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### **Road accident mortality in the Sakha Republic (Yakutia) in 2001-2010**

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**Summary.** The research analyzes road accidents (RA) in the Sakha Republic (Yakutia) for the period 2001-2010. This includes major causes of accidents on the republic's roads, their frequency split for different regions, as well as road accident mortality. It has been revealed that the road accident mortality on M-56 federal motorway is 2-2.5 times higher than in population aggregates.

**Key words.** Road accident, injury rate, mortality.

Road accidents injury rate has critical demographic, economic and social consequences, and in most countries is considered a major social problem, which, however, may be successfully solved through purposeful measures.

Despite a lower level of automatization in Russia, the road accident mortality is significantly higher than in other countries: by 1.6 times higher compared with the USA; France - by 2.9 times; Sweden - by 3.8 times; Great Britain - 4.6 times [2]. According to the State Inspection for Traffic Safety (GIBDD), Russia experiences annually approximately 200 thousand road accidents, resulting in 27 thousand deaths and 250 thousand injuries. Over the past three years, the annual RA damage has made 2.4-2.6% of the country's Gross Domestic Product, with the economic damage rate increasing by 5-7% a year [2, 4]. The figures show importance of the issue, especially in areas with well-developed road infrastructure and growing number of vehicles.

**Purpose of the research** is to study the level of road accidents and RA mortality in the Sakha Republic (Yakutia).

#### **Material and methods of the research.**

The research analyzes the trend of RA occurrence and mortality of this cause in the Sakha Republic (Yakutia) over the past ten years. In order to do that, we have studied accident books, annual reports by GIBDD Department in the Sakha Republic (Yakutia) for the period 2001-2010. Also, we have analyzed reports by the Emergency Unit (ER) on providing pre-hospital medical aid at road accidents in the city of Yakutsk in 2009-2010 and 10 months of the year 2011.

#### **Results of the research.**

Over the studied period the republic registered 9,252 road accidents, with casualties totaling to 12,432 people. The annual pattern, however, has been fluctuating considerably. With 818 accidents registered in 2002, their number reached the peak of 1,137 cases in 2007, making the difference of 313, or 28% (Fig. 1).

It is worth noting that in the recent years (2007-2010) there is a trend for decreased number of road accidents, compared to the previous years; still, the figures are quite great. A number of casualties directly depends on a number of road accidents, and it is the largest in 2007, amounting to 1,501 people.

The number of the dead is 12.5% (1,550 people, including 96 children under 16). The remaining 87.5% (10,882 people, including 1,460 children) suffered from injuries of different degrees.

Among municipalities of the republic, by the number of road accidents the city of Yakutsk ranks first, followed by the town of Neryungri. Then come Mirninsky, Aldansky, Lensky, Megino-Kangalassky and Khangalassky regions (Table 1).

Several factors affect the road situation. The analysis of road accidents shows that over 90% of fatalities were caused by drivers failing to follow rules of the road (1,420 people); in the rest of the cases deaths were fault of pedestrians themselves (130 people). One should note that before 2009 the official statistics included deaths within 7 days after an accident; then in 2009 the period of monitoring road accident casualties was extended to 30 days (cf., in the USA this period is one year after an injury).

As for the modern state of the road infrastructure, the republic is facing progressive increase in the number of vehicles and subsequent decrease in road capacity in cities. During the studied period unsatisfactory roads caused 2,173 accidents (including 370 fatalities). Yakutsk accounts for the largest share in this statistics with 952 cases (43.8%) and 107 deaths.

Unfortunately, another contributing factor is low standards of driving and spread of alcoholism among the republic's population. For example, in the period 2007-2010 alone, drunk driving caused 487 deaths.

Over 70% of accidents occur in population aggregates, with the city of Yakutsk accounting for over a half (61.0%) of them. The republic's capital also accounts for about a quarter of road accident deaths (28.2%). Out of 1,458 registered accidents involving children, 557 (38.2%) happened in Yakutsk, killing 22 (23%) out of 96 children.

Half of the accidents beyond population aggregates are registered on M-56 federal motorway (B. Never - Yakutsk, Yakutsk - Kolyma) running through the republic's territory (2008 - 53.6% of road accidents, 2009 - 47.8% , 2010 - 50.3%). Territorial units rating by road

accidents occurred in 2010 on the federal motorway goes as follows: Aldansky (22 cases) Megino-Kangalassky (20), Churapchinsky (17), Neryungrinsky and Tattinsky (7 each), Tomponsky (6), Oymyakonsky and Khangalassky (5 each). mortality in these cases exceeded the one for population aggregates by 2-2.5 times. The most dangerous sections of M-56 federal motorway in 2010 are shown in Table 2 (GIBDD data).

Road accident rates in the republic are also characterized by periods of increase and decrease. For example, in 2003 the road accident factor per 100 thousand people increased from 85.9 to 101.8, which is by 15.6%; then it decreased to 85.8-89.9 by the end of 2006 and then skyrocketed to 199.8 (by 33.1%). In the period 2008-2010 this factor made 109.8, 107.5, and 95.1, respectively (Fig. 2).

