of 30% of all deaths);
2. seatbelts and child restraint systems use (25% to 50% of car occupants who die are not wearing a seat belt);
3. the use of helmets by motorcyclists and cyclists;
4. driving under the influence of alcohol (25% of all road deaths);
5. distraction;
6. vehicle safety;
7. infrastructure safety;
8. post-crash care.

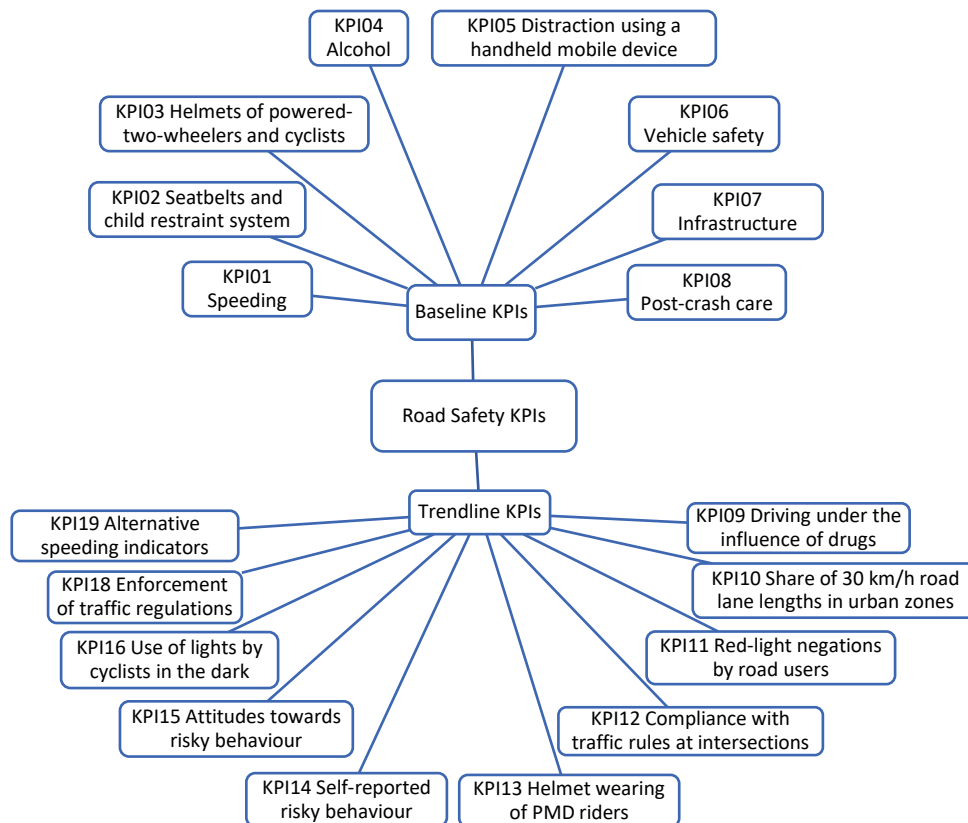


Fig. 2. Road safety Key Performance Indicators (KPIs)

The KPIs are an integral part of the EU road safety policy framework 2021-2030. The role of the Baseline project was to support the authorities of the participating Member States (18 EU Member States) in the collection and harmonized reporting of the 8 KPIs and to contribute to strengthening the capacity of Member States that did not previously collect and calculate data relevant to the KPIs. A new Trendline project, partly funded by the European Commission, will build on the work undertaken during Baseline. Work began in October 2022 and will last three years. This project brings together 25 EU Member States (as well as two other Member States and two EFTA countries as observers) to collect data, analyse data, provide road safety KPIs and use them in road safety policies. In addition to the eight KPIs used in the Baseline, the consortium will analyse and test 10 new experimental indicators, develop appropriate methodologies and test them on a limited scale (Figure 2) [6,7]:

1. Driving under the influence of drugs;
2. Share of 30km/h road lane lengths in urban zones;
3. Red-light negations by road users;
4. Compliance with traffic rules at intersections;
5. Helmet wearing of PMD riders;

6. Self-reported risky behaviour;
7. Attitudes towards risky behaviour;
8. Use of lights by cyclists in the dark;
9. Enforcement of traffic regulations;
10. Alternative speeding indicators.

