

ROAD SAFETY ON THE EXAMPLE OF THE CITY OF BYTOM

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Abstract

National Road Safety Program 2013-2020 assumes to reduce fatalities by half and seriously injured by 40% from 2010 to 2020. It means that no more than 2,000 people per year should die on Polish roads and no more than 6,900 people should suffer serious injuries in traffic accidents. The experience of other European Union countries with improving road safety gives hope that these goals are still realistic, but there is a need to intensify the activities carried out in this area. In Poland, more and more institutions are taking part in the process of improving road safety: state institutions, non-governmental organizations, local governments, enterprises, scientific and research institutions, the media and many others. The study presents the problem of road safety in the city of Bytom on the basis of its analysis in the years 2013-2017. It discusses the types of road accidents and their classification. Moreover, the paper describes the issues illustrating the situation on roads that have a particular impact on the safety level of road users, among others, the number of road accidents, reasons for their occurrence, the consequences and groups of perpetrators of accidents. It also describes actions and initiatives taken to improve road safety in the city of Bytom.

Keywords: road safety, traffic incidents, traffic accident, road collision, fatalities, injured people

1. Introduction

The European Commission's strategy is to strengthen the position of the European Union as a world leader in terms of safety and security in relation to all transport modes. In order to achieve this goal, it was assumed to reduce fatalities by half in road transport from 2010 to 2020 and achieve a nearly zero figure by 2050 [2]. The analysis of statistical data shows that mortality as a result of traffic incidents, both in Europe and on Polish roads, has a downward trend. Unfortunately, this indicator is still high (Table 1).

According to data provided by the European Commission, Poland is in the group of countries with the highest risk of loss of life and health in road traffic. Only Croatia, Bulgaria and Romania are in a similar situation.

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Tab. 1. Number of fatalities in road accidents in Poland and the European Union in the years 2010-2017 [2, 24]

Year	Number of fatalities			
	European Union		Poland	
	Total	2011=100%	Total	2011=100%
2011	30 685	100	4 189	100
2012	28 243	92.04	3 571	85.25
2013	25 956	84.59	3 357	80.14
2014	25 977	84.66	3 202	76.44
2015	26 130	85.16	2 938	70.14
2016	25 651	83.59	3 026	72.24
2017	25 300	82.03	2 831	61.92

In terms of road safety, various initiatives in the field of legislation, development and improvement of the road infrastructure are taken [3, 6, 14]. The supervision of road traffic and social campaigns, educational and informational projects, road rescue, statistical analysis [9, 19, 20] as well as scientific researches in the field of road safety, are intensified [8, 13, 28]. The National Road Safety Council (KRBRD) is an inter-ministerial advisory and auxiliary body of the Council of Ministers in matters of road safety. This body proposes state policy directions and develops programs in order to improve the level of road safety. In 2013, the National Road Safety Program 2013-2020 was adopted by the KRBRD. This program defines the directions of actions aimed at achieving the following targets by 2020 [10]:

- Reducing the number of fatalities in road traffic accidents by at least 50% compared to 2010, i.e. up to a maximum of 2000 people killed;
- Reducing the number of seriously injured victims in road accidents by at least 40% compared to 2010, i.e. up to a maximum of 6.900 seriously injured people.

The program was created in the context of existing international and national programs and strategies, such as:

- Global Plan for the Decade of Action for Road Safety 2011-2026 [6];
- 4th European Action Program for Road Safety [31];
- National Development Strategy 2020 [21];
- Transport Development Strategy until 2020 [22];
- Efficient State Strategy 2020 [23];
- National Health Program for the years 2007-2015 [12];
- National Program for Prevention and Solving Alcohol Problems for the years 2011-2015 [11].

Specific actions for implementation of the directions of activities specified in the National Road Safety Program 2013-2020 have been recorded in two-year implementation programs. In the Implementation Program for the years 2018-2019, two priority areas of intervention have been determined:

- Pedestrian protection,
- Speed management.

These priorities have been repeated from previous implementation programs. The document sets out the specific tasks under six pillars [15]:

- Safe man;
- Safe roads;
- Safe speed;
- Safe vehicle;
- Rescue and post-accident care;
- Traffic Safety Management System.

According to researchers dealing with road safety, the number of traffic incidents is connected with the growing number of vehicles on the road, the quality of roads, the technical condition of vehicles, the driver experience [1, 16, 17], driving culture [4, 18, 29] and the organizational factors [5].

Traffic incidents can be divided into:

- Traffic accident (Article 177 of the Criminal Code);
- Road collision (Article 86 of the Misdemeanor Code);
- Event from Article 97 of the Misdemeanor Code;
- Event from Article 98 of the Misdemeanor Code;
- Parking damage.

