

# Considerations on the road safety situation in Sibiu county, between 2010 and 2019

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**Abstract.** Road transportation has become a significant part of human society and interactions, especially from an economic and social point of view. Road accidents represent major disruptions in this regard, and therefore, nowadays, road safety management is a critical topic. Sibiu county is located in a critical position in Romania, at the crossing of major North-South and East-West roads. Starting from these facts, the current paper aims to present an analysis of the road accidents that occurred in Sibiu county from January 1<sup>st</sup>, 2010 to December 31<sup>st</sup>, 2018, focusing on the number of victims but also on the causes generating or favoring the generation of these accidents.

## 1. Introduction

Modern civilization cannot be conceived without roads and cars. Unfortunately, in the conditions of an ever-increasing population, roads and cars to are increasing in numbers, and this, in turn, means that problems such as pollution or road accidents are also on the rise. Just as pollution is fought with the help of new, innovative, less polluting, renewable fuel sources [1, 2], road accidents can be fought by adopting specific road safety measures. These measures can be legal provisions, or they can be organizational or physical elements such as new motorways or lane-separating barriers. However, the essential precondition for efficient road safety management is to know the number of accidents, to know the evolution of this number over time and to know the causes of the accidents.

The member states of the European Union are among the best in terms of road safety. Still, in 2017, a total of 25260 persons lost their lives in road accidents across the European Union (while 1.45 million people have sustained severe or light injuries) [3, 4, 5]. While this represents a significant reduction compared to 54900 fatalities in 2001, it is nonetheless only a slight improvement in comparison to the figure of 31 500 fatalities in road accidents in 2010, especially considering the fact that the EU had set in 2010 a target of halving the number of road deaths until the year 2020 and that the ambitious “Vision Zero” goal seeks to eliminate fatalities and serious injuries stemming from accidents on European roads by the year 2050 [3].

In Romania, the government has adopted in 2016 the National Road Safety Strategy 2016-2020 [6], that reaffirms Romania’s commitment to the goal of a 50% reduction of the number of road deaths between 2010 and 2020 and this involves several measures in all aspects related to road safety, in all administrative units of the country [7, 8].

Still, the number of accidents recorded at the national level is relatively high, and there are required more efforts and solutions to achieve the goal, considering that in 2017, for example, there were recorded 1899 road fatalities compared to 2377 in 2010 [9, 10]

Sibiu county is crossed by several vital roads that usually see a high volume of road traffic. Therefore, road safety is paramount in this area, and the analysis of the number of road accidents and of the conditions in which they occur is a significant step in applying the right road safety measures.

In the current paper, the author analyses the number of accidents produced in Sibiu county between 2010 and 2018, the causes and the consequences of these accidents.

## 2. Analyzed area and methodology

Sibiu county is located in the center of Romania, and this location has allowed it to contain several important roads and road crossings (figure 1 [11]);

- DN1 crosses the county from east to west, coming from Braşov, passing through the city of Sibiu and going towards Sebeş and Alba Iulia;
- DN7 enters the county from the south, through the Olt River Gorge, enters the city of Sibiu and continues westwards towards Sebeş; from Sibiu to the border between Sibiu county and Alba county DN1 and DN7 share the same road within ;
- The A1 motorway segment from Sibiu to the border between Sibiu county and Alba county doubles the DN1/DN7 segment in that area.
- DN14 links the city of Sibiu with the city of Mediaş and the city of Sghişoara (the latter in Mureş county).



**Figure 1.** The leading road network of Sibiu county [11].

The statistical indicators for the number and causes of road accidents that occurred in Sibiu county between January 1st, 2010 and December 31st, 2018 have been interpreted using quantitative analysis with exploratory character, using mainly three sources:

- the National Road Safety Strategy 2016-2020 [6];
- the EAC (Registry of Road Accidents) application of the General Inspectorate of the Romanian Police [9];
- statistics published by the General Inspectorate of the Romanian Police [12].

It should also be mentioned that the numbers included in this analysis do not include road accidents from the analyzed period and the analyzed county (Sibiu County) that resulted only in material damage, without casualties.

