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Analysis of the State of the Road Traffic Safety in the Republic of Kazakhstan

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Abstract. The article presents the results of the study of the road traffic safety on the automobile roads of the Republic of Kazakhstan. We performed the analysis of the main indicators, specifying the state of the road traffic safety on the automobile roads of the republican significance of the Republic of Kazakhstan. In many regulatory acts, such as "The Priority Action Plan for Improving the Road Traffic Safety of the Republic of Kazakhstan for 2017–2020", developed with the support of the Asian Development Bank, and in the "National Concept of Road Traffic Safety" project as well , developed by the Interdepartmental Research Institute called "The Academy of Law Enforcement Agencies" of the General Prosecutor's Office of the Republic of Kazakhstan, the urgent need to improve road traffic safety is clearly pointed. At the same time, it is necessary to have the information about the extent of the existing problem in the field of road traffic safety, which is ensured by the constant consideration and analysis of the statistical indicators, as well as by planning appropriate measures aimed at correcting the situation and achieving planned indicators in the framework of, for example, the national concept of road traffic safety. Currently, statistics on road traffic accidents, occurring in Kazakhstan, are published by the Committee on Statistics of the Republic of Kazakhstan and the Committee on Legal Statistics and Special Accounting. However in the current situation, this is not enough, especially since the ARC MIID of the Republic of Kazakhstan outlined the program of actions aimed at eliminating the existing shortcomings in the field of the road traffic safety and significant improving its indicators. The analytical investigation of the status of the road traffic safety on the roads of the Republic of Kazakhstan was carried out. This will become a kind of starting point in the consistent work in this direction, which will provide the interested parties, first of all the experts, with the high-quality and reliable information about the main figures, characterizing the state of safety of the road users. Based on objective accident data, it is possible to take the effective measures aimed at improving the situation on the roads of the Republic of Kazakhstan.

Keywords: road traffic safety, road traffic accident, actual state, statistics, indicators of the state of the road safety

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Анализ состояния безопасности дорожного движения в Республике Казахстан

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Реферат. В статье представлены результаты исследования безопасности дорожного движения и проведен анализ основных показателей, определяющих состояние безопасности дорожного движения на автомобильных дорогах республиканского значения Казахстана. Во многих распорядительных документах, таких, например, как «Приоритетный план действий по повышению безопасности дорожного движения в Республике Казахстан на 2017–2020 годы»,

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разработанном при поддержке Азиатского банка развития, а также в проекте «Национальная концепция безопасности дорожного движения», подготовленном Межведомственным научно-исследовательским институтом «Академия правоохранительных органов» Генеральной прокуратуры Республики Казахстан, четко указана острая необходимость повышения безопасности дорожного движения. В то же время необходимо иметь информацию о масштабах существующей проблемы в области безопасности дорожного движения, что обеспечивается постоянным изучением и анализом статистических показателей, а также планированием соответствующих мер, направленных на исправление ситуации и достижение запланированных показателей в рамках, например, Национальной концепции безопасности дорожного движения. В настоящее время статистика дорожно-транспортных происшествий, происходящих в стране, публикуется Комитетом по статистике Республики Казахстан и Комитетом по правовой статистике и специальному учету. Однако в сложившейся ситуации этого недостаточно, тем более что Министерство индустрии и инфраструктурного развития Республики Казахстан наметило программу действий, направленную на устранение существующих недостатков в области безопасности дорожного движения и значительное улучшение ее показателей. Проведено аналитическое исследование состояния безопасности дорожного движения. Это станет своего рода отправной точкой в последовательной работе в данном направлении, которая предоставит заинтересованным сторонам, в первую очередь экспертам, качественную и достоверную информацию об основных показателях, характеризующих состояние безопасности участников дорожного движения. Исходя из объективных данных о ДТП, можно принять эффективные меры, направленные на улучшение ситуации на дорогах Республики Казахстан.

Ключевые слова: безопасность дорожного движения, дорожно-транспортное происшествие, реальное положение, статистика, показатели состояния дорожной безопасности

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Introduction

Various international organizations collect, analyze and publish statistics on the road traffic safety on roads. These are, for example, WHO, the World Bank, the European Commission, the OECD, and others. Some countries also publish their national reports on the road safety, including the world leaders in improving the road safety such as Australia, Great Britain, Sweden [1–3] and some others. This, once again, testifies to the importance and seriousness of the problem of improving the road traffic safety on auto roads. This applies to the Republic of Kazakhstan as well.