3. TRAFFIC ACCIDENT

According to the explanatory dictionary of the Romanian language, the accident is defined as the fortuitous, unpredictable event that interrupts the normal course of things (causing damage, injury, mutilation or even death), a random, trivial fact that brings misfortune [8]. Road accident is any accident involving at least one road vehicle in motion on a public road or on a private road to which the public has a right of access, resulting in at least one person being injured or killed [9].

In a legal sense, however, according to Romanian legislation, namely Government Emergency Ordinance 195/2002 regarding traffic on public roads and the updated Road Code 2023, a traffic accident is an event that cumulatively meets the following conditions [10,11]:

- occurred on a road open to public traffic or had its origin in such a place;
- resulted in death, injury to one or more people, or damage to at least one vehicle or other material damage;
- at least one moving vehicle was involved in the event.

Traffic accidents (Figure 3) are classified according to several criteria, which individualize and differentiate them at the same time [1,12]:



Fig. 3. Serious traffic accident [13]

- *the consequences they have (severity)* - accidents resulting only in material damage or accidents resulting in casualties. In turn, accidents resulting in casualties are divided into light accidents, resulting in only minor injuries, which do not require hospitalization of the victims, and serious accidents, resulting in the death of the victims or their serious injury, requiring the hospitalization of the injured for healing;

- *the legal consequences they involve* - criterion that discriminates between accidents that attract contravention and civil liability (sold only with material damage) and those that attract the criminal liability of those who produced them (accidents with victims);
- *knowledge of the perpetrator* - accidents can be with known perpetrators or with unidentified perpetrators, who left the place of occurrence of the event without the consent of the investigative bodies, evading investigation.

4. CAUSES OF SERIOUS ROAD ACCIDENTS

Unfortunately, in Romania, according to statistical data from the year 2022, the rate of deaths caused by road accidents recorded in Romania is 86 per one million inhabitants, compared to the EU average of 46 per one million inhabitants (Figure 4 and Figure 5) [6]. All this in the context in which 2022 was considered the safest year from a road point of view in Romania.