Traffic accident

A traffic accident is determined in Article 177 of the Criminal Code (KK), as an offense which is a traffic incident involving the intentional or unintentional violation of safety rules in land, water or air traffic, in which another person has suffered a violation of bodily functions or a health disorder for a period of more than 7 days (Article 157§1 of the Criminal Code) [25]. This is a sudden and unforeseen (in principle) event, which usually also causes damage to property. The aggravated type of the described crime is its additional features, i.e. the consequence of an accident is the death of another person or serious damage to health (Article 155 of the Criminal Code).

Road collision

A road collision, in accordance with Article 86 of the Misdemeanor Code (KW) is a minor offense consisting in causing a threat to road safety by failing to take due care on a public road, in a residential area or a traffic zone [26]. This minor offense can also be committed in the state after using alcohol or a similarly acting agent [27]. Causing a safety risk is a traffic disruption that leads to a road collision. It must be characterized by a real nature, i.e. a character that will cause that the current situation on the road can change into

a situation that will have negative effects. Collision is the contact/damage of vehicles as a result of failure to exercise due caution by one or more drivers. Here, we can include other events, e.g. hitting an animal, building, etc.

Event described in Article 97 of the Misdemeanor Code

An other traffic incident described in Article 97 of the Misdemeanor Code is an event taking place on a public road, in a residential zone or in a traffic zone, in which the only participant of the incident is the perpetrator, who is also the victim (he causes a threat to himself). A classic example of committing a minor offense determined in Article 97 of the Misdemeanor Code is a driver, who exceeds the speed without adapting it to the conditions on the road, loses control of the vehicle and hits the lighthouse, tree, building, etc.

Event described in Article 98 of the Misdemeanor Code

In Chapter XI of the Misdemeanor Code, Article 98 states: „Whoever, driving a vehicle outside the public road, does not exercise due caution and poses a threat to the safety of other people, or does not apply to provisions regulating the use of internal roads or other places accessible to vehicles, is subject to a fine or a reprimand” [26]. The place of incident is internal roads, and their definitions are contained in the Act of 21 March 1985 on public roads. This minor offense consists in causing a threat to the security of another person, and no damage to the property itself. An example is a situation connected with reversing the vehicle in the internal road car park, where the driver does not notice the person, who is forced to jump abruptly in order to avoid hitting or impact.

Parking damage

Parking damage is an incident similar to the above-described incidents. It must also take place on the internal road, but there is no threat to the safety of persons, only damage to property.

2. State of road safety in the city of Bytom

Analyses presented in the further part of the study were based on the data from the Central Statistical Office (GUS), the National Road Safety Council and information made available by the Municipal Police Headquarters in Bytom. Police officers document traffic incidents (protocol of acceptance of the notification about the minor offense, protocol of a witness interview, inspection report, official notes, etc.) and fill in statistical prints, i.e. a traffic incident card and registration card [30]. Data from the cards are entered into the Accident and Collision Record System (SEWIK). The SEWIK database contains the following data, among others [24]:

- Places of a traffic incident (sketch of an incident);
- Conditions at the time of the incident;
- Type of incident;

- Vehicles participating in the incident;
- Damages with the exception of vehicles;
- Reasons (circumstances) of a traffic incident;
- Participants of a traffic incident;
- Method for resolving the case;
- A policeman, who undertakes actions in connection with a traffic incident.

The number of traffic incidents in the city of Bytom in the years 2013-2017 does not show a downward trend (Table 2). In the last five years, the highest number of traffic incidents was recorded in 2015, and the highest number of victims in 2014. After 2015, the number of incidents and their victims decreased, while the number of collisions increased in the same period.

Tab. 2. Number of traffic incidents in Bytom in the years 2013-2017 [24]

Year	Number of traffic incidents			
	Number of traffic accidents	Number of fatalities	Number of injured people	Number of collisions
2013	121	4	140	1518
2014	142	11	160	1420
2015	149	8	178	1266
2016	121	4	135	1376
2017	109	4	123	1548

Statistical data provided by the Municipal Police Headquarters in Bytom indicate that the most common cause of road accidents is hitting the pedestrian, and then vehicle collision (Fig. 1). Among the collisions, side collisions occur most frequently.