The most scaling statistical analysis of the road traffic accidents in the context of various countries of the world is carried out by WHO. Currently, two such studies are known that were carried out in 2009 [4] and 2013 [5]. The main indicator of the road safety according to WHO is the number of deaths in the road accidents per 100.000 people of the country. So, the average world indicator (as of 2013) is 18.0 deaths in the road accidents / 100 thousand people, while in Europe – 8.7 deaths in the road accidents / 100 thousand people, in Kazakhstan 24.2 deaths in accident / 100 thousand people [5].

The experience of compiling and analyzing of such summarized information about the accidents on the road network shows that such periodic reports not only hold up-to-date information, but also capture the relevant trends, which in its turn, helps to make reasonable management decisions, allowing, to some extent, to control the overall situation in the field of the road traffic safety.

The WHO data for 2009 [4] and 2013 [5] show that there are countries that are better than others in solving the task of minimizing the consequences of the road accidents, which allows us to hope to improve the situation at the national level. For this, first of all, it is worth to turn to the analysis of the foreign experience.

According to the indicator called as “the traffic fatalities per 100.000 people”, Sweden is the safest country with an indicator of 2.8 people per year (as of 2013), the UK – 2.9 people who died in road accidents / 100 thousand people, Germany – 4.3 deaths in traffic accidents / 100 thousand people, the USA – 10.6 deaths in traffic accidents / 100 thousand people, Australia – 5.4 deaths in traffic accidents / 100 thousand people, Canada – 6.0 fatalities in road accident / 100 thousand people [5]. This indicator for Belarus is 13.7 deaths in traffic accidents / 100 thousand people, for the Russian Federation – 18.9 deaths in traffic accidents / 100 thousand people [5].

In relation to the Republic of Kazakhstan, we considered four groups of data, which include:

– general and detailed information about the nature, causes and consequences of road accidents as a phenomenon in the Republic of Kazakhstan as a whole and by regions over the past five-year period;

– the information characterizing the place and the time of the accident in the Republic of Kazakhstan for the previous year;

– the general and detailed information, quantitatively and qualitatively characterizing the participants of the accidents in the Republic for the last reporting period;

– the reference information characterizing the network of the republican highways and the fleet of vehicles required for the comparative analysis.

For the analysis we used the information from the official website of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan. The graphs below are based on the information contained therein.

The road traffic safety of the National auto roads

According to the statistics, the peak in the number of accidents in Kazakhstan falls on 2013. In subsequent years, there has been a significant improvement in the generalized indicators characterizing the road traffic safety (Fig. 1).

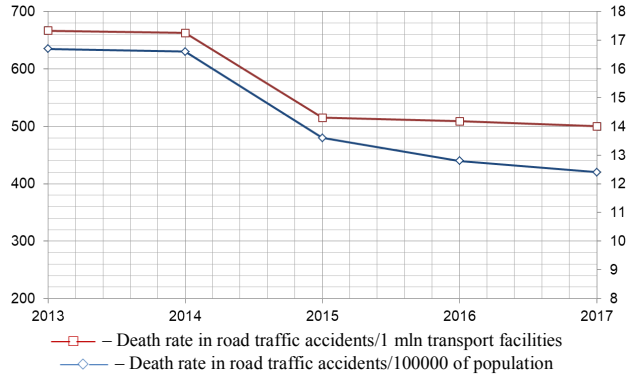

Fig. 1. Dynamics of the changes in the road traffic safety indices in Kazakhstan

Currently, this tendency is not so pronounced, in particular, on the network of the republican roads there was no significant improvement in indicators characterizing the state of safety in 2018. The positive tendencies in some areas are offset by negative dynamics in others. Only in one region of Kazakhstan – East Kazakhstan – in the last two years there has been a consistent decrease in both the total number of accidents and the severity of their consequences: in comparison with 2016, the number of accidents recorded in 2018 decreased by 31 %; the fatalities in road accidents decreased by 26 %; the number of injured was reduced by 30 %.