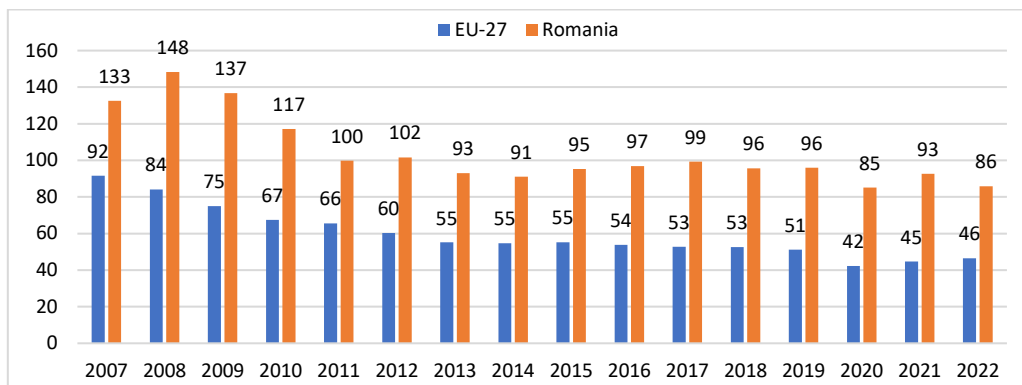


Fig. 4. Number of road fatalities per million population in EU-27 and Romania

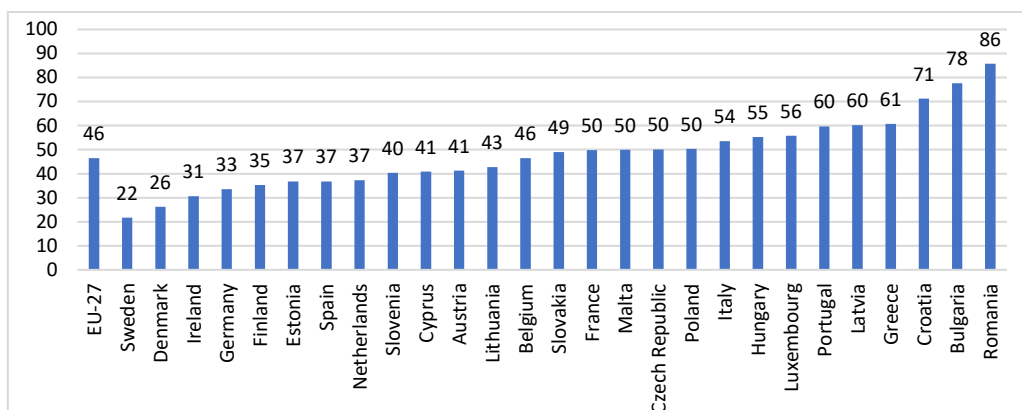


Fig. 5. Number of road fatalities per million inhabitants by country in 2022

The analysis of traffic accidents is done according to the criteria:

- production environment (rural, urban, roads outside towns);
- road category (street, national road, county road, municipal road, highway, other roads);
- special characteristics of the road (curve, tunnel, intersection, bridge, railway crossing);
- weather characteristics (normal, fog, sleet, snow, rain, strong wind);
- type of impact (collision, aquaplaning, fall from vehicle, fall off road, fall into vehicle, front-rear collision, frontal collision, chain collision, side collision, collision followed by fire, collision followed by rollover, stationary vehicle collision, skidding, hitting an animal, hitting an obstacle outside the roadway, hitting an obstacle on the roadway, hitting a pedestrian, leaving the vehicle by participants, overturning, others);
- the month the accident occurred;
- the day the accident occurred;
- the time of the accident;
- causes of serious traffic accidents;
- the category of vehicle involved (car, bicycle, animal traction, 2-wheel motorcycle, utility vehicle, public transport, other categories);
- the age of the driver's license;
- age of the driver involved in serious traffic accidents;
- the gender of the driver;
- people killed in serious accidents;
- pedestrian fatalities (age and sex);
- deceased cyclists (age);
- 2-wheel motor vehicle drivers deceased (age);
- death category (road type).

According to the data recorded in the Traffic Accident Record, the main causes, in terms of the number of events produced and the number of deaths, for the occurrence of serious road accidents are (Figure 6) [1,14,15]:

1. pedestrian indiscipline (irregular crossing, movement of pedestrians on the road, imprudence or lack of supervision of minors) (19%);
2. travel speed (irregular, not adapted to road conditions) (17.4%);
3. cyclist offences (10.9%);
4. not giving priority to pedestrians (9.5%);
5. not giving priority to vehicles (8%);
6. other distracting concerns;
7. irregular overtaking;
8. failure to respect distance between vehicles;
9. driving under the influence of alcohol.

Accidents caused by the first five causes represent 64.8% of all serious road accidents.

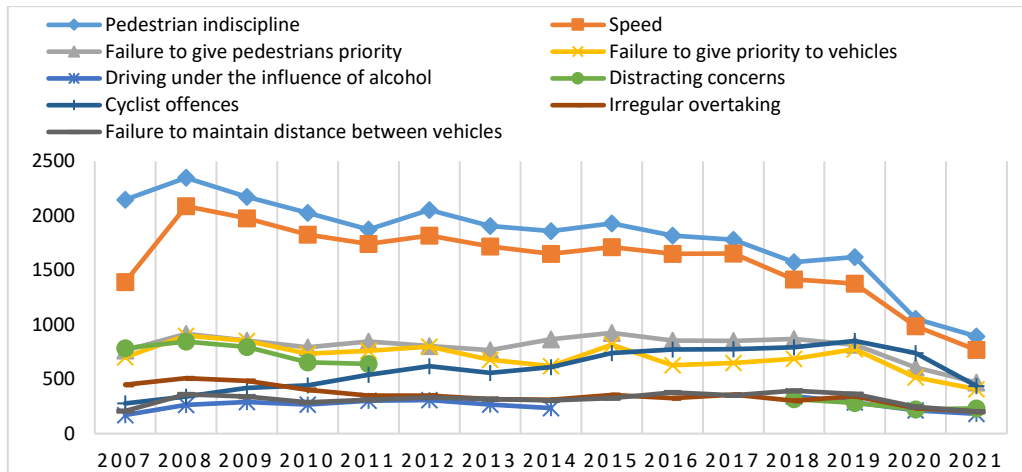


Fig. 6. Causes for the occurrence of serious road accidents

Thus, in 2022, at the national level, 4,712 serious accidents were registered, resulting in the death of 1632 people, the serious injury of another 3690 people and the slight injury of 2075 people, which means a daily average of 12.9 serious road accidents [16]. Compared to 2021, there were 205 fewer accidents (-4.2%), 145 fewer deaths (-8.2%) and 106 fewer seriously injured people (-2.8%) [15]. The evolution in the first 8 months of 2023 of the main indicators of road safety recorded decreases in the number [17]:

- serious accidents – 3143 (-156);
- people who died in traffic accidents – 1051 (-105);
- seriously injured persons – 2470 (-123).