Following analysis methods have been used:

- trends analysis;
- analysis of the intensity of an indicator in a specific time interval;
- comparative data analysis.

### 3. Results and discussion

The number of road accidents that occurred in Sibiu county between 2010 and 2018 and involved is presented in table 1.

**Table 1.** Number and consequences of road accidents that occurred in Sibiu county between 2010 and 2018.

Types of accidents and of consequences	2010	2011	2012	2013	2014	2015	2016	2017	2018
Light accidents	232	206	259	270	262	301	352	330	346
Serious accidents	202	217	204	196	208	200	187	184	196
Fatalities	47	44	43	31	46	29	33	31	34
Serious injuries	229	228	209	204	217	229	213	187	193
Light injuries	422	363	414	439	447	447	583	540	544

The leading causes of these accidents and the number of accidents attributed to each are listed in table 2. It can be noticed that the hierarchy of importance of these causes differs according to the category of accidents (light accidents or serious accidents).

**Table 2.** Leading causes of road accidents produced in Sibiu county between 2010 and 2018.

Main cause	Serious accidents	Light accidents	Total
Speed not adapted to road conditions	422	430	852
Failure to grant the right of way to vehicles	188	387	575
Illegal road crossing by pedestrians	227	229	456
Failure to grant the right of way to pedestrians	206	246	452
Failure to maintain a safe distance between vehicles	66	268	334
Illegal or unsafe actions by bicycle riders	112	143	255
Illegal overtaking maneuvers	100	96	196

The first four causes mentioned were responsible for 52% of all fatalities, severe injuries, and light injuries resulted from road accidents produced in Sibiu county between 2010 and 2018.

The first cause, speed not adapted to road conditions led to the death of 109 persons, to severe injuries in 506 persons and light injuries in 946 persons.

During the analyzed period, the second cause indicated in table 2, the failure to grant the right of way to vehicles, led to the deaths of 12 persons, the serious injuring of 214 persons and light injuring of 655 persons within the limits of Sibiu county. The highest number of victims from accidents having this cause was recorded on city/village streets, with a total of 595 casualties of various types. However, it should also be noted that this cause led to a much more significant proportion of light accidents than serious accidents (a trend that is also preserved in the case of the failure to maintain a safe distance as a cause).

The illegal crossing of roads was the cause of 46 fatalities, 184 severe injuries, and 237 light injuries. In this case, too, the highest number of severe consequences was recorded on city/village streets (346).

The failure to grant the right of way to pedestrians led to 19 fatalities, 193 severe injuries, and 270 light injuries. Again, most (448) victims were recorded on city/village streets.

However, it should be pointed out that the importance of the causes of road accidents varied on the various roads function of the intensity of the road traffic and the specific road conditions. As an example, table 3 shows the leading causes of accidents on the Olt River Gorge sector of DN7 [13]

**Table 3.** Leading causes of road accidents produced on the Olt River Gorge between 2010 and 2018 [13].

Curr. No.	Causes	Accidents
1	Speed not adapted to road conditions / excessive speed	93
2	Illegal overtaking manoeuvres	31
3	Falling asleep while behind the wheel	25
4	Driving on the wrong side of the road	15
5	Failure to grant the right of way to pedestrians	14
6	Failure to maintain a safe distance between vehicles	16
7	Pedestrians indiscipline	14
8	Driving under the influence of alcohol	6
9	Failure to grant the right of way to vehicles	6
10	Driver distracted by other preoccupations	3
11	Medical conditions	2

For a more detailed analysis, table 4 shows the evolution of the consequences of road accidents by type of road.