In absolute terms, the situation is least favorable in the Almaty region: the largest number of recorded accidents, fatalities and injuries – 802 accidents (+46 % by 2017), 206 fatalities (+20 %) and 1255 injured (+46 %), respectively. When considering the road traffic safety from the perspective of accident indices, the negative accents affect not only Almaty, but Zhambyl and Akmola regions as well. The accident rate in these regions had the greatest impact on the average value of the number of accidents per 100 thousand of the population of Kazakhstan, which in 2018 amounted to 18.1 for the republican roads (Fig. 2). Taking into account that in the remaining eleven regions this indicator is three to four times lower than the national average, the close attention should be paid to these regions when planning the work to improve the road traffic safety.

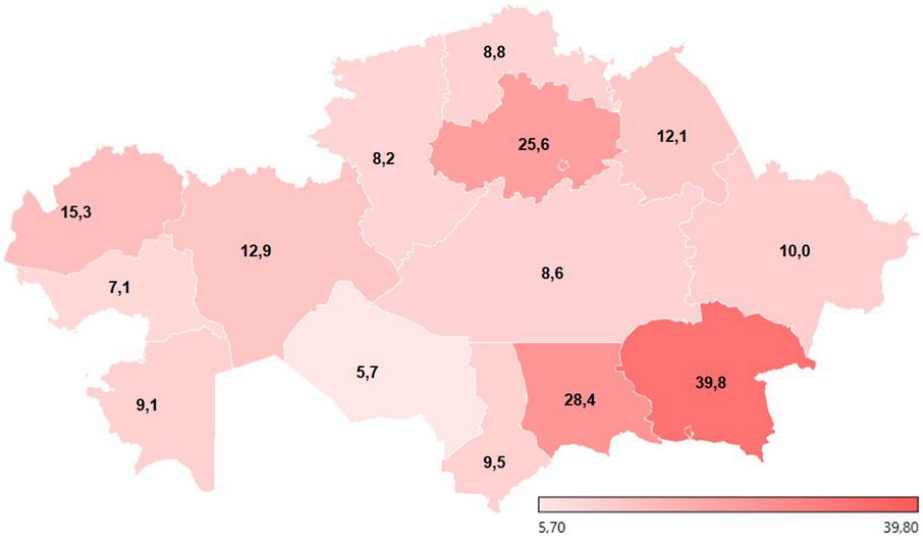

Fig. 2. The traffic fatalities in 2018 on the republican auto roads per 100 000 of the population

The reasons and the circumstances of the road accidents

The results of the numerous studies conducted around the world show that the non-compliance with the speed limit significantly increases the risk of the traffic accidents [6]. The relationship between the speed and the road traffic safety is not just statistical, but it is causal as well [7]. The continuous authoritative research only confirms these provisions [8].

In Kazakhstan, as well as in the whole world, the main cause of the accident is the non-compliance with the speed limit (Fig. 3), specified for this section of the road – 38 % of the total amount (923 accidents). At the same time the most adverse outcome is observed in an accident in which the vehicle enters an oncoming lane (head-on collision): in 71 out of 100 cases, this type of accident is fatal for one of the participants, while another 247 people are injured. Despite the fact that the total number of such accidents slightly exceeds 10 % of the total amount, the death rate in them is 20 % of the total, and almost every six wounded received injuries during the reporting period precisely when leaving for oncoming traffic.

Driving under the alcohol influence in the world practice [9] is recorded as the most malicious way of neglecting the public order, and at the same time, this way is the most dangerous from the point of view of social consequences. The statistics of the accidents on the republican roads of Kazakhstan indicate that drug intoxication (including alcohol) is not so common (Fig. 3), and mortality in such accidents is about 21 %, which is the eighth cause of death in road accidents. In Kazakhstan, in 2018, the legislation regulating the inspection of drivers and the procedure for determining their alcohol intoxication changed. Under the new rules, the blood alcohol content of the driver should be more than 0.5 per mille in order to record the fact of driving under the alcohol intoxication.

The minimum number of road traffic accidents in 2018 occurred in the shortest month of the year – February: 123 road accidents, one in three of which were fatal (Fig. 4). The maximum number of road accidents occurred in November – 259 road accidents. At that, the most negative month in this series was August, when more than 10 % of all road accidents were recorded, of which almost every second road accident ended with the death of one of its participants. It can be noted that such a breakdown of road accidents by months corresponds to data obtained in other countries [10], so this may indicate a possible existence of some regularity.