These values are the lowest for the last 10 years.

The main causes of traffic accidents were:

- non-compliance with the legal speed regime (168 people died);
- pedestrian indiscipline (108 people dead);
- cyclists' indiscipline (92 people dead).

At the same time, 61 people died in accidents caused by alcohol consumption, and 9 people died in accidents caused by driving under the influence of psychoactive substances.

In the period June-August 2023, the evolution of the main indicators of road safety maintained a downward trend, in the context of the intensification of the actions carried out in the street environment to detect drivers who represent a danger on public roads, compared to the similar period of 2022, registering decreases in number:

- serious accidents, by 9.1% (-118);
- persons who died in traffic accidents by 5.7% (-25);
- seriously injured persons by 12.9% (-137).

According to the data recorded by the Romanian Police, in addition to the main

causes of serious road accidents, other causes also intervene (in the order of the events produced): traffic in the opposite direction, lack of insurance when changing the direction of travel, driving without a license, violations by drivers hitches or animals, falling asleep at the wheel, failure to back up, passenger/passenger/companion violations, irregular turning, failure to comply with traffic lights, failure to ensure lane change, failure to comply with railway crossing rules, vehicle driver violations, vehicle technical defects, animals or other objects, infirmities or other medical conditions, non-observance of mandatory or regulatory road signs, driving under the influence of drugs, stopping, irregular parking, damaged or under construction road, incomplete/insufficient road signs, aggressive driving.

5. ACTIVITIES TO PREVENT AND COMBAT INDISCIPLINE AND ROAD CRIMINALITY

Road safety is a shared responsibility, which requires concrete and coordinated actions, and the improvement of the specific parameters of the field can only be achieved with the involvement of everyone, both from the position of road user and from that of regulatory authority and law enforcement.

In order to reduce the number and consequences of road accidents, the Ministry of Internal Affairs (MIA) remains one of the important vectors in the design and application of related measures, especially in the context of the intensification of the criminal phenomenon regarding the consumption of psychoactive substances and the driving of vehicles under their influence [17]. MIA structures are actively involved in the implementation of the provisions of the strategic documents adopted at the national level, initiated by the Ministry of Transport and Infrastructure (MTI):

- *the national strategy for road safety 2022-2030* establishes the framework and planning for the implementation of objectives and action plans in the field of road safety. The intended directions of action aim at efficient road safety management, safer conditions for road use, increased safety conditions for infrastructure, prevention, monitoring and optimal interventions in case of emergency situations;
- *the national strategy for intelligent transport systems 2022-2030*, document necessary for the operationalization, in a coordinated manner, of intelligent transport systems in the road sector and the interface with other modes of transport, correlated with investment priorities and available resources.

Guidance, supervision and control of compliance with traffic rules on public roads are carried out by the traffic police within the General Inspectorate of the Romanian Police (GIRP), which has the obligation to take legal measures in case of violations thereof. One of the general objectives of the Romanian Police is "increasing the degree of safety and protection for citizens". Through the activity carried out, the Road Directorate aims to achieve this, respectively its own objective, to reduce the victimization of the population through traffic accidents. Thus, the Traffic Police aims to systematically combat the causes of accidents, through the firm application of the

measures within its competence, simultaneously with the development of traffic education activities. To combat the main elements that endanger the safety of traffic participants, based on the structures of the Traffic Police, they organize actions aimed mainly at:

- fighting the main causes of serious traffic accidents;
- fighting traffic crime;
- imposing road rules through thematic actions, organized at European level.

