

STUDY IN ROAD ACCIDENT CAUSES IN CHISINAU

A. POPU OI

Abstract: *This article begins with a brief introduction containing data on the current situation on traffic accidents, which unveils that there is an issue related traffic road accidents at the global level. There are presented the goals, statistics of road accidents in the Republic of Moldova based on time interval, on weekdays and months of the year. All this is analysed, which unveils the causes of road accidents. It was thoroughly examined the situation of the road traffic on Stefan cel Mare Boulevard. Forecasts of transport network development show that a sharp increase in transport units increases the risk of accidents. At the end of the article, the author comes with proposals that could improve the situation.*

Keywords: *road network, urban transport network, traffic accident, injured, road safety.*

1. Introduction

Some 1.25 million people die each year as a result of road traffic crashes, according to the WHO's Global status report on road safety 2015, despite improvements in road safety. "Road traffic fatalities take an unacceptable toll – particularly on poor people in poor countries," says Dr Margaret Chan, Director-General of WHO [4].

Road traffic injuries are among the three leading causes of death for people between 5 and 44 years of age. Unless immediate and effective action is taken, road traffic injuries are predicted to become the fifth leading cause of death in the world, resulting in an estimated 2.4 million deaths each year. This is, in part, a result of rapid increases in motorization without sufficient improvement in road safety strategies and land use planning [5].

However, the number of road traffic

deaths is stabilizing even though the number of motor vehicles worldwide has increased rapidly, as has the global population. In the last three years, 79 countries have seen a decrease in the absolute number of fatalities while 68 countries have seen an increase.

Countries that have had the most success in reducing the number of road traffic deaths have achieved this by improving legislation, enforcement, and making roads and vehicles safer.

Road safety is a shared responsibility. Reducing risk in the world's road traffic systems requires commitment and informed decision-making by government, industry, non-governmental organizations and international agencies. It also requires the participation of people from many different disciplines, including road engineers, motor vehicle designers, law enforcement officers, health professionals, educators, and community groups.[6]

2. Objectives of the Investigation

1. To outline the causes that generate serious traffic accidents.
2. To make rational analysis and planning of measures to improve the situation.
3. To unveil the existing problems on local level, the composition of traffic flows, as well as skills of specialists in the realm.
4. To develop a strategy on road accidents resulting in casualties aiming to reduce the number of traffic accidents with injuries.
5. To promote measures aiming to protect participants in traffic.
6. To develop a set of procedures and functions which would provide, in a network of certain streets, the size and

structure of traffic flows, areas (major and minor intersections, streets) where there is an increased risk of accidents;

- to identify possible solutions aiming to increase road safety, specific peculiarities of Chisinau city.

3. The Frequency of Road Accidents in Moldova

The frequency of road accidents. During 2015 (12 month), they were recorded 2,527 traffic accidents with 297 fatalities and 3,021 injured people. The frequency of road accidents. During 2015 (12 months), police recorded 2,527 traffic accidents with 297 fatalities and 3,021 injured people.

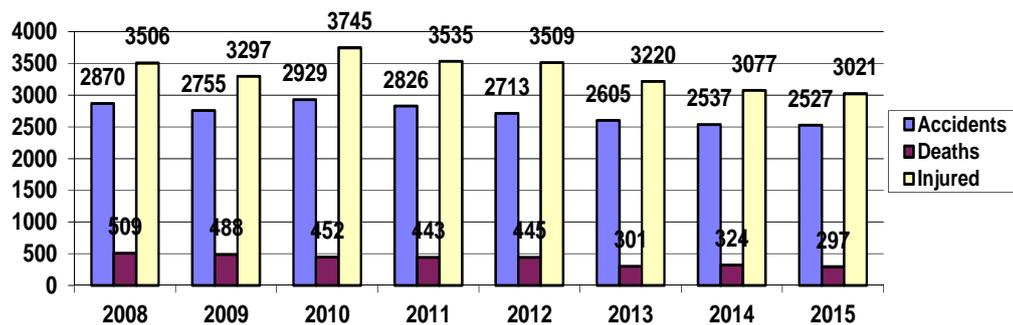


Fig. 1. Frequency of road accidents (2008-2015)

Of the total number of accidents, most of them consists of:

- buffering pedestrians - 884 accidents (34.5% of total number of accidents committed in that period);
- clash of transport means - 819 (31.9%);
- buffering obstacles - 358 (14.0%);
- inversion of transport means - 255 (10.0%);
- buffering cyclists - 85 (3.3%);
- collision of stationed transport means - 35 (1.4%);
- buffering hipomobiles - 21 (0.8%).