The most dangerous, and this should be remembered by all road users, is the evening time and the twilight period (Fig. 5). In total, almost half of all accidents occur during the day period with insufficient natural lighting for auto roads. At that, the greatest number of deaths occurred in the period from 18 to 24 hours – more than 30 %.

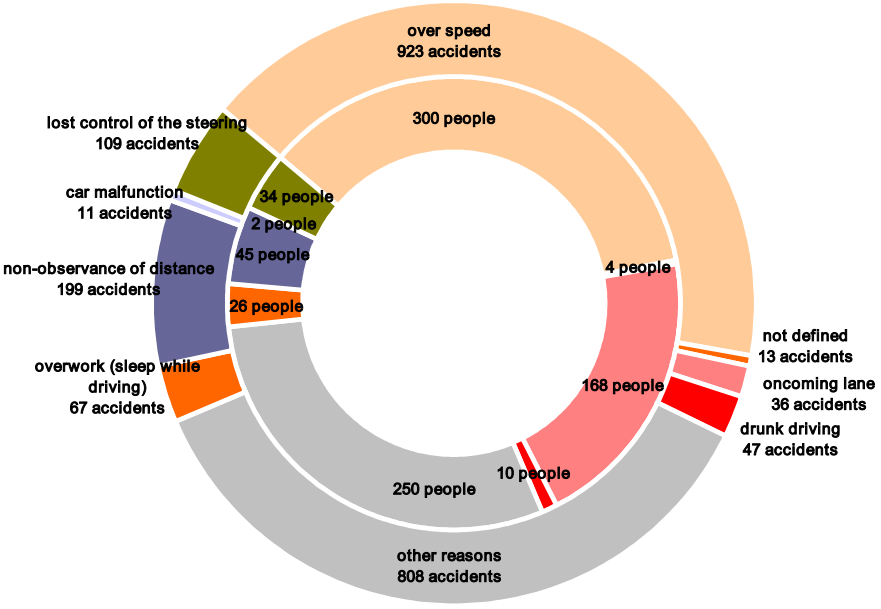

Fig. 3. The reasons of the road traffic accidents

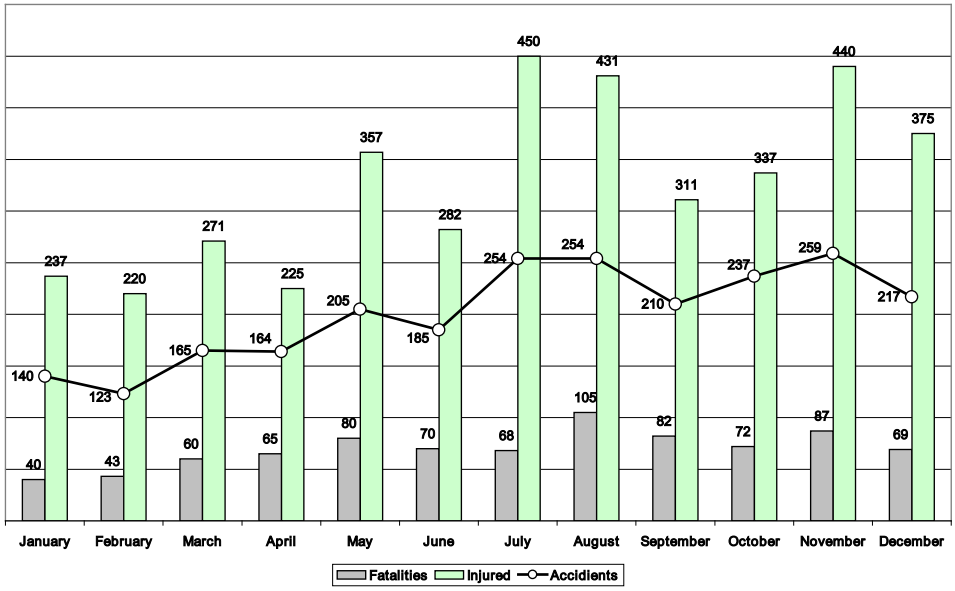

Fig. 4. Statistics of road accidents by months of 2018

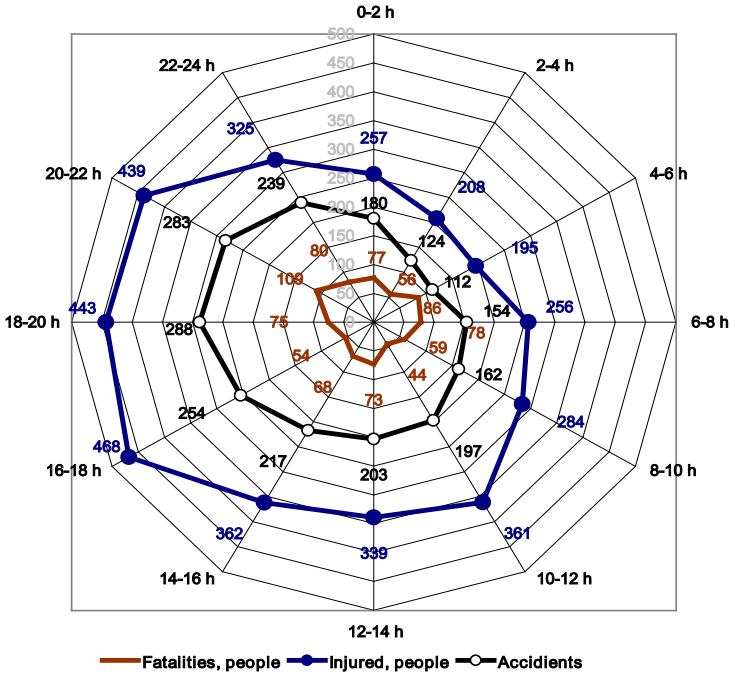

Fig. 5. Statistics of road accidents by the time of the day

The typical traffic violator , the culprit of every third accident, is a driver of 25–35 years (Fig. 6). In 2018, the drivers of 40–45 years posed the minimum danger to the life and health of road