# TWO DECADES OF ACCIDENTAL SITUATION IN THE REPUBLIC OF MOLDOVA

# REPUBLICA MOLDOVA: ANALIZA ACCIDENTELOR RUTIERE PE DURATA A DOUĂ DECENII

**REZUMAT:** *Accidentele de circulație sunt cea mai periculoasă amenințare pentru sănătatea și viața oamenilor din întreaga lume. Daunele provocate de accidentele rutiere depășesc daunele provocate de toate celelalte accidente de transport (aeriene, navale, feroviare etc.) luate împreună. Problema se agravează prin faptul, că victimele accidentelor de circulație sunt, de regulă, persoanele tinere și sănătoase, apte de muncă. Accidentele rutiere cauzează daune sociale, materiale și demografice enorme economiei oricărei țări și societății în ansamblu. În Republica Moldova în perioada anilor 2000–2019, au murit în accidentele rutiere 7702 de oameni, iar 63560 de persoane au fost traumatizate. Articolul cuprinde o analiză succintă a statisticii accidentelor rutiere în ultimii 20 ani în Republica Moldova și în diferite zone geografice ale globului pământesc.*

***Key-words:*** *road accidents, statistics, accidents severity*

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## 1. INTRODUCTION

It has been more than a century since the first car appeared on earth. Time passed, they multiplied. The number of vehicles is increasing day by day and it is difficult to estimate exactly how many cars are currently in the world. However, experts say that the number of cars exceeds 1,2 billion, and in 2035 will reach 2 billion. By 2050, the figure will reach 2,5 billion, and the world's population – 9,731 billion [1][2]. There will be almost one car for four people.

For the first time, the number of vehicles exceeded one billion in 2010. According to a study by Wards Auto [3], there were 1,015 billion cars on the planet at the time, and the engine level of the population was 1 to 6,75. For comparison: in 2009, the world car fleet was 980 million transport units, in 1986 – 500 million, and in 1970 – 250 million. Since 1950, the number of vehicles has begun to double approximately every ten years.

With the advent of cars, road accidents also appeared. The information about the first road accident is quite controversial [4][5]. While some claim that the first accident took place in 1869, others claim that the first was in 1834. Unofficial sources claim that the first traffic accident took place on July 29, 1834. A steam stagecoach, of the Edinburgh engineer, hit a stone intentionally placed on the road. The steam boiler exploded, killing 5 people. Other documents state that the first accident with victims took place on August 31, 1869. Mary Ward was with her husband and her cousins (the Parson brothers), on a trip with an experimental, steam vehicle. In a tighter turn, Mary lost her balance and fell, being trampled on by the wheel of the vehicle.

The first road accident in the world was officially recorded on May 30, 1896, in New York [5][6]. Henry Wells, who was driving an electric car, bumped into a cyclist Evelyn Thomas. Fortunately, Evelyn was left with only one fractured leg. In the same year, a few months later, on August 17, 1896, the first fatal accident in the world occurred in London. During the presentation of the new car, driven by Arthur Edsell, a 44-year-old woman Bridget Driscoll, mother of two children, was hit.

The first road accident that resulted in the death of the driver occurred on February 12, 1898. It took place in Great Britain and the victim was Henry Linfield [4]. It seems that the steering system failed, and the car hit a tree. The driver died the next day. Thus, mankind began to pay the disastrous price of one of the most brilliant manifestations of technical progress – the automobile, the dizzying pace of development of which is accompanied by an equally rapid increase in the number of victims.

Urbanization and rapid motorization of the world's population are accompanied by an increase in the number of road accidents, in which people die, are traumatized and injured. According to the latest estimates of the World Health Organization (WHO), approximately 1,4 million people die in traffic accidents each year, and up to 50 million are injured by bodily injury, which often leads to disability [5][7].

Victims of road accidents, their families, and countries in general, suffer significant economic losses, related to the treatment and loss of productivity of the deceased, left with disabilities or caring for traumatized relatives. These deaths and traumas have a huge impact on the families of the victims, whose lives often change irreversibly as a result of these tragedies, as well as on other communities where the victims have lived and worked.

The social topicality of the problem consists in the fact that thousands of people die and remain crippled, these constituting, in their great majority, the active, apt of work part of the population. These losses consist of expenses for the payment of disability benefits and pensions, for treatment, production losses and administrative expenses: criminal investigation, court, etc. Economic losses also include damage resulting from damage to cargo, vehicles, road construction, production delays, traffic, etc. Therefore, reducing the damage from road accidents is a task of great socio-economic importance.

Road accident statistics in developed countries are similar to statements on the battlefields of the world. Road accidents cost most countries about 1-3% of gross domestic product (GDP), and globally are about $ 518 billion of which about $ 100 billion in developing countries, twice the amount of financial assistance of them [5][8][9]10][11].

In Europe, the price paid for morbidity is still extremely high. Every year on the roads of the European Union in road accidents over 120000 people die and another about 2,4 million are traumatized. The cost of directly measurable road accidents is around € 45 billion. Indirect costs are three or even four times higher. The annual value is about € 160 billion, the equivalent of 2% of GDP in the European Union [5][8][9][10], in the CIS countries – € 8,4 billion, the equivalent of 1,5% of GDP. The cost of a human life lost in a car accident is estimated differently from country to country, in Europe averaging € 1 million [5][12].