**Table 4.** Numbers of casualties on the various types of roads in Sibiu county between 2010 and 2018.

Casualties by type of road	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
National roads										
Fatalities	24	31	23	13	34	25	20	14	17	199
Severe injuries	82	91	65	59	77	88	103	68	76	709
Light injuries	145	136	129	136	175	166	227	172	180	1466
County roads										
Fatalities	5	6	9	8	3	3	4	11	9	58
Severe injuries	39	32	31	34	37	22	37	38	31	301
Light injuries	44	43	66	73	64	64	82	117	87	640
Communal roads										
Fatalities	0	0	0	0	0	0	0	0	0	0
Severe injuries	2	3	2	2	1	3	0	3	1	17
Light injuries	4	3	1	9	5	8	3	5	8	46
City streets										
Fatalities	18	7	11	10	9	1	9	6	8	79
Severe injuries	106	102	110	107	102	116	73	78	82	876
Light injuries	229	180	217	218	203	209	271	246	263	2036
Other types of roads										
Fatalities	0	0	0	0	0	0	0	0	0	0
Severe injuries	0	0	1	2	0	0	0	0	3	6
Light injuries	0	1	1	3	0	0	0	0	6	11

It can be seen that most (83%) severe injuries and fatalities occurred on national roads or city/village streets.

Most accidents occurred on national roads (852), followed by county roads (247) and city/village streets (191). It is noteworthy that on public roads and other types of roads (forestry roads etc.) there were no fatalities and only 6 seriously injured persons.

When analysing the situation of the road accidents occurring on the streets of the city of Sibiu, for example, it can be seen that the first two streets in terms of the number of accidents (Alba Iulia street with a total of 128 accidents in the analyzed period and Dumbravii street with a total of 95 accidents in the analyzed period) recorded a higher number of accidents than the following four streets combined.

An essential element to note in table 4 is also the fact that in the last two years of the analysis, 2017 and 2018, the number of fatalities and serious injuries has decreased compared to the previous years. This is a consequence of the implementation of several measures, targeting mainly the road infrastructure, taken in order to increase the road safety, such as the installation of direction-separating barriers (New Jersey barriers), the improvement of the road markings, the introduction of appropriate speed limitations and not least the (re-)opening of the motorway segment from Sibiu towards the border between Sibiu county and Alba county.

#### 4. Conclusions

When analysing the number of road accidents, their causes, the road conditions, the vehicles and persons (drivers, passengers, pedestrians) involved, it can be concluded that the majority of accidents that occurred on the roads of Sibiu county in the period 2010-2018 had as main favoring factor the human factor, which is the most important, but also the most difficult to manage.

This is especially significant when because 98% of the road accidents occurred on flat road segments and 77% of the road accidents occurred on dry roads.

The author intends to expand her studies about road safety to include the situations in other/neighborhood counties and more influencing factors and causes.

#### References

- [1] Dumitru M, Stanciu M, and Bibu M 2013 *Lucr. St. Manag. Agr.* **15** 156-159
- [2] Bibu M and Dumitru M 2014 *Sci. Pap. Manag. Ec. Eng. Agri. Rural Dev.* **14** 35-38
- [3] European Commission 2011 *Roadmap to a single European transport area – towards a competitive and resource efficient transport system* (Brussels: European Commission)
- [4] ETSC 2018 *Ranking EU progress on road safety. 12th road safety performance index report* (Brussels: European Transport Safety Council)
- [5] ERSO 2018 *Annual accident report 2018* (Brussels, European Commission)
- [6] Government of Romania 2016 *National road safety strategy for the period 2016-2020* (Bucharest: Monitorul Oficial al Romaniei)
- [7] Government of Romania 2012 *Law 265/2008 regarding the management of the safety of traffic on the road infrastructure, republished* (Bucharest: Monitorul Oficial al României)
- [8] Government of Romania and AECOM 2015 *Final revised variant of the report on the master plan on short, medium and long term* (Bucharest: AECOM)
- [9] Inspectorate-General of the Romanian Police 2019 *EAC Registry of road accidents* (Bucharest: Romanian Police)
- [10] Tarnu L and Deac C 2018 *Matec Web Conf.* **184** 01012
- [11] Google 2018 *Map of Sibiu county* (Mountainview, California: Google)
- [12] Inspectorate-General of the Romanian Police 2019 *Statistics* (Bucharest: Romanian Police)
- [13] Tarnu L and Deac C 2018 *Matec Web Conf.* **184** 01011