users. The highest index of injured is observed in the road accidents with participation of the young drivers under the age of 20: 271 people per every 100 road accidents. Novice drivers should be more attentive and responsible towards other road users, in particular towards their passengers and fellow travelers.

Assessing the situation on the republican roads in indices per 100 km of the road network in 2018 (Tab. 1) and in the previous years, we can note a positive tendency towards a decrease in the road accident rate and the severity of the consequences of the road accidents (Fig. 7).

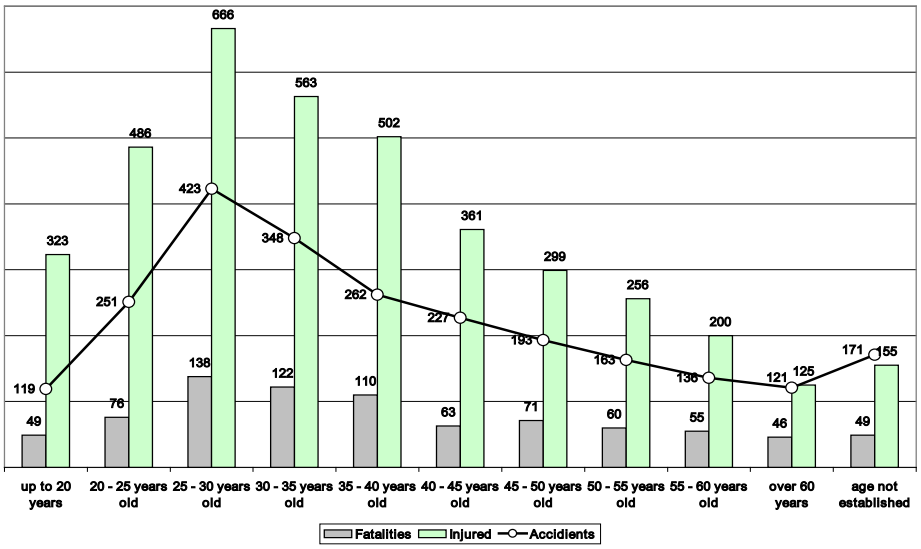

Fig. 6. The road accident statistics by the age category of the drivers

Table 1

Consolidated indices of the state of the road traffic safety on the republican roads of Kazakhstan in 2018

