

## ROAD ACCIDENTS: TRANSPORT AND SOCIAL RISKS

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### ABSTRACT

On the basis of statistics of traffic accidents accident rate on the roads of Irkutsk region was analyzed. It is shown that the majority of accidents with

victims occur due to violations of traffic rules by drivers. The dependence of the number of accidents and injuries on time of day was identified. The maximum contribution to accident rate is made by car drivers.

**Keywords:** car, traffic safety, accident rate on roads, traffic accident, transport risk, social risk.

**Background.** Road traffic accident is a problem that affects all countries. Annually 1,25 million deaths are recorded on the world's roads due to road traffic accidents (RTA). Injuries caused by traffic accidents are one of the main causes of death among young people aged 15 to 29 years [1]. In low- and middle-income countries, which account for slightly more than half of registered vehicles in the world, there are nevertheless 90% of all deaths due to road accidents. Cars, which are sold in 80% of the countries of the planet do not meet basic international safety standards.

**Objective.** The objective of the author is to consider transport and social risks of road accidents.

**Methods.** The author uses general scientific methods, comparison, analysis, graph construction, evaluation method.

### Results.

#### Strategy's priorities

According to statistics, every year in Russia about 200 thousand accidents occur, in which about 27 thousand people die, more than 250 thousand Russians get injured [2]. Those relative accident rate indicators are high such as the number of road fatalities per 10 thousand units of transport (transport risk) and the number of road fatalities per 100 thousand population (social risk).

Due to the fact that negative effects of accidents in road transport are much higher than the damage caused by other accidents, road traffic safety has become one of the most important socio-economic and demographic problems of the country.

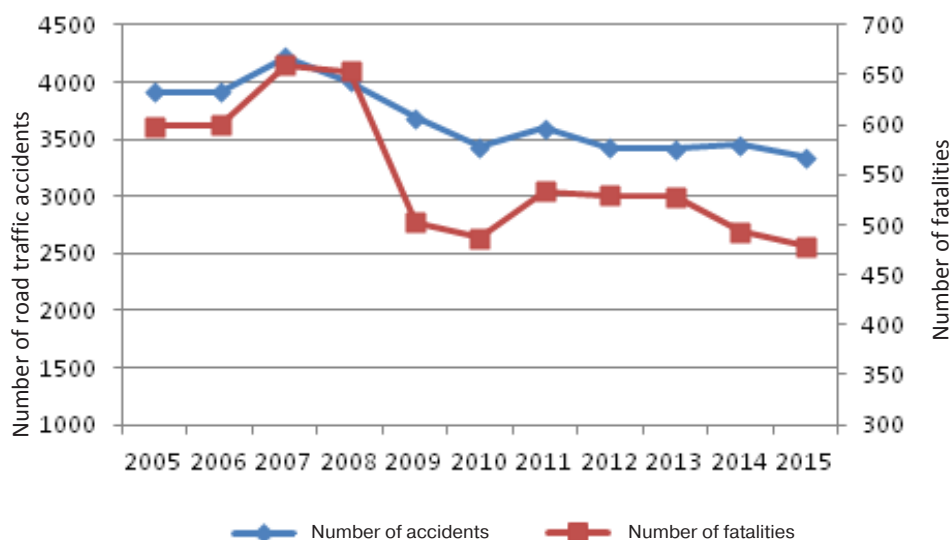
In recent years a series of legal acts has been adopted aimed at improving traffic control, prevention

of causes of accidents and lessening their consequences. The federal target program «Development of Transport System of Russia (2010–2020)» has been formed and is existing now [3]. Increasing integrated safety and sustainability of the transport system is the basis of its subprogram «Highways», target indicators of which reflect the activities aimed at increasing the length of federal public roads, meeting relevant regulatory requirements.