The risk of road accident mortality is higher in countries with lower levels of development. Even in high-income countries, the probability of being hit by a car accident is higher among people with lower socio-economic

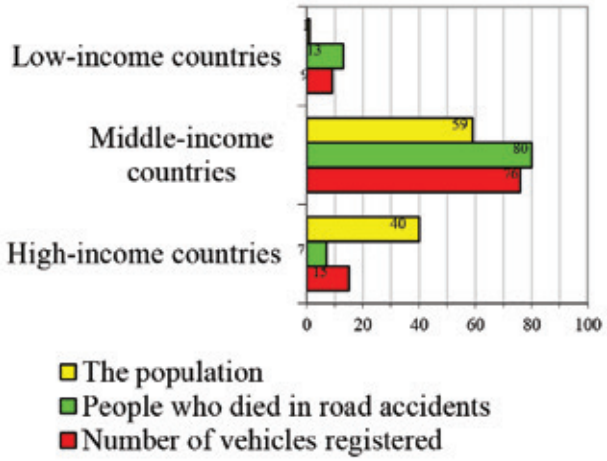


Fig. 1. Population share, number of deaths caused by road accidents and number of vehicles registered by groups of countries with different levels of per capita income, year 2016, %

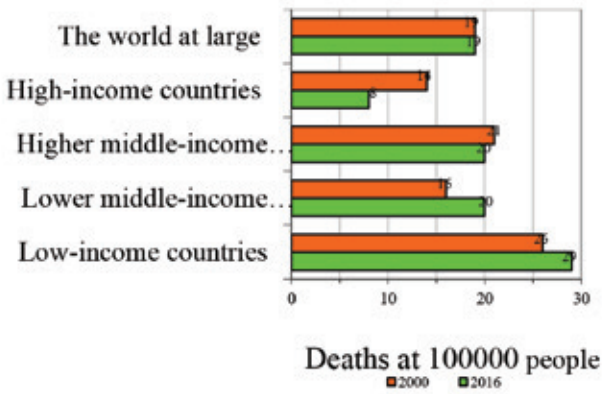


Fig. 2. Mortality rate in road accidents by groups of countries with different levels of per capita income, years 2000 and 2016, the number of deaths caused by road accidents per 100000 people

status. Over 90% of road accident deaths occur in low- and middle-income countries [7][11][13].

## 2. ANALYSIS OF THE SITUATION WITH ROAD SAFETY

The disproportionately high burden of road accident mortality in middle-income countries is indicated by the fact that these countries account for 80% of road accident deaths, 76% of the world's population and only 59% of the world's registered motor vehicle fleet (figure 1).

The share of deaths in road accidents in high-income countries is 11 times lower (7%), and the share of the world fleet of registered vehicles is only 1,5 times lower (40%). In low-income countries, the level of motorization is still low, and the share of the world's population concentrated in them (9%). The share of deaths caused by road accidents (13%) is higher than the share of the world fleet of registered vehicles (1%) [7].

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Worldwide, deaths due to road accidents accounted for approximately 19 deaths per 100000 people in 2016, according to WHO estimates. The highest value of the indicator is noted in low-income countries – 29,4 per 100000 people, and in high-income countries is 3,7 times lower – 8,0 per 100000 people (figure 2). In countries with higher and lower average incomes, this indicator is practically the same, slightly exceeding the world average, but the changes compared to 2000 were the opposite. In countries with a higher average income, deaths in road accidents decreased from 21,5 to 19,7 per 100000 people, and in countries with a lower average income increased from 16,4 to 19,9 at 100000 people. The largest decrease in road accident deaths occurred in high-income countries, where it fell by 5,5 points – from 13,5 to 100000 people in 2000 to 8,0 in 2016. Low incomes, road traffic deaths increased by 3 points – from 26,3 deaths per 100000 people in 2000 to 29,4 in 2016 [7].

The mortality rate in road accidents varies significantly between WHO regions. The highest mortality rate in road accidents is the African region (27,8 cases per 100000 people), three times lower – in the European region (9,3 cases per 100000 people). Compared to 2000, the road accident mortality rate decreased in three WHO regions: 5,2 points in the European region, 3,3 points in the Western Pacific region and only 0,3 points in the Eastern Mediterranean region (figure 3). In the other three WHO regions, the road accident mortality rate increased, especially by 5,4 points in the South-East Asia region (from 15,6 to 21,0 per 100000 people). In the American region, the mortality rate increased slightly, remaining almost at the same level as at the beginning of the century (15,9 per 100000 people in 2016 compared to 15,8 in 2000).

Significant differences in road accident mortality rates are also observed between countries in the same region. The number of deaths in road accidents and the number of registered vehicles contained in the database of the *Global Health Observatory* allow the estimation of the number of deaths in road accidents per 1000 registered vehicles. There is no clear link between these indicators, as many depend on the technical characteristics of the vehicles, the quality of the road infrastructure, compliance with road safety rules and a number of other factors. However, the correlation of these two indicators provides an additional picture of the state of road safety.

In the *WHO African region*, the road accident mortality rate ranges from 13,7 per 100000 inhabitants on the island of *Mauritius* to 35,9 in *Liberia*. In half of the countries (without 25% of the countries with the lowest and 25% with the highest incomes), the value of the indicator varies from 24,9 to 30,0 per 100000 people, with a median value of 27,6. In addition to *Mauritius*, the mortality rate is lower than the world average in the *Seychelles* (15,9 per 100000 people), which are the only ones in this group of countries with a high level of national income.