Region	RTA quantity/100 km	Fatality, people/100 km	Injured/ 100 km
Almaty	28.4	7.3	44.5
Akmola	8.3	2.6	12.8
Aktobe	5.9	2.4	10.4
Atyrau	3.9	2.9	6.7
Eastern Kazakhstan	4.0	1.4	7.1
Jambyl	27.5	6.1	54.1
Western Kazakhstan	7.1	3.1	10.3

Region	RTA quantity/100 km	Fatality, people/100 km	Injured/ 100 km
Karaganda	4.3	3.5	7.6
Kzyl-Orda	4.4	1.9	8.6
Kostanay	5.1	1.7	5.3
Mangistau	5.7	3.4	10.0
Pavlodar	5.5	2.4	8.1
Northern Kazakhstan	3.3	2.0	5.5
Turkestan	32.0	9.9	47.8

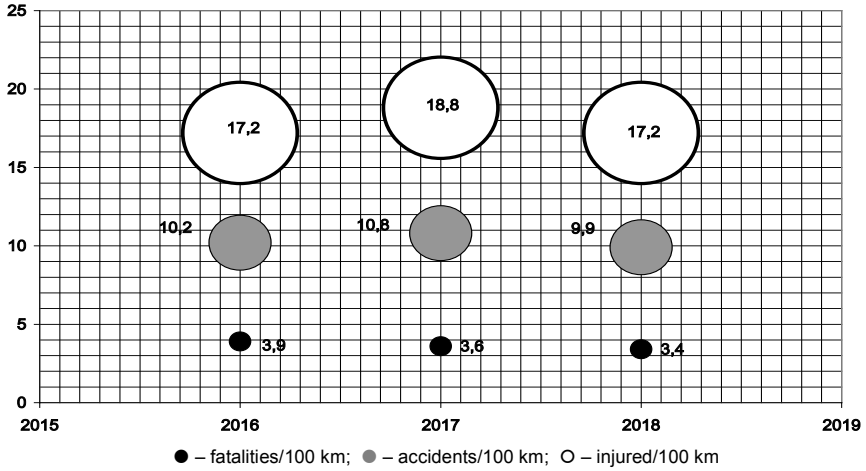

Fig. 7. Consolidated indices of the state of the road traffic safety per 100 km of the republican roads of Kazakhstan

Road accident tendencies in the Republic of Kazakhstan

The analysis of the absolute values associated with the road traffic accidents within a short period (1–3 years) does not provide a complete understanding of the tendencies in the accidents. The consideration of historical data, including the use of some relative data, is of significant interest [11].

Fig. 8 presents data on the number of road accidents and fatalities in them over 15 years, as well as

the change in the number of cars over the same time. Studying the graphs in Fig. 8 allows to make some interesting observations. In the period from 2003 to 2007 there was a certain dependence of the growth in the number of deaths in the road accidents from the increase in the number of cars. At the same time, in the period of 2007–2013, there was no relationship between the number of the road accidents and the number of cars. However, after the number of cars exceeds 200 units per 1000 people (2011–2013), a gradual annual decrease in the number of the road accidents, as well as the deaths in them, is observed. This tendency, especially in relation to the number of road accidents continues to the present.

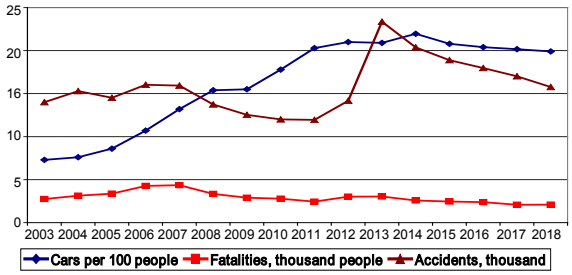

Fig. 8. Road accidence in the Republic of Kazakhstan in 2003–2018

Here we should recall the studies of R. Smeed, conducted in 1949. Smeed linked the road accident statistics with the level of motorization in the country and showed that the mortality rate in the road accidents per unit of the car fleet decreases as the motorization continue to grow [12, 13]. The dependencies proposed by him, called the "Law of Smeed", were subsequently specified and repeatedly tested in many countries. At that, in the developed countries, the actual road accident rates lie below the Smeed curve, in Africa, Brazil, India, China – above the curve. However, the general regularity of the model remains in all countries [12].

If we compare the transport risks in the Republic of Kazakhstan with the world trend according to Smeed, we get the following picture (Fig. 9). You can see that from the level of 200 cars/1000 people the transport risks situation in the Republic of Kazakhstan looks more like the situation typical for the developed countries.