After months of the year, accidents are distributed as follows:

January	- 172 (6.8%)
February	- 151 (5.9%)
March	- 177 (7%)
Aprilie	- 244 (9.6%)
May	- 234 (9.2%)
June	- 233 (9.1%)
July	- 226 (8.9%)
August	- 212 (8.3%)
September	- 241 (9.5%)
October	- 230 (9.0%)
November	- 186 (7.3%)
December	- 221 (8.7%)

The frequency of road accidents according to waking hours (in.2015) Table 1

2015			
Time interval	Accidents	Deaths	Injured
00.00-06.00	262	58	319
06.00-08.00	147	13	204
08.00-10.00	239	14	271
10.00-12.00	217	14	272
12.00-14.00	247	22	314
14.00-16.00	269	24	345
16.00-18.00	348	38	394
18.00-20.00	359	50	380
20.00-22.00	259	38	296
22.00-24.00	180	26	226
Total General	2527	297	3021

Performing an analysis of traffic violations committed by drivers leading to traffic accidents that bring these violations are distributed as follows:

- inadequate speed with visibility conditions, road situation - 619 accidents (27.1% of all accidents involving drivers' fault);
- to the passage of pedestrian crossings - 283 (12.4%);
- failure priority to the passage intersections - 288 (12.6%);
- start of movement, change of direction, steering - 239 (10.4%);
- driving under the influence of alcohol - 161 (7%);

- failure to comply with distance, lateral interval 138 (6%);
- exceeding speed - 98 (4.3%);
- inattention - 64 (2.8%);
- to the overrun, bypass - 51 (2.2%);
- stopping, stationary - 23 (1%).

Performing an analysis of traffic violations committed by pedestrians, such violations shall be distributed as follows:

- crossing the street without ensuring in advance - 123 accidents (58% of all accidents involving pedestrians fault);
- crossing the street in prohibited places - 43 accidents (20.2%);
- irregular movement on the road - four accidents (3.4%);
- unexpected exit behind vehicles - two accidents.

4. Influence of Traffic Intensity on The Boulevard Stefan cel Mare on The Frequency of Road Accidents

Movements in the downtown is at the limit of capacity of the streets and in nearby bus stations, central market, the National Square and other areas such as market in the street. Pushkin is conducted with frequent congestion. During rush hours, the situation is complicated considerably, traffic jams occur almost on all street linking the outskirts with the downtown Chisinau. As a result of the considerable increase in the number of transport means in the city (3 times in the last decade), the burden on the road network was increased 2-fold. Such traffic flow situation is very acute in the historical center and requires considerable efforts and concentration to solve it [3].

The boulevard Stefan cel Mare is located in the center, with the passage in Buiucani sector. It is between Liberty square and square Dimitrie Cantemir. It has a length of 3.8 km, being the largest

urban highway, the main axis of Chisinau, along which are placed the most important objects of the social and political, economic as well as urban cultural life of the city. Width of the bd. Stefan cel Mare is 18.5m. from street Metropolitan B nulescu Bodoni to the square Dimitrie Cantemir and 18.0 m. from the street the Metropolitan B nulescu Bodoni to the Liberty Square. The highway is designed in three lanes in each direction, the bandwidth being 3.0 m. The longitudinal profile varies from 0.5% -5.3%, the cross-sectional profile is 2%. At rush hour the intensity for a lane is 1,460 vehicles/hour [1].

There were measurements along the boulevard, and it was established the intensity of traffic between intersections during 2015. They are counted all transport means moving on the boulevard during an hour, in different directions, at different hours, in different days and in different directions. From the results it was done the analysis of selected data. See below a graph of the difference in traffic levels during the day.