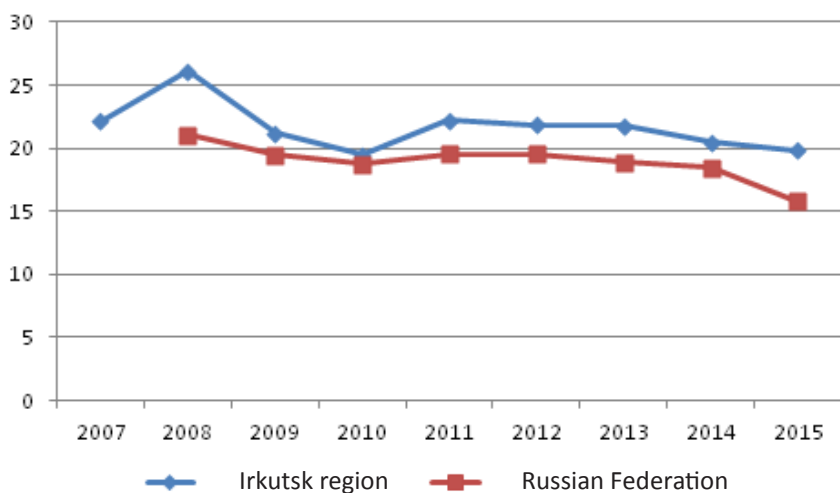
Priorities in the field of transport policy, safety of the road transport system are indicated in the transport strategy of the Russian Federation [4]. On solving one of the problems of strategy – improving road safety – focuses the federal target program «Improvement of traffic safety in 2013–2020», adopted in October 2013 [5]. The intended outcomes are reduction by 2020 deaths in road accidents by 8 thousand people (28,82%), social risks – by 30,5%, transport risk – by 36,7% (in comparison with 2012). The ability to achieve such performance is based on the positive results of the similar program, which was effect earlier [6], implementation of which has reduced by almost 30% the number of accidents with victims, by 23,6% – the number of deaths.

#### Ranking the most dangerous

Irkutsk region, located within the Baikal region, has an area of about 770 thousand km<sup>2</sup> and a population is just above 2,4 million. Formed under the influence of local economic and geographic characteristics, the transport complex is represented by all kinds of transport – rail, road, air, inland waterways and a network of railways and roads.