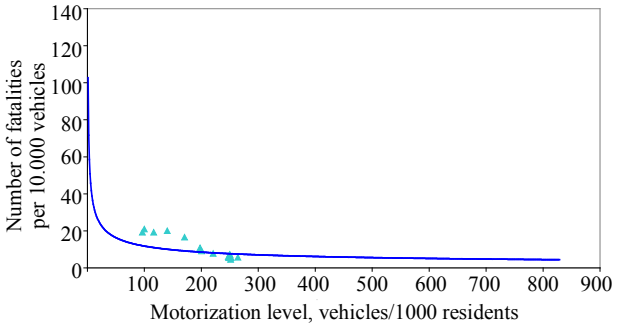

Fig. 9. Transport risks in the Republic of Kazakhstan and the world trend: ▲ – Republic of Kazakhstan, 2003–2017; —— – world trend according to R. Smeed

It is known together with the growth of the automobilization of the country, the nation's transport self-education process takes place, as a result of which the road accident rate may be decreased even without regard to specially taken measures. The process of self-education of the nation takes place simultaneously with the formation of the road network that meets the transport needs, as well as the continuous improvement of the parameters of active and passive car safety, as J. Adams spoke about in the 1980 [14].

In terms of the transport risks, the situation in the Republic of Kazakhstan is far from satisfactory. Fig. 10 shows the possible trend of this indicator in comparison with the average value in the developed countries. The figure shows that the transport risks are getting closer to the limit that is significantly higher than in the developed countries.

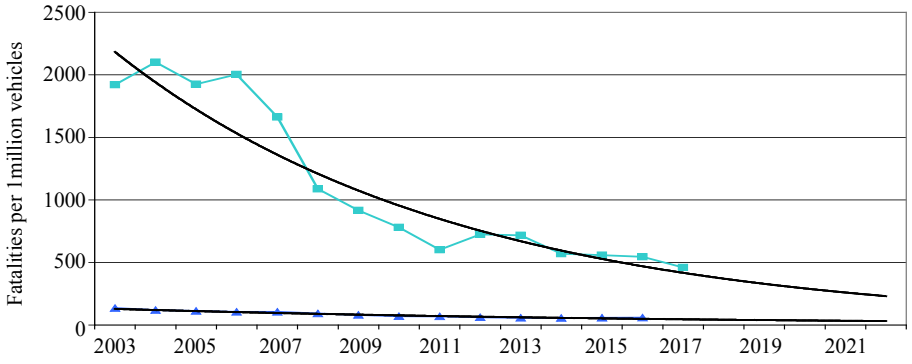

Fig. 10. Possible trend of the transport risks:
■ – Republic of Kazakhstan; —▲— – average value in developed countries

The significant improvement in the road accident situation requires the targeted systematic actions throughout the country. If we consider the immediate actions that can be taken at the level of the road authorities, then it makes sense to assess the risks of traffic on auto roads, for example, according to the IRAP method.

CONCLUSIONS

1. The foreign practice indicates that the preparation of the detailed reliable statistics on the road accidents is a good way for authorized bodies to demonstrate to the citizens their openness, responsibility and care for them in the field of exercising their powers.

2. For 12 months of 2018, we see that on the roads of the republican significance in Kazakhstan the long-term tendency of reduction of the number of road accidents and the number of injured persons remained.

3. In the period from 2016 to 2018 only three (East Kazakhstan, Kostanay and Turkestan) out of eleven regions of Kazakhstan show the rise of the main accident rates, in the remaining areas there was a downfall, which had a negative impact on the process of improving the road traffic safety in the country in whole.

4. The most dangerous time of the day in 2018 was the period from 20 to 22 hours, the most dangerous month was August. The most frequent reason for the accident in 2018 was the excess of the permissible speed of the vehicle, and the greatest danger to the life and health of road users was crossing into the oncoming lane (front collision of the vehicles).

5. In 2018, the number of dead and injured as a result of the traffic violations by drivers under the alcohol intoxication decreased. At the same time, the analysis shows the significant setback of the Republic of Kazakhstan from developed countries in terms of the road traffic safety. Improving the accident situation requires the targeted systemic actions throughout the country.

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