The number of road accident deaths per 1000 registered vehicles ranges from 0,3 in *Mauritius* to 53 in *South Sudan*, with an average of about 7. In addition to *South Sudan*, the *Central African Republic*, *Ethiopia*, *Togo*,

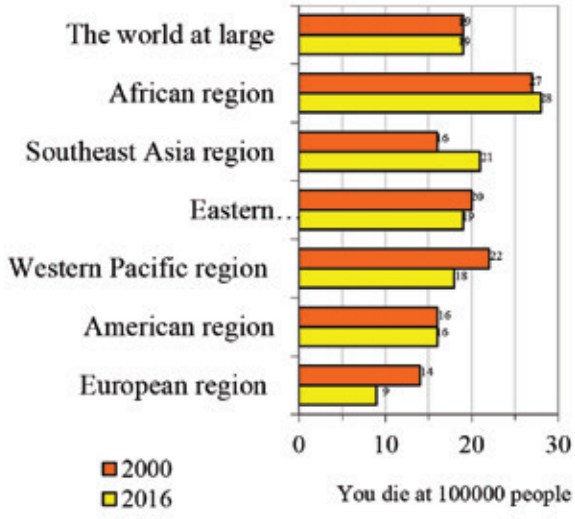


Fig. 3. Road accident mortality rate by WHO regions, years 2000 and 2016, number of deaths caused by road accidents per 100000 people

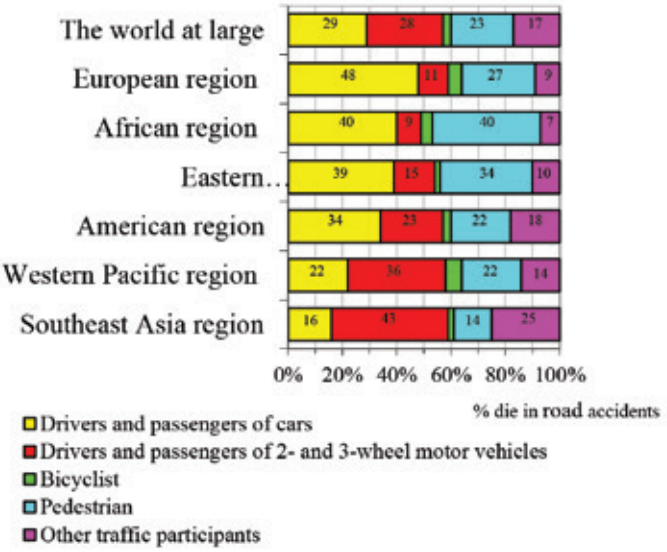


Fig. 4. Mortality rate in road accidents by WHO regions, number of deaths caused by road accidents per 100000 people

*Burundi* and *Madagascar* have a high number of road deaths per 1000 vehicles (from 30 to 41 road accidents per 1000 registered vehicles).

Among the countries in the *WHO American region*, the value of the road accident mortality rate varies from 5,6 per 100000 people in *Barbados* to 35,4 in *Saint Lucia*. However, in most countries in the region the mortality rate is in a narrower range – from 12,4 to 20,9 per 100000 people, with a median of 14,4 per 100000 people. In the most motorized countries of the region, the mortality rate in road accidents is relatively low – 12,4 per 100000 people in the *US*, 5,8 – in *Canada*. The number of deaths caused by road accidents per 1000 registered vehicles varies from 0,1 in *Canada*, the *United States* and *Barbados* to 12 in *Guyana*. Excluding *Guyana*, in the countries of the *American region*, the mortality rate in road accidents does not reach 2 per 1000 vehicles. The *WHO European region* is characterized by the largest differences in road accident mortality, in low-income countries is almost three times higher than in high-income countries (18,6 and 6,3, respectively per 100000 people). The number of road accident deaths per 100000 permanent residents is from 2,7 in *Norway* and *Switzerland* to 18,1 in *Tajikistan*. In most countries, the mortality rate ranges from 5,3 to 10,6, with an average of 7,4 deaths per 100000 people. Among the countries in the *WHO Eastern Mediterranean region*, the road accident mortality rate ranges from 9,3 deaths per 100000 people in *Qatar* to 28,8 in *Saudi Arabia*. In most countries in the region, the indicator has values between 16,5 and 25,4 per 100000 people with a median value of 20,1 per 100000 people.

The number of road accident deaths per 1000 registered vehicles varies between 0,2 in *Qatar* and 65 in *Somalia*. In addition to *Somalia*, *Afghanistan* and *Sudan*, where the value of the death rate is about 8 deaths in road accidents per 1000 vehicles, the rest of the countries in the region are characterized by low values of the mortality rate, not exceeding 2 deaths in road accidents per 1000 vehicles. Among the countries in the *WHO South-East Asia region*, *Thailand* (32,7 deaths in road accidents per 100000 people) and the *Maldives* (0,9) stand out with extreme values. In other countries in the region, the value of the mortality rate varies from 12,2 per 100000 people in *Indonesia* to 22,6 in *India*. The number of road deaths per 1000 registered vehicles ranges from zero in the *Maldives* to 8,7 in *Bangladesh*.

Among the countries in the *WHO Western Pacific region*, with extreme mortality rates, there are also two countries – the island state of *Micronesia* (1,8 deaths in road accidents per 100000 people) and *Vietnam* (26,4), in the other countries in the region have a road accident mortality rate between 2,8 in *Singapore* and 23,6 in *Malaysia*. In 8 countries in the region, the road accident mortality rate is less than 10 deaths per 100000 people (including *Australia*, *New Zealand*, *Japan* and *South Korea*), in the other thirteen countries it exceeds 11 deaths per 100000 people. In urbanized countries, 70% of traffic accidents are concentrated on road networks in localities, where the most vulnerable category of road users are pedestrians, and 30% occur on roads outside localities, which are characterized by high severity of consequences [12]. Thus, the greatest potential to reduce the general level of damage is to reduce the number of road accidents in localities, and the greatest potential to reduce the general severity of road accidents – reducing the number of accidents on roads outside localities. Among the victims of road accidents, men visibly predominate, in addition, their share increased from 72% in 2000 to 74% in 2016 (*figure 5*), so in recent years there have been almost three times more men among the victims road accidents, than women [7][14][15].