**Pic. 1. Accident rate on the roads of Irkutsk region.**

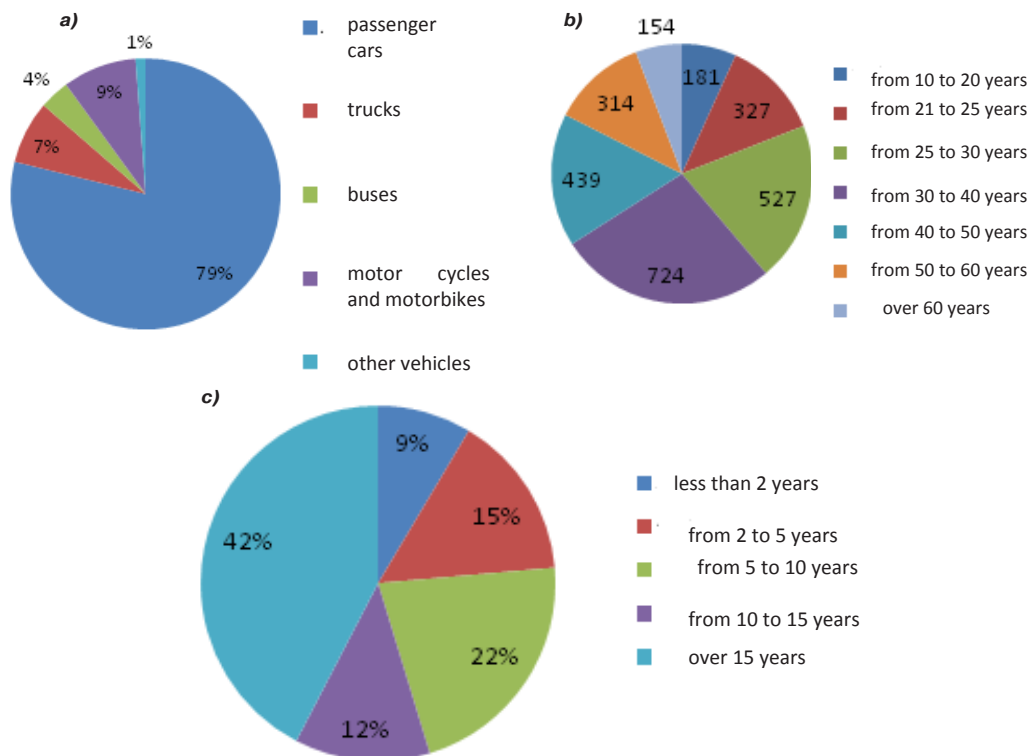


**Pic. 2. The dynamics of death rate in road traffic accidents per 100 thousand population (social risk).**

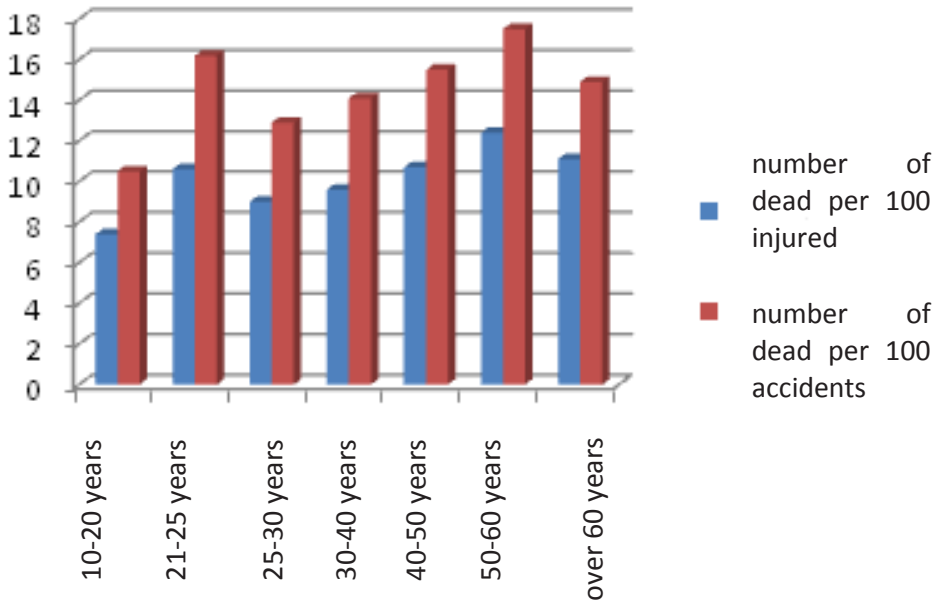
The basis of the road network is federal, regional and local roads with the length, respectively, 1, 7, 12.6 and 17 thousand. km. More than 912 thous. cars are registered in the region and many transit cars are moving on them. The density of public roads is 24 km per 1000 km<sup>2</sup> of the territory, which is much less than the average figure in the Siberian Federal District [7]. Many highways are within the boundaries of cities and other settlements, which leads to an increase in the number of traffic accidents. In urban settlements, their share is about 70% of cases.

The serious point: the region repeatedly fell in the ratings of areas with the most dangerous roads. Thus, according to the inter-regional community center «For safety on the Russian roads» in 2011, among 30 the most densely populated regions of Russia it ranked the 22<sup>nd</sup> on this indicator [8]. During 2005–2015, in the area 37082 statistically recorded accidents occurred, which killed more than six thousand. people (Pic. 1).

Individual risk of death in a traffic accident was two times higher than the prevailing in international



**Pic. 3. Distribution of accidents due to traffic violations: a) by types of vehicles; b) by age of the drivers; c) by specific driving experience.**



**Pic. 4. The degree of severity of accidents related to violation of traffic rules by drivers of different age categories.**

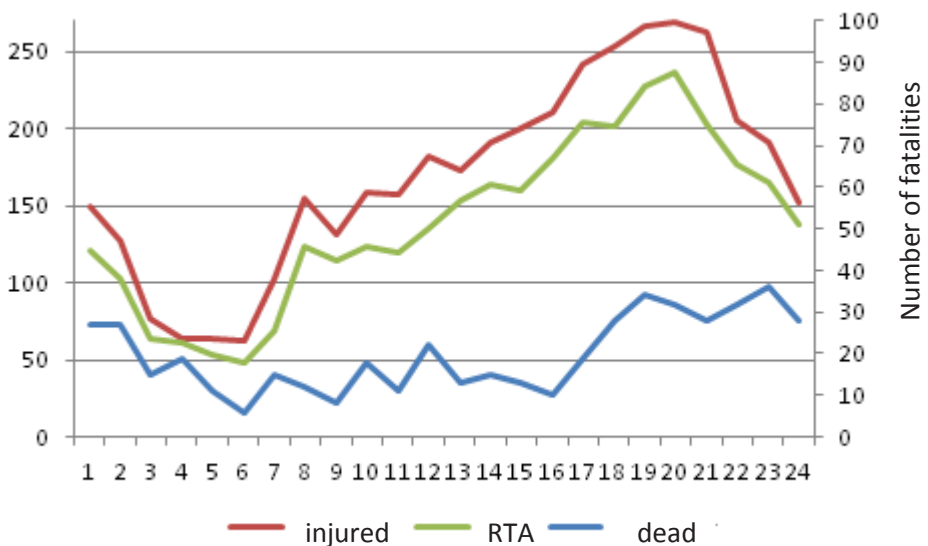
practice acceptable risk. As can be seen from the data (Pic. 1, 2), the peak of the accident rate in the period under review fell on 2007–2008. It coincided with maximum deaths both in absolute value and in relative terms (number of deaths per one accident, and per 100 thousand inhabitants).