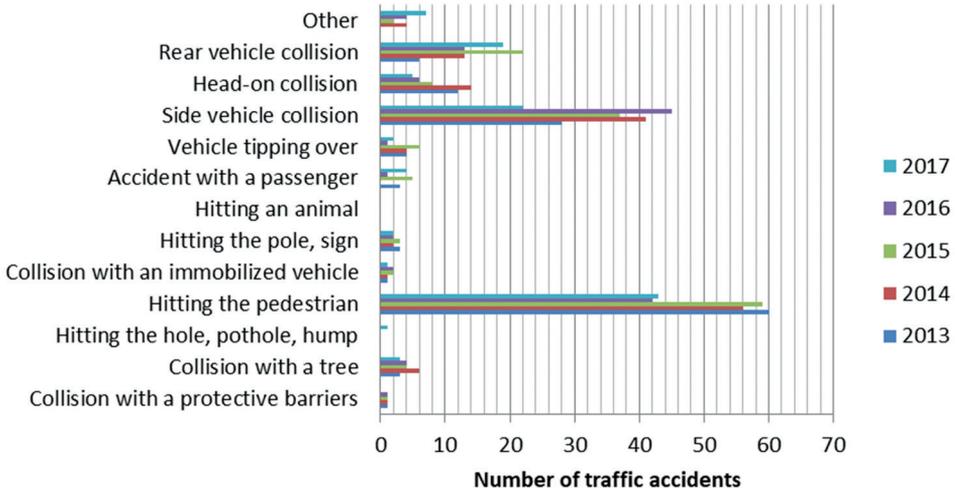


Fig. 1. Types of road accidents in the city of Bytom in the years 2013-2017

Among the registered road collisions, the most common are side and rear vehicle collisions and collisions with an immobilized vehicle (Fig. 2).

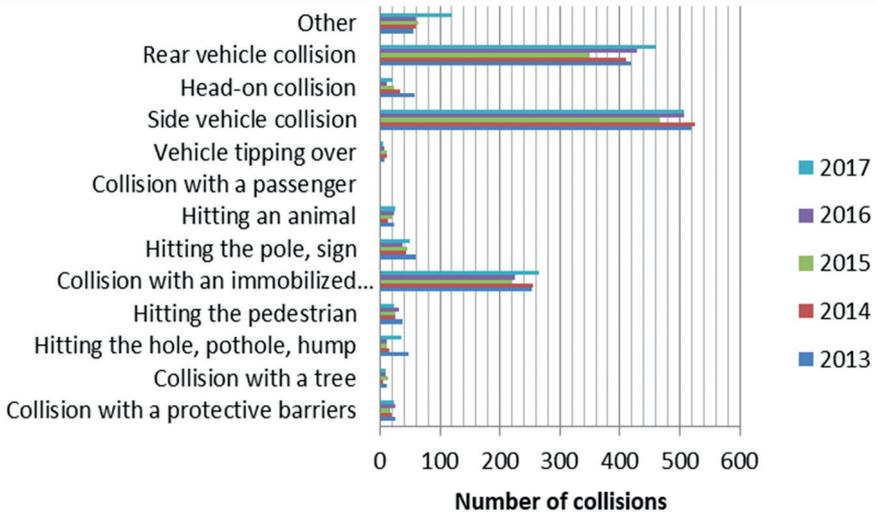


Fig. 2. Types of road collisions in Bytom in the years 2013-2017 (own study based on [24])

The most often determined the cause of road collisions in Bytom are objects and animals on the road, as well as improper road conditions (Fig. 3).

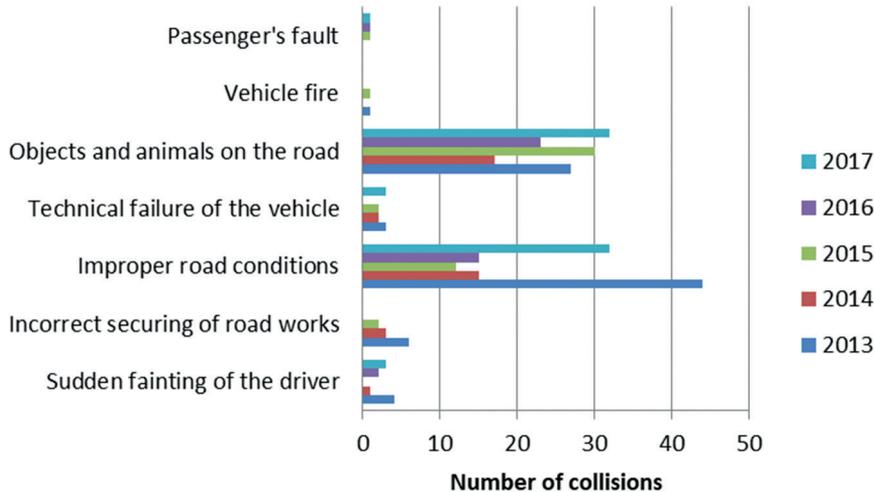


Fig. 3. Causes of road collisions in Bytom in the years 2013-2017 (own study based on [24])