In this context, contravention sanctions are applied for violating traffic rules, the main sanctioned violations being:

- exceeding the legal speed limit;
- not using the seatbelt or not using the restraint devices;
- non-compliance with traffic rules by pedestrians;
- using the mobile device without having a "hands-free" device;
- non-compliance with overtaking rules;
- failure to give pedestrians priority;
- driving a motor vehicle by a person under the influence of alcohol;
- disobeying the red colour of the traffic light;
- not giving the right of way to vehicles.

The situation of driver's licenses withheld, by category of contraventions, is presented in Figure 7.

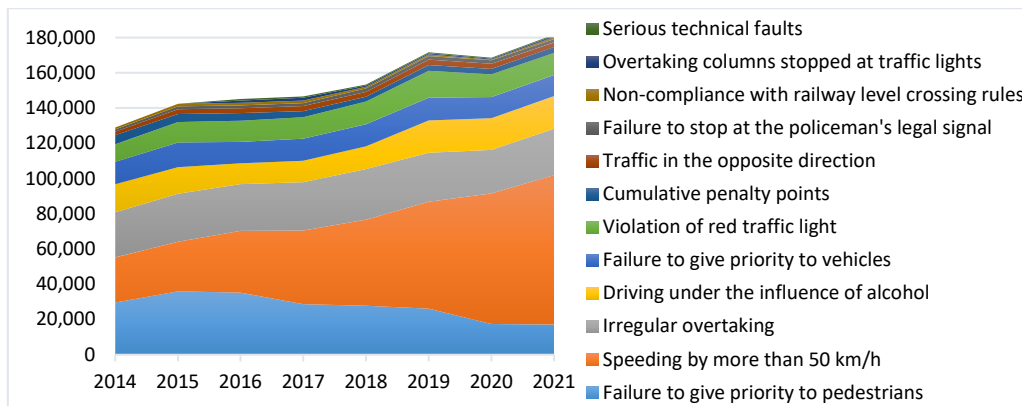


Fig. 7. The situation of driver's licenses withheld, by category of contraventions

Traffic police structures achieved the following in the first 8 months of 2023 (comparison with the similar period in 2022) [17]:

- 38,797 actions performed (+9.5%, +3,364).
- 1,372,950 contravention sanctions applied (+9.6%; +120,615).
- 25,970 offenses against traffic safety on public roads reported (-3.9%; -1,043), of which 2,752 offenses for driving a vehicle under the influence of psychoactive substances (1,400 in the last 3 months);

- 157,037 driving licenses withheld (-2.6%; -4,252), of which 25,000 for alcohol, in 8,000 cases criminal files were also drawn up;
- 57,292 registration/registration certificates withdrawn (+7.8%; +4,127), respectively 8,959 registration plates (+10.1%; +823).

5. CONCLUSIONS

In order to increase the degree of road safety, the active and direct involvement of all administrative structures, from those at the European, regional, national and local levels, is imperative.

The most important aspect, however, concerns the individual responsibility of all traffic participants, because only by adopting a preventive behaviour by each user of public roads can an appropriate road safety climate be achieved. Traffic education is a main component of traffic police activity, which aims at the knowledge and correct application of traffic rules by traffic participants, in order to adopt a preventive traffic behaviour. In this sense, the educational activities aimed at making traffic participants aware of road risk and the determining role that their attitude has in improving road traffic safety, must be intensified and diversified, because only in this way can the indifferent attitude of a large part of the population, based on the mentality that road safety issues are the job of the authorities, and avoiding risky situations in traffic is the task of road partners [1].

As a result of the educational campaigns carried out by the Road Directorate within the General Inspectorate of the Police and the increasingly numerous actions of guidance, supervision and control of compliance with traffic rules on public roads (128,960 driving licenses retained in 2014 to 181,700 driving licenses retained in 2021), a significant decrease in serious accidents on Romania's roads due to pedestrian indiscipline and the speed of motor vehicles has been observed, from 4,437 accidents in 2008 to 2,999 accidents in 2019. In 2021, there were only 1,661 serious road accidents having as the cause the indiscipline of pedestrians and the speed of vehicles, but it should be noted that it was a pandemic year with important traffic restrictions. Cyclist violations have registered an increase in the share of serious road accidents from 277 in 2007 to 851 in 2019, probably also on the background of the almost exponential increase in bicycle users. The other important causes for the occurrence of serious road accidents remained approximately constant in terms of the number of occurrences of serious road accidents.

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