The most favorable conditions for all indicators developed in 2010. Later in the positive dynamics of the decline in the overall number of road accident an increase in fatalities and relative indicators of accident rate was observed. So, the analysis of deaths in road accidents per 100 thousand. population (Pic. 2) revealed a consistently high level of social risk, including in comparison with its national values. And

if the value of this indicator for the Russian Federation in 2015 (15,8) for the first time in more than 10 years has decreased significantly, the official data on the region (19,84) do not give cause for optimism. For information: in the UK, which has one of the lowest death rate on the roads in the world, the value of social risk is 2,9 [9].

#### **The main culprits – men and passenger cars**

Since the main cause of accidents in Irkutsk region, as in other regions of the country [11], is a flagrant violation of traffic rules by drivers, reduction of accident rate and fatalities is associated primarily with toughening of administrative sanctions for such offenses. It is no accident in the Code of Administrative



**Pic. 5. Daily dynamics of road traffic accident rate in Irkutsk region in 2015.**

Offences of the Russian Federation (Administrative Code) were added articles related to deprivation of a driver's license for repeated offenses; significantly increased the size of penalties, for example, unbuckled seat belt, car driving by a person deprived of this right. In the Administrative Code were introduced articles that assume responsibility for admission to operation of the vehicle for a driver, which has no Russian national driver's license, for infringement of the conditions for transportation of children, and others. In Art. 20 of the Federal Law «On Road Traffic Safety» a paragraph appeared on mandatory equipping of a number of vehicles for transportation of passengers and cargo with technical means of verification (tachographs).

According to statistics [12], in 2015, in the region occurred 2872 accidents because of traffic violations, or 86% of the total. Decisive influence on the accident rate have drivers of vehicles belonging to individuals. Specific weight of accidents with their participation exceeds 90%. By gender lion's share of violations that led to the accident (87%) were committed by men.

The maximum contribution to the accident rate was made by the drivers of passenger cars (Pic. 3a). This is not surprising, given that the share of such cars in the regional fleet is 74% [2]. Despite the positive overall trend, the increase in traffic accidents caused by drunk drivers alerts: regarding passenger cars – by 18,9%, among the owners of motorcycles – by 52,4% (2015 year to 2014 year).

Driving while intoxicated is not only a Russian problem. Thus, 40% of all accidents in the United States and 60% of fatalities are caused by drinking alcohol [14]. Only 34 countries in the world have national laws restricting the blood alcohol content (BAC) for young and novice drivers to a level consistent with best practices ( $\leq 0,2\%$ ), and Russia is not among them.

Even in Turkey, where traffic rules are much more loyal than in our country (for example, there is not customary to buckle the seat belt, absence of a child seat is not an offence), in accordance with the current legislation, there are two permissible BAC level. Drivers of public transport, taxi, official drivers of vehicles must keep the zero concentration of alcohol in the blood while driving. The study of non-fatal accidents caused by drivers showed that drivers with zero BAC have a statistically lower risk of being in an accident than those with an acceptable level of BAC, which in Turkey is  $\leq 0,5 \text{ g/l}$  ( $\leq 0,5\%$ ) [15].

A large number of accidents in 2015 was the fault of bus drivers (96, 21,5% higher than a year earlier). These accidents, not related, as a rule, to the state of intoxication due to the scale of losses can often be qualified as an emergency. So, overnight into November 26, 460 km from the regional center on the route Novosibirsk–Irkutsk as a result of exit into oncoming traffic occurred a head-on collision of minibus «Toyota» with another minibus, the result of which was the death of 7 people, two others were injured. In just one year in accidents caused by drivers violating traffic rules buses 168 people were injured.