More than half of those who died in road accidents, 58% in 2000 and 55% in 2016, are people aged between 15 and 49, i.e at the age of greatest economic activity and labor productivity, of which about 80% are men (*figure 6*). Road injuries are the leading cause of death for children and young people aged 5 to 29 years [7][16]. The proportion of deaths caused by road accidents is the highest among those aged 15 to 29 and increased by 3,2 percentage points compared to 2000 – from 10,9% to 14,1% in 2016. Compared to 2000, the number of children who died in road accidents decreased: by 13% by children aged 5-14, by 18% by girls up to 5 years of age and by 7% by their male colleagues. The number of deaths in road accidents over the age of 15 has increased for all age groups, especially significantly at the age of 50-59 (men – by 69%, women – by 57%) and older. During the years 2000-2016, the mortality rate in road accidents practically did not change, increasing only by 0,3 points (from 18,5 to 18,8 per 100000 people), but as a result of the multidirectional

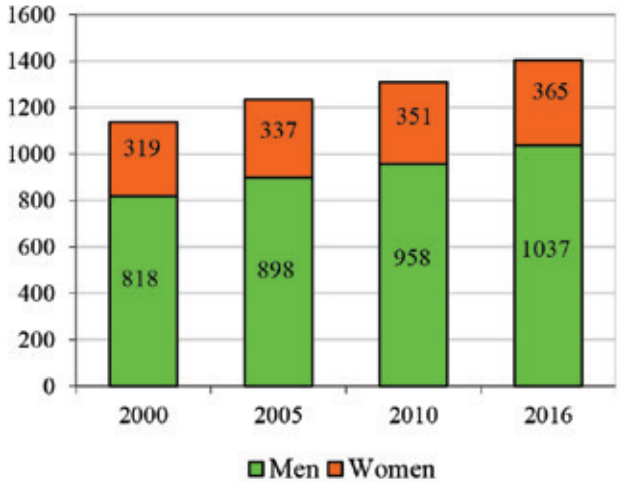


Fig. 5. Number of deaths caused by road accidents by sex, the world, 2000, 2005, 2010 and 2016, thousands of people

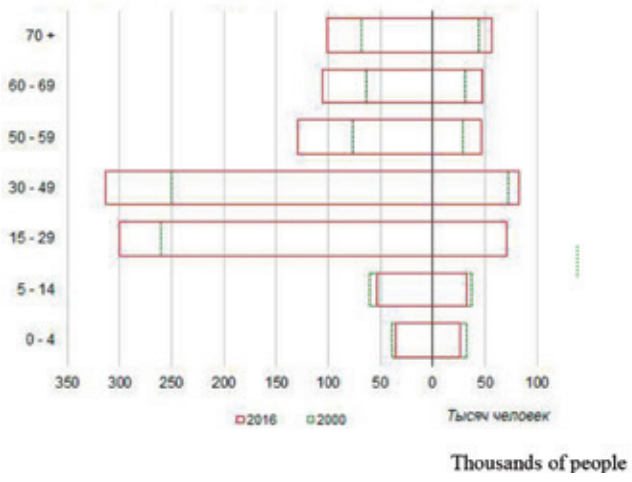


Fig. 6. Distribution of deaths caused by road accidents by sex and age, the world, 2000s and 2016, thousands of people

changes of mortality in other causes of death, its position among the leading causes of death has increased. The WHO forecast for 2030 indicates a shift in road accidents from 9th to 5th place due to deaths [13].

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Worldwide, more than half of those killed in road accidents are the most vulnerable road users – pedestrians (23%), cyclists (3%) and motorcyclists (28%). Another 29% of those who died in road accidents belong to drivers and passengers of cars, and the remaining 17% – toother road users [7][13][17][18]. The situation varies significantly between regions of the world. In most low- and middle-income countries, the percentage of road accident victims, such as pedestrians, cyclists, drivers, and passengers of two- and three-wheeled motor vehicles, is significantly higher than in high-income countries. For example, in the WHO African region, 40% of all road accident deaths are due to pedestrians, and in the WHO West Pacific region 36% are to motorcyclists, i.e. drivers and passengers of 2- or 3-wheel motor vehicles (figure 4). Drivers and passengers represent between 16% of those killed in road accidents in the South-East Asia region to 48% in the European region. Pedestrians account for about a quarter of road accident deaths in all regions except the African region (40%), the Eastern Mediterranean region (34%) and the Southeast Asia region (14%). The rapid development of road traffic in the Republic of Moldova, determined by the increase of the national vehicle park, which at the beginning of 2020 constituted (without the districts on the left bank of the Dniester and Bender municipality) 1031481 transport units, of which: 648779 cars, 193055 trucks, 21087 buses and minibuses, 49983 tractors, 44462 motorcycles, 74115 trailers and semi-trailers, with the ever-increasing demands of the market economy, are currently an indisputable reality [19]. In the Republic of Moldova, as in other states, road trauma presents a major danger to the population threatening people's lives and health, causing considerable socio-economic damage. Road accidents are one of the leading causes of death. They take place for several reasons, of which they are both technological and human.

But the risk of being involved in a road accident is often influenced by third party factors, such as the month of the year, the day of the week, the time of day, the weather conditions, the quality of the road surface etc. In all countries of the world there is a record of road accidents, and the causes of their challenge are analyzed. This is necessary to be able to undertake a complex of technical-organizational measures to prevent them. This issue is also receiving special attention from international organizations. The analysis of the road accident statistics during the years 2000–2019 in the Republic of Moldova (table 1) indicates that on the territory of the country were registered 52383 (on average 2619 per year) serious road accidents, as a result of which 7702 died (385 per year) people, and another 63560 (3178 per year) were traumatized. The severity index of road accidents (the number of deaths per 100 victims) in the country in the last twenty years is 10,81 [5][8][9][20][21][22][23][24][25].