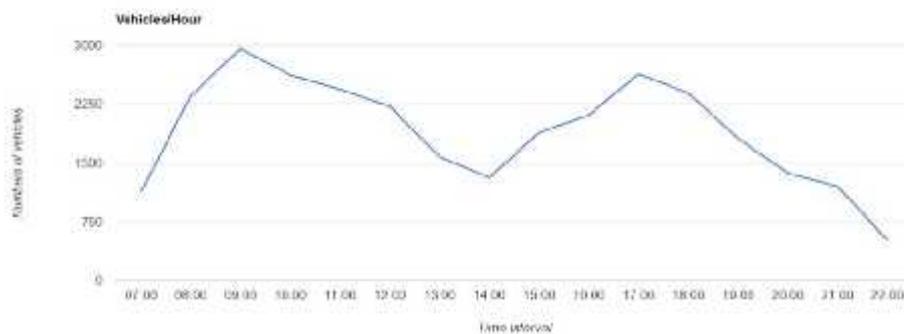


Fig. 2. The changing intensity of traffic during the day

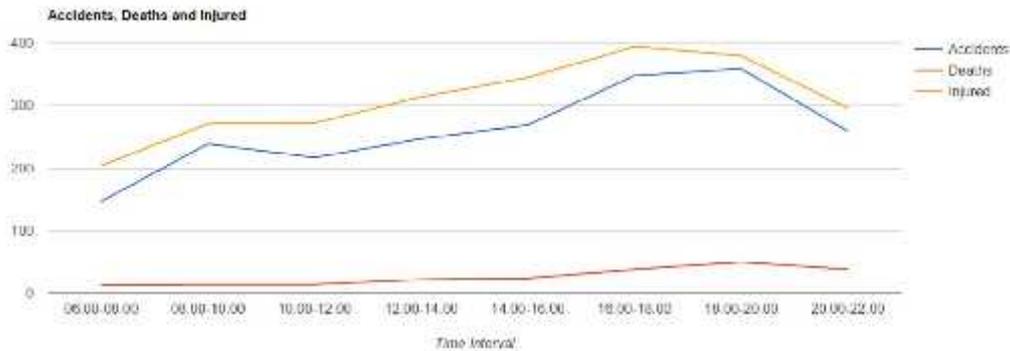


Fig. 3 The changing intensity of traffic during the day.

The graph above shows traffic accidents depending on the time of day. Making an analysis of these two graphs, we see that the intensity of traffic increases between 08:00 and 09:00 and 16:00-18:00 and frequency of road accidents grows from 08:00-09:00 and from 16:00-18:00 which gives us proof that it the frequency of road accidents depends of the traffic intensity.

5. Calculating the Rate of Accidents in the Intersection of the Boulevard Stefan cel Mare and the Street Ismail

Usually the rates used are rates per million and / or per 100 million vehicle-km. The rate per million vehicles entering (RMEVs) is the number of accidents per million vehicles entering the study site during the study period. It is expressed as RMEV.

$$RMEV = (A \times 1,000,000) / V \quad (1)$$

Where RMEV = accident rates per million vehicles entering the crossroad.

A = total accidents or accidents depending on the type occurring in 1 year on the examined sector.

V = average daily traffic (ADT) x 365

This rate is often used as a measure of the rate of accidents at intersections.

Let's calculate the rate of accidents in the intersection of Boulevard. Stefan cel

Mare and the street Ismail.

The total number of recorded accidents at an intersection in one year was equal to 4 accidents and the average volume of entries within 24 hours from all entries was 78,374 units of transport, the traffic, and intensity on bd. Stefan cel Mare is 31,612 vehicles/24 hours. The intensity of traffic on the stree Ismail is 46,762 vehicles/24hour, so the intensity at this intersection is 78,374 vehicles/24hours.

$RMEV = (4 \times 1,000,000) / (78,374 \times 365) = 0.14$ accidents / million vehicles entering the intersection.

This rate is often used as a measure of the rate of accidents at intersections. It makes the analysis of results from intersections of the same category. If the results are different than we see which is the difference between junctions, to take actions for the one with higher accident rate [2].

It can be concluded that main streets of central zone, intended for connection with other urban areas, do not honor their duties and require reconstruction with compliance to the normative technical parameters.

Under the same aspect, the bd. Stefan cel Mare is problematic. Being the main artery of the city, the boulevard generates the greatest pedestrian traffic flows and commodity because it focuses on a large number of objects with mass attendance.

6. Conclusions

Lack of road safety measures is perceived as "aggressive traffic" both by the drivers and other road users (pedestrians, cyclists, etc.). Symptoms of aggressive traffic perceived by a driver or other road user can be the following:

- limited freedom of movement in traffic,
- the feeling of clutter perceived by road users,
- frequent occurrence of incidents that can lead to traffic accidents,
- traffic jams, even in traffic volumes without high values,

In such a context, it is necessary to solve the problems indicated to conduct projects that do not require large investments but can create positive effects.

7. Proposals

Forecasts of transport network development show that a sharp increase in transport units increases the risk of accidents. The establishment of a research center, which would play a stimulating role in adapting and developing road safety techniques, training of specialized personnel, as well as innovation activities and evaluation. If this center can be interconnected with polytechnic universities, then the road safety techniques will be part of road safety education of police officers, engineers of roads and other specialists.

8. Theoretical and Practical Importance

Road safety requirements for the planning, design, construction, maintenance and use of equipment are (or should be) contained in the standards and technical specifications applicable on public roads.

A high level of road safety can often be

the result of a state of balance between the different interests which that section of road must satisfy. Ideally a road should satisfy the demand of vehicles on that sector, to provide transport safety and cause a minimum harm to the environment.

9. Scientific Problem Solved

The results obtained in allow the improvement, efficiency, management, maintenance and building new constructions for road networks which would contribute directly to the improvement of road safety, the implementation of a viable road safety management, and implicitly a road infrastructure at the European standards.

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