The analysis of the causes of traffic incidents in the last five years has shown that over 90% of collisions are caused by the fault of the driver, while the pedestrian's fault is only 1%. In road accidents, the guilt of the driver also prevails and it has an upward trend from 74% to 82%. The pedestrian's guilt varies between 17% and 20%. In 2017, the percentage share of accidents with the participation of pedestrians due to the guilt of the driver in the total number of accidents amounted to 25%. Detailed analysis of police data reveals recklessness of drivers, lack of driver's driving culture, including breaking the regulations (Figs. 4, 5 and 6). Specific reasons include (Table 3):

- Failure to keep a safe distance between vehicles;
- Incorrect reversing;
- Inappropriate speed for traffic conditions;
- Failure to comply with the priority rule;
- Incorrect change of the lane.

According to statistical data, the dominant guilt of pedestrians in road accidents and collisions is careless entrance to the road in front of a moving vehicle. It is appalling that the majority of accidents with the participation of pedestrians take place at pedestrian crossings.

Tab. 3. Causes of road incidents due to the driver's behavior [24]

Driver's behavior	2013	2014	2015	2016	2017
Violent braking	5	1	7	6	7
Driving on the wrong side of the road	9	8	7	-	-
Failure to adjust speed to traffic conditions	173	179	140	144	158
Incorrect reversing	221	196	163	191	201
Incorrect passing the stationary vehicle	102	107	105	86	97
Incorrect crossing of the pedestrian crossing	3	7	3	-	-
Incorrect turning	94	104	99	121	139
Incorrect passing from the opposite direction	21	9	9	18	19
Incorrect overtaking	28	30	31	13	18
Incorrect stop or parking	11	18	10	13	10
Incorrect U-turn	18	17	10	8	7
Incorrect lane change	89	90	107	94	124
Failure to observe signs and other signals	12	66	85	91	60
Failure to adapt to traffic lights	9	0	1	9	16
Failure to give priority to pedestrians	40	27	23	36	33
Failure to give right of way	293	250	159	166	170
Failure to maintain a safe distance between vehicles	319	298	308	345	384
Entry at a red light	9	12	5	-	-
Fatigue, falling asleep	3	5	10	4	10



Fig. 4. Traffic incident at Chorowska Street [32]



Fig. 5. Traffic incident at Powstańców Śląskich Street [33]



Fig. 6. Traffic incident at Jan Paweł II Avenue [34]

According to statistical data from the last five years, the perpetrators of traffic incidents in Bytom were usually drivers aged 25-39. The second group of perpetrators included drivers aged 40-59, and the third group – drivers between 18 and 24 years of age.

In 2017, compared to 2016, an increase in traffic incidents, where the perpetrator was a drunk driver, was recorded (Table 4). On the national scale, this indicator was lower in 2017 than in the previous year. It should be emphasized that in 2017, police officers in Bytom revealed 374 persons, who were driving a vehicle under the influence of alcohol.

Tab. 4. Drunk perpetrators of traffic incidents [24]

Accidents			Collision		
2016	2017	2016=100%	2016	2017	2016=100%
1	4	400%	18	20	111.11%

In Bytom, the largest number of traffic incidents took place with the participation of the following vehicles (Table 5): passenger cars, trucks, public transport buses, mopeds, motorcycles and bicycles.

Tab. 5. Vehicles of traffic incident participants [24]

Type of vehicle	2013	2014	2015	2016	2017
Other bus	1	3	1	2	3
Public transport bus	18	14	20	14	24
Motorcycle	12	12	5	6	10
Moped	13	24	7	15	12
Bicycle	11	15	14	17	12
Truck	148	114	117	158	157
Passenger car	1197	1191	1066	1124	1233
Tram, trolleybus	1	6	5	4	9

Other vehicles not included in Table 5 also participated in traffic incidents, but their share was negligible in comparison to the above-mentioned vehicles.

A detailed analysis of road accidents in the city of Bytom in 2017 showed that the highest repeatability of accidents - 13, took place in Strzelców Bytomskich Street, i.e. the route DK-11, and the most dangerous day of the week was Friday - 20 accidents. The most traffic collisions were recorded on the following routes: DK-94, DK-11, DK-79 and DW-925 (Table 6).