Reducing damage from road accidents is a task of great socio-economic importance. Although the figures do not give us a complete picture of the real state of affairs in this sphere of human life, we cannot do without statistical data. According to the data presented (figure 7), the most unfavorable in this period, in terms of the number of road accidents, were the years 2002 and 2010, when 2899 and 2930 road accidents were registered respectively. A slightly lower number of road accidents were recorded in 2008 and 2011. For the first time, the number of people who died as a result of road accidents exceeded 500 people in 2008 and fell below 300 in 2013. The number of traumatized people, the worst was also the year 2010, when 3747 traumatized people were registered. In another four years (2002, 2008, 2011 and 2012) the number of traumatized people

Table 1. Frequency of road accidents (years 2000–2019)

| Year | Road accident | Deceased | Traumatized | Coefficient of severity of road accident consequences |
|---|---|---|---|---|
| 2000 | 2580 | 406 | 3147 | 11,43 |
| 2001 | 2666 | 410 | 3277 | 11,12 |
| 2002 | 2899 | 412 | 3505 | 10,52 |
| 2003 | 2670 | 424 | 3215 | 11,65 |
| 2004 | 2447 | 405 | 2888 | 12,30 |
| 2005 | 2289 | 391 | 2770 | 12,37 |
| 2006 | 2298 | 382 | 2807 | 11,98 |
| 2007 | 2437 | 464 | 2984 | 13,46 |
| 2008 | 2875 | 508 | 3511 | 12,64 |
| 2009 | 2755 | 487 | 3297 | 12,87 |
| 2010 | 2930 | 452 | 3747 | 10,76 |
| 2011 | 2826 | 443 | 3535 | 11,14 |
| 2012 | 2712 | 441 | 3510 | 11,16 |
| 2013 | 2603 | 295 | 3221 | 8,39 |
| 2014 | 2564 | 324 | 3080 | 9,52 |
| 2015 | 2527 | 297 | 3021 | 8,95 |
| 2016 | 2479 | 311 | 2928 | 9,60 |
| 2017 | 2640 | 302 | 2993 | 9,17 |
| 2018 | 2614 | 274 | 3123 | 8,03 |
| 2019 | 2572 | 274 | 3001 | 8,37 |
| **Total** | **52383** | **7702** | **63560** | **10,81** |

Table 2. Frequency of road accidents by categories (years 2000–2018)

| The type of accident | Road accident | Average annual value | % of the total number of road accidents |
|---|---|---|---|
| Collision of vehicles | 14023 | 738,05 | 28,15 |
| Vehicle overturning (reversal) | 4455 | 234,47 | 8,95 |
| Buffering with a stationary vehicle | 657 | 34,58 | 1,32 |
| Buffering with an obstacle | 5984 | 314,95 | 12,01 |
| Buffering a pedestrian | 20019 | 1053,63 | 40,19 |
| Bumping into a cyclist | 1754 | 92,32 | 3,52 |
| Buffering with an animal-drawn vehicle | 557 | 29,32 | 1,12 |
| Other types of road accidents | 2362 | 124,32 | 4,74 |
| **Total** | **49811** | **2621,63** | **100** |

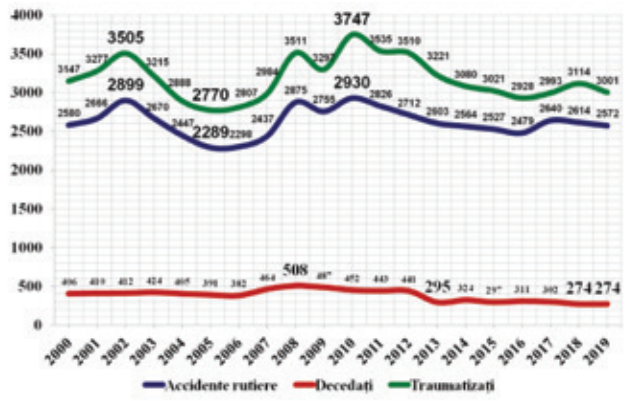


Fig. 7. Frequency of road accidents (2000–2019)

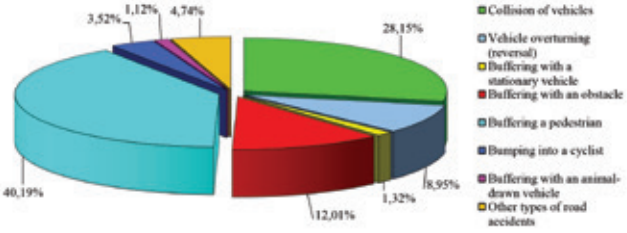


Fig. 8. Frequency of road accidents by categories (years 2000–2018)

exceeded 3500. It should be mentioned that, in addition to serious accidents, there are about 11,000 other road accidents resulting in material damage.

After reaching a peak in 2002, the frequency curves of road accidents began to decrease by about 200 accidents per year reaching the minimum of the period analyzed in 2005. Since 2006, the frequency curve of road accidents began to rise again, slowly but steadily, which is as natural as possible in the conditions of the low road discipline of drivers, the operation of vehicles with technical deficiencies, that travel on roads far from being perfect. The increase continued until 2010 (except for 2009), when the maximum of the analyzed period was reached, after which it started to decrease slowly reaching a new minimum value in 2016. In the last two years there is a slight reduction in the number of accidents road.

In the last seven years, the number of people who died in road accidents has dropped below 300 times, and in the last two years the lowest number of people who have died in road accidents has been recorded. Also, in the last seven years, the coefficient of severity of the consequences of road accidents has dropped below the figure 10. In such a situation, the decrease in the number of road accidents lately makes us happy, but also warns us. As world practice shows, crises appear and disappear. The roots of evil, however, remain, a truth confirmed by the experience of our country.

Of the total number of road accidents (*figure 8*), the largest part is:

- tamponade of a pedestrian – 20019 road accidents (on average 1054 per year (*table 2*), which constitutes 40,19% of the total number of road accidents committed in the reference period);
- vehicle collision – 14023 (738 – 28,15%);
- buffering with an obstacle – 5984 (315 – 12,01%).