#### **Experience creates confidence?**

Nearly half of the incidents related to violation of traffic regulations, are caused by drivers between the ages of 25 and 40 (Pic. 3b), which is usually associated with high self-esteem of driving skills. However, the severity of accidents, which is determined by the number of dead per 100 accidents and the number of fatalities per 100 victims (the total number of dead and injured), is significantly higher for the age

category of offenders from 40 years (Pic. 4). At the same for the same accidents falls an increase in accident rate indicators (number of accidents, number of dead and injured) in relation to the previous year. The severity of accidents is also great for the age category 21–25 years.

The largest contribution to the accident statistics of the region, as well as throughout Russia, was made not by novices, and by drivers with driving experience over 15 years (Pic. 3c). On the one hand, this can be explained by a large number of these drivers as compared with other categories. At the same time, the positive dynamics of violations of traffic rules is marked only for the named group of drivers. This may indirectly indicate that their significant contribution to their accident rate on the roads cannot be associated solely with large in absolute terms number of drivers with many years of driving experience. Most likely, the situation with accidents reflects the overall picture for professional experience in the high-risk characteristic of adoption to existing risks, reduced alertness and careless attitude to safety requirements [16].

About half of all accidents (48%) took place from Friday to Sunday, slightly higher than the nationwide figure (45%). The main types of accidents were collisions with vehicles and pedestrians. The proportion of the victims was 69%. Pedestrian collisions have led to the injury of 25,7% persons. Vehicle collisions are one of the most frequent types of accidents not only in the Irkutsk region [17].

More than 44% of the total number of accidents was accompanied by poor state of maintenance and arrangement of the road network. This factor is marked as exacerbating the situation with the road traffic accident rate in other regions of the country [11, 18], and in Russia as a whole [19].

Daily dynamics of the accident rate (Pic. 5) has revealed a correlation between road traffic injuries and the number of road accidents. Clear tendency to increase in these indicators was observed in the period from 6:00 a.m. to 20:00 p.m. Maximum road accidents accounted for the period from 16:00 p.m. to 21:00 p.m. – for a 5-hour interval occurred 32% of all accidents. At the same time this period had the highest number of victims. The death rate during the day varied constantly and had no clear trend.

The most numerous and the most vulnerable road users are pedestrians. In 2015, with their participation 1126 traffic accidents were recorded, which killed 134 and injured 1033 people. The vast number of accidents is collision with pedestrians. Despite the fact that such accidents are often the result of negligence of pedestrians themselves and their traffic rules violations, about half of all cases still occurred because of drivers, and 25,3% of the cases – at pedestrian crossings. Unregulated crossings became the scene of collision in 82% of cases. At the same time as the significant increase in the number of accidents and the number of injured was observed at regulated pedestrian crossings, which shows not just the fault of drivers, but a serious violation of rules for safe behavior on the road.

Unsettling statistics in 2015 is associated with traffic accidents involving children. And if the total number of such accidents has not increased, then compared to the previous year increased by 38,9% the share of fatalities among minors (under 16 years). More than half of cases relate to children-pedestrians, and here the growth in the number of dead and injured. In accidents involving children-passengers aggravating factor leading to injuries and deaths in





the category up to 12 years, was a violation of rules of children transportation (no seat belts or retaining devices) by drivers.

**Instead of conclusion.** The analysis of accident rate on the roads of the Irkutsk region has revealed a high level of individual risk of death in an accident, which is significantly greater than the allowable. Most accidents occur due to violations of traffic rules by drivers. The low density of public roads, not designed for modern traffic flows, leads to a deterioration of traffic conditions and, as a consequence, increase in the number of accidents. This also contributes to the decrease in public transport transportation and a corresponding increase in transportation by passenger cars. High social and transport risks put the region among the regions with the most dangerous roads in Russia.

Road safety is an important objective at all levels. It is no accident that in March 2010, the UN General Assembly proclaimed 2011–2020 as the Decade of Action for Road Safety. Globally decade plan formulated measures to improve the safety of roads and vehicles, improvement of provision of emergency medical care, creation of a common road safety control. The overall objective is stabilization and twofold reduction by 2020 of the projected death rate in accident situations.

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