Tab. 6. Roads with the highest repeatability of road collisions

National and provincial road		District and commune road	
Road name	Number of road collisions	Road name	Number of road collisions
DK-94	332	Piekarska	19
DK-11	155	Krzyżowa	18
DK-79	99	Łągiewnicka	11
DK-88	50	-	-
DK-78	19	-	-
DW-925	78	-	-
DW-911	31	-	-

The comparative analysis of the road safety in the city of Bytom the background of the entire Poland covers the year 2017 and applies only to road accidents (Tables 7 and 8).

Tab. 7. Hazard indicators in the city of Bytom on the background of the country [24]

Demographic indicators	Bytom	Poland
Number of accidents / 100,000 residents	64	85
Number of people killed / 100,000 residents	2	7.4

Tab. 8. Share of accidents in the city of Bytom on the background of the country [7, 24]

Share of accidents	Bytom	Poland	
Driver's guilt	82%	87%	
Pedestrian's guilt	17%	7%	
Inadequate speed to traffic conditions	11%	21%	
Hitting a pedestrian	36%	24%	
Collision of vehicles in motion	side	18%	30%
	rear	16%	13%
With the participation of cyclists	7%	5%	

Based on the statistical data presented in Tables 7 and 8, the following conclusions can be made:

- In 2017, the number of accidents and their casualties, both fatal and injured, decreased in Bytom. Accident and death rate per 100,000 residents is much lower than for the rate for the whole country,
- The city of Bytom has a very high rate of accidents involving pedestrians (hitting a pedestrian), as well as accidents due to the pedestrian's fault,
- In the structure of accidents, in the city of Bytom, side and rear collisions dominate. The rate of accidents in the rear impact exceeds the percentage of such accidents on the national scale.

3. Conclusions

The level of road safety in the city of Bytom does not differ significantly from the country, with the exception of the following issues:

- residents of the city are more exposed to road accidents with the participation of a pedestrian;
- in Bytom accidents due to the fault of the pedestrian are 2.4 times more frequent.

The statistics confirm the legitimacy of the actions carried out by the Police in Bytom and the selection of priority areas of intervention in the Realization Program for the years 2018-2017 in the area of pedestrian protection. With regard to pedestrian safety, it is particularly important to:

- Raising awareness of road hazards, traffic regulations and the need to comply with these regulations;

- Awareness of the consequences and consolidation of the principles of safe movement;
- Development of skills and proper attitudes related to safe participation in road traffic with the use of a variety of teaching methods.

Police, based on the analysis of road safety in Bytom, develops a strategy to improve the identified problems. The following activities are most often planned:

- Activities of Police patrols in the field of disclosure of minor offenses that are the main cause of traffic incidents;
- Directing patrols to the patrol service on the roads with the highest number of accidents;
- Intensification of vehicle inspections towards the disclosure of driver under the influence of alcohol in selected regions and time, according to statistical lists revealing the most traffic incidents involving the participation of drivers under the influence of alcohol.

Additionally, on the basis of monthly analysis of road incidents involving pedestrians, Police in Bytom takes the following actions:

- Assignment of police officers twice a month for own actions entitled "Monitoring of pedestrian crossings" and twice a month for voivodeship actions "Safe pedestrian";
- Location of patrols in places particularly at risk for pedestrians;
- Participation in lectures about pedestrian safety, e.g. "Safe way to school" in cooperation with Fire Brigade officers, who present first aid;
- Requirement for pedestrians to use reflective elements in the unbuilt area in autumn and winter.

Police, depending on current needs, cooperates with various institutions. Places of repeated road incidents are inspected by designated officers in order to reveal the occurrence of anomalies. If the causes of incidents are found during the control, information along with the order to remove the deficiencies is passed to the appropriate institutions. These institutions include, e.g.:

- Roads and Bridges Management Authority;
- Greenery and Municipal Economy Management Authority;
- Water Supply and Sewage Authority.

In addition to the current tasks resulting from basic duties, the Police in Bytom takes innovative actions. As a result of cooperation with Lifor Sp. z o.o., Municipal Police and Municipal Road Administration, it took part in the pilot project "Safe Bytom". The project concerned an integrated system for comprehensive speed camera service and automatic processing of registered minor offenses and creating complete fine documentation. The operation of this system was based on specialized devices (speed cameras, cameras, data transmission modems) mounted on masts. These devices enabled to monitor road traffic 24 hours a day and to transmit registered minor offenses, to a selected fine center.

Furthermore, the Road Traffic Department conducts numerous preventive activities aimed at improving safety and increasing social awareness of the negative effects of violating traffic safety regulations.

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