At the same time, according to the severity of the accidents in the reference period, the following were highlighted: collision with a stationary vehicle, overturning vehicles, collision with a cyclist, collision with an obstacle, collision with a pedestrian, where the severity index sometimes far exceeds the average annual value the seriousness of the consequences of road accidents.

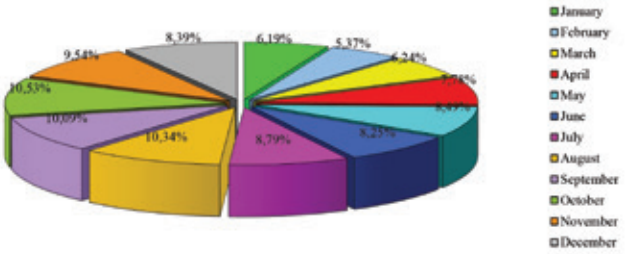


Fig. 9. Frequency of road accidents after the months of the period (2000–2019)

The distribution of road accidents by month (*figure 9*) shows that the most dangerous from the point of view of road traffic were the months:

- October – 5515 (on average 276 per year (*table 3*), which constitutes 10,53% of the total number of road accidents committed during the reference period);
- August – 5416 (271 – 10,34%);
- September – 5287 (264 – 10,09%);
- November – 4999 (250 – 9,54%).

At the same time, according to the severity of the consequences of the accidents in the reference period, the months (except 2019 year) were highlighted:

- ✓ November – 12,65;
- ✓ December – 12,38;

Table 3. Frequency of road accidents by months of the period (2000–2019)

| Months | Road accident | Deceased (without the year 2019) | Traumatized (without the year 2019) | % of the total number of road accidents | Coefficient of severity of road accident consequences (without the year 2019) |
|---|---|---|---|---|---|
| January | 3243 | 462 | 3795 | 6,19 | 10,85 |
| February | 2811 | 368 | 3205 | 5,37 | 10,30 |
| March | 3268 | 427 | 3758 | 6,24 | 10,20 |
| April | 4074 | 500 | 4706 | 7,78 | 9,60 |
| May | 4448 | 586 | 5115 | 8,49 | 10,28 |
| June | 4324 | 546 | 5060 | 8,25 | 9,74 |
| July | 4605 | 646 | 5456 | 8,79 | 10,59 |
| August | 5416 | 818 | 6379 | 10,34 | 11,37 |
| September | 5287 | 698 | 6277 | 10,09 | 10,01 |
| October | 5515 | 874 | 6310 | 10,53 | 12,17 |
| November | 4999 | 809 | 5588 | 9,54 | 12,65 |
| December | 4393 | 694 | 4910 | 8,39 | 12,38 |
| **Total** | **52383** | **7428** | **60559** | **100** | **10,93** |

Table 4. Frequency of road accidents by days of the week (2000–2019)

| Days of the week | Road accident | Deceased (except 2012, 2013 and 2019 years) | Traumatized (except 2012, 2013 and 2019 years) | % of the total number of road accidents | Coefficient of severity of road accident consequences (excluding 2012, 2013 and 2019 years) |
|---|---|---|---|---|---|
| Monday | 7755 | 1129 | 8378 | 14,80 | 11,88 |
| Tuesday | 7060 | 859 | 7174 | 13,48 | 10,69 |
| Wednesday | 6901 | 776 | 6750 | 13,17 | 10,31 |
| Thursday | 7052 | 766 | 7090 | 13,46 | 9,75 |
| Friday | 7782 | 958 | 7727 | 14,86 | 11,03 |
| Saturday | 7694 | 1058 | 7905 | 14,69 | 11,80 |
| Sunday | 8139 | 1146 | 8804 | 15,54 | 11,52 |
| **Total** | **52383** | **6692** | **53828** | **100** | **11,06** |

- ✓ October – 12,17;
- ✓ August – 11,37.

According to statistical data, among the months with the highest number of people killed in road accidents are October, August and November, with a share of 11,77% (average 46 per year), 11,01% (43) and 10,89% (43) respectively of the total number in the reference period, and among the months with the lowest share – February, March and January (4,95% (19), 5,75% (22) and 6,22% (24) respectively).

The monthly dynamics of those traumatized in road accidents place August, October and September in the first positions, with a share of 10,53% (on average 336 per year), 10,42% (332) and 10,37% (330) respectively from the total number in the reference period, and on the last positions, the same months as for the deceased persons – February, March and January (5,29% (169), 6,21% (198) and 6,27% (200) respectively).

The distribution of road accidents by the days of the week (*figure 10*) shows that the most dangerous from the point of view of road traffic were the days of:

- ➢ Sunday – 8139 road accidents (on average 407 per year (*table 4*), which is 15,54% of the total number of road accidents committed in the reference period), then follow the days of:
- ➢ Friday – 7782 (389 – 14,86%);
- ➢ Monday – 7755 (388 – 14,80%);
- ➢ Saturday – 7694 (385 – 14,69%).

At the same time, according to the severity of the consequences of the accidents in the reference period, the days were highlighted (except 2012, 2013 and 2019 years):

- ✓ Monday – 11,88;
- ✓ Saturday – 11,80;
- ✓ Sunday – 11,52;
- ✓ Friday – 11,03.

Following the analysis of statistical data, it was found that the highest number of people who died in road accidents were recorded on Sundays and Mondays, with a share of 17,12% (average 67 per year) and 16,87%

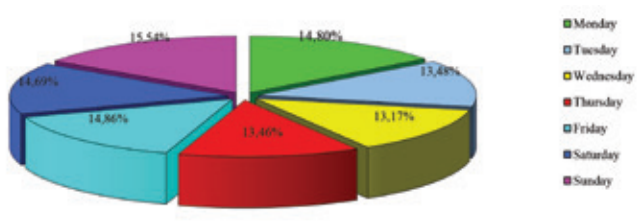


Fig. 10. Frequency of road accidents after weekdays (2000–2019)

(66) respectively from the total number in the reference period, and the days with the lowest share – Thursday and Wednesday (11,45% (45) and 11,60% (46) respectively). On Sundays and Mondays, with a weight of 16,36% (on average 518 per year) and 15,56% (493) respectively of the total number in the reference period of those traumatized in road accidents are placed on the first positions, and on the last, the same days as for the deceased, only in reverse order – Wednesday and Thursday (12,54% (397) and 13,17% (417) respectively).

The distribution of road accidents after the hour of happening (*figure 11*) shows that the most dangerous from the point of view of road traffic were the periods:

- ➢ 18–20 – 7533 road accidents (on average 377 per year (*table 5*), which constitutes 14,38% of the total number of road accidents committed in the reference period);
- ➢ 16–18 – 7153 (358 – 13,66%);
- ➢ 20–22 – 5883 (294 – 11,23%);
- ➢ 00–06 – 5801 (290 – 11,07%).

At the same time, according to the severity of the consequences of the accidents during the reference period, the hours were highlighted (except 2012, 2013 and 2019 years):

- ✓ 00–06 – 15,73;
- ✓ 22–24 – 14,47;
- ✓ 20–22 – 14,46;
- ✓ 18–20 – 12,46;
- ✓ 06–08 – 11,14.

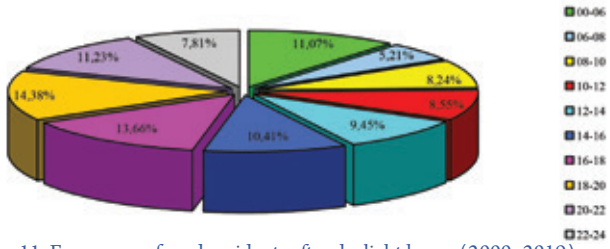


Fig. 11. Frequency of road accidents after daylight hours (2000–2019)

Table 5. Frequency of road accidents by day (2000–2019)

| Day time | Road accident | Deceased (except 2012, 2013 and 2019 years) | Traumatized (except 2012, 2013 and 2019 years) | % of the total number of road accidents | Coefficient of severity of road accident consequences (except 2012, 2013 and 2019 years) |
|---|---|---|---|---|---|
| 00–06 | 5801 | 1234 | 6612 | 11,07 | 15,73 |
| 06–08 | 2727 | 386 | 3080 | 5,21 | 11,14 |
| 08–10 | 4315 | 354 | 4571 | 8,24 | 7,19 |
| 10–12 | 4479 | 325 | 4571 | 8,55 | 6,64 |
| 12–14 | 4948 | 395 | 4887 | 9,45 | 7,48 |
| 14–16 | 5451 | 421 | 5617 | 10,41 | 6,97 |
| 16–18 | 7153 | 841 | 7149 | 13,66 | 10,53 |
| 18–20 | 7533 | 1042 | 7323 | 14,38 | 12,46 |
| 20–22 | 5883 | 978 | 5786 | 11,23 | 14,46 |
| 22–24 | 4093 | 716 | 4232 | 7,81 | 14,47 |
| **Total** | **52383** | **6692** | **53828** | **100** | **11,06** |

Table 6. Frequency of road accidents involving pedestrians (2000–2018)

| Year | Road accidents involving pedestrians | % of the total number of road accidents | Road accidents involving children | % of the total number of road accidents |
|---|---|---|---|---|
| 2000 | 1269 | 49,19 | 491 | 19,03 |
| 2001 | 1237 | 46,40 | 496 | 18,60 |
| 2002 | 1369 | 47,22 | 518 | 17,87 |
| 2003 | 1289 | 48,28 | 440 | 16,48 |
| 2004 | 1122 | 45,85 | 373 | 15,24 |
| 2005 | 1041 | 45,48 | 342 | 14,94 |
| 2006 | 1006 | 43,78 | 316 | 13,75 |
| 2007 | 1054 | 43,25 | 360 | 14,77 |
| 2008 | 1079 | 37,53 | 635 | 22,09 |
| 2009 | 1066 | 38,69 | 536 | 19,46 |
| 2010 | 1071 | 36,55 | 544 | 18,57 |
| 2011 | 1006 | 35,60 | 564 | 19,96 |
| 2012 | 935 | 34,48 | 557 | 20,54 |
| 2013 | 980 | 37,65 | 485 | 18,63 |
| 2014 | 886 | 34,56 | 411 | 16,03 |
| 2015 | 831 | 32,88 | 357 | 14,13 |
| 2016 | 835 | 33,68 | 387 | 15,61 |
| 2017 | 997 | 37,77 | 371 | 14,05 |
| 2018 | 946 | 36,20 | 414 | 15,84 |
| **Total** | **20019** | **40,19** | **8597** | **17,26** |

According to the statistical data, among the time intervals with the highest number of people who died in road accidents, the time intervals between 00-06, 18-20 and 20-22 stand out, with a share of 19,17% (in 73 per year per year), 16,19% (61) and 15,19% (58) respectively of the total number in the reference period, and among the time intervals with the lowest share – 10-12 and 08-10 (5,05% (19) and 5,50% (21) respectively).

For those traumatized in road accidents on the first positions are the time intervals between 18-20, 16-18 and 00-06, with a weight of 14,16% (on average 431 per year), 13,82% (421) and 12,78% (389) respectively of the total number in the reference period, and on the last positions – 06-08 and 22-24 (5,96% (181) and 8,18% (249) respectively).

According to statistics, most of the number of road accidents occurred through the fault of drivers: 44886 (on average 2244 per year, which is 85,69% of all road accidents committed in the country during the years 2000-2019).

Analyzing the violation of traffic rules committed by drivers, which lead to road accidents, it was found that the highest number of accidents occurred as a result of the following causes:

- exceeding the established speed and speed inappropriate to the road conditions;
- non-compliance with handling rules;
- not giving priority to pedestrians;
- drunk driving.

Road accidents involving pedestrians constitute about 40% (2000-2018) of the total number of accidents (*table 6*) [5][25]. Most accident situations are characteristic of localities, where their share is much higher. They are created in places where pedestrians frequently appear at pedestrian crossings, road vehicle stations, intersections, markets, places often frequented by children etc. Every ninth road accident was caused by pedestrians (5357, or 10,75% of the total number of road accidents during the years 2000-2018) [5][25].

The violations committed by pedestrians that led more frequently to road accidents were:

- crossing the street without being insured beforehand;
- crossing the street in forbidden places;
- irregular driving on the road;
- unexpected exit from vehicles, obstacles.

The number of road accidents in which children suffered is 8597 or 17,26% of the total number of road accidents, as a result of which 602 or 8,11% of the total number lost their lives and 8757 children or 14 were traumatized 46% (*figure 12*). 1810 road accidents were the children's fault. 114 of them died and 1682 children were traumatized. More than half of those killed and traumatized in road accidents are people aged 30-64, followed by those aged 17-24, 24-30 and 64+, together accumulating about 30% of the number of people died and traumatized in road accidents. Referring to the location of road accidents on a national level, it is found that the most frequent events occur in localities, over 70% of the total number of road accidents. Most road accidents were registered in

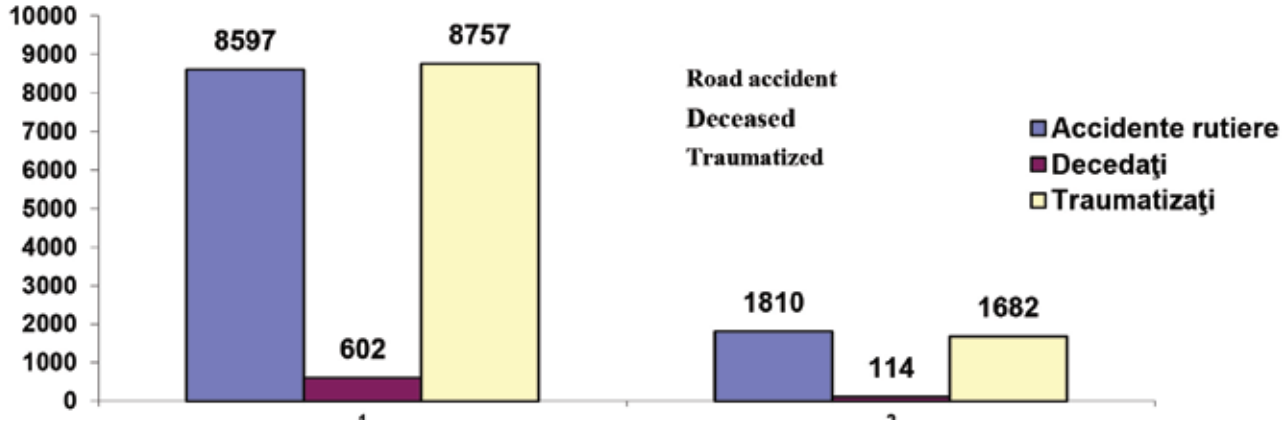


Fig. 12. Children who suffered in road accidents (2000–2018)

*Chisinau*, over 45%, followed by *Orhei*, *Balti*, *Ialoveni*, *ATU Gagauzia*, with a share of 3-5% each.

Lately, road accidents involving public transport is growing steadily from year to year. Most cases involving public transport take place in *Chisinau*.

## 3. CONCLUSION

The analysis of road accidents worldwide, European, and national in the reference period, is largely superficial and does not provide a clear answer about the model, which determines the number of victims. For detailed investigation, systematic information is not sufficient, such as the circumstances of the traffic accident, the location and time when they occurred, the causes and factors that contributed, the condition of the driver, the vehicle etc. Every 23 seconds a person dies on the roads around the world. The statistics of road accidents are alarming, about 1,4 million people die, and another up to 50 million are seriously traumatized. The experience of many separate countries shows that these tragedies can and must be stopped.

In this context, the *United Nations* (*UN*) *General Assembly* considers road mortality and road accident injuries an obstacle to the achievement of the *Millennium Development Goals*. As is well known, to solve this extremely important problem of modern society, the *UN* in collaboration with the *WHO* has proclaimed the years 2011-2020 as a *Decade of Actions for road traffic safety*, globally. The primary goal of this *Decade* is to significantly reduce the number of road disasters, namely by taking various measures at the national level in each state. At the same time, to achieve the objectives, the *Global Plan for the Decade of Action for Road Safety 2011-2020* was elaborated, which provides a general framework of activities over the years, improving the safety of road infrastructure and transport networks, developing vehicle safety systems, improving the behavior of road users, as well as the improvement of post-accident assistance systems [26]. Thus, in 2011 the *Republic of Moldova* together with hundreds of states around the world committed itself to fight against the neglect of the field of road traffic safety and to draw special attention to these catastrophes, which bring great damage to both Public Health and National Economy. Starting from the importance of human life and state responsibilities in this regard, following the signing by the *Republic of Moldova* of the *UN Resolution* on the declaration of the years 2011-2020 *„Decade of actions in the field of road safety"*, by Government Decision nr. 1214 of December 27, 2010, the *National Strategy for Road Safety* (*SNSR*) was approved, and on December 21, 2011, by Government Decision nr. 972 of 21.12.2011, the Action Plan on the implementation of *SNSR* was approved [23][24][27].

The goal of reducing the number of road deaths by 50% by 2020 has not been achieved globally or nationally. But this should not be an obstacle to continuing the fight and achieving the proposed goal in the next decade. In this context, it should be mentioned that the activity in the field of road traffic safety is a complex one and requires the involvement of the authorities from the central, local level to the civil society and each person.

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