When comparing the road accident mortality rate in the republic with the one in the Russian Federation, we see that the road situation in the Sakha republic (Yakutia) is relatively favorable (Table 3).

During the period of the highest mortality rate in the republic - 2001-2005 - the road accident mortality made 17.1 - 18.9 per 100 thousand people; however, in 2008, with the total mortality rate at 1,007.7 it decreased to 13.6. On the contrary, with a considerable fall in the total mortality rate to 973.2 in 2006, the RA mortality was as high as 18.7

Road accident deaths account for 6.4-8.7% of all external cause deaths and 82.2-92.0% of all transport-related injuries (Table 4).

Obviously, the presented data show that the republic faces a serious situation with road accident injuries. Along with a set of various measures to prevent road accidents, an important way to reduce the number of road accidents is provision of timely and qualified medical service on spot.

Consequences of road accidents for casualties largely depend on timeliness and quality of medical service provided. According to Sklifosofsky Emergency Medicine Research Institute, road accidents account for 57% of severe multisystem injuries. 60% of people with severe road injuries die on spot, 8% - during transportation to medical institutions. Doctors believe that the lack of qualified medical service within the first hour after a road injury increases mortality by 30%; within first 3 hours - by 60%; and within first 6 hours - by 90% [5].

"Concept of lowering population's mortality in the Sakha Republic (Yakutia) of preventable causes and oncology diseases until the year 2025" states that about one third of the injured in various accidents and disasters die of late provision of medical service (failure to provide first medical aid, including self- and mutual aid, unreasonable prolongation of the isolation stage) [3].

According to Emergency Unit, in the city of Yakutsk in 2009, 1,043 people were injured in road accidents (6 of them died before arrival of ambulance brigade); in 2010 - 1,036 (8); during nine months of 2011 - 900 (9). 65% of the injured in the republic's capital were helped by specialized Emergency Unit brigades. In 97% off calls for accidents the brigades would leave within 4-5 minutes and arrive on spot within 15 minutes. After being provided first aid, 80% of the injured were take to hospital^ 2009 - 847 (81.2%); 2010 - 834 (80.5%); during nine months of 2011 - 745 (82.8%). 27.0-28.5% were admitted to hospital due to their bad condition.

### **Conclusion:**

1. In the period 2001-2010 the Sakha Republic (Yakutia) witnessed 9,252 road accidents injuring 12,432 people and killing 1,550 people (12.5%) (including 96 children under 16).
2. 28.2% of road accident fatalities among adults and 23% among children happen in Yakutsk, the republic's capital.
3. mortality on M-56 federal motorway running through the republic's territory exceeds mortality in population aggregates by 2-2.5 times.
4. To lower the road accident mortality the republic should adopt a regional program with a number of measures designed for lower road injuries, improved quality of medical aid at all stages, and more effective interaction between the Health Ministry and the Ministry for Emergency Situations and the State Inspection for Traffic Safety (GIBDD).

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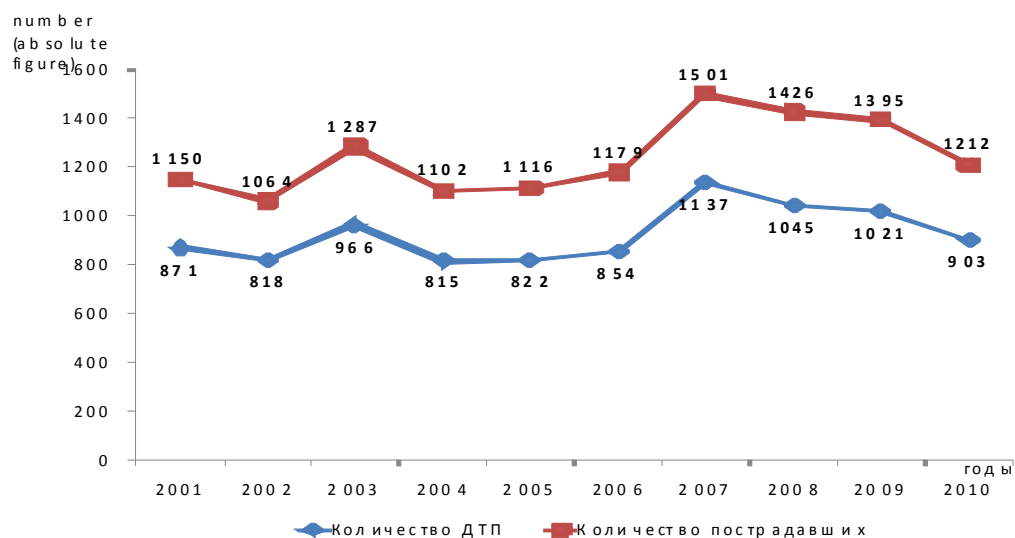
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Figure 1. Number of road accidents in the Sakha Republic (Yakutia) in 2001-2010



number  
(absolute figure)

number of road accidents

number of casualties

years

Table 1

**Number of road accidents in certain regions of the Sakha Republic (Yakutia) (2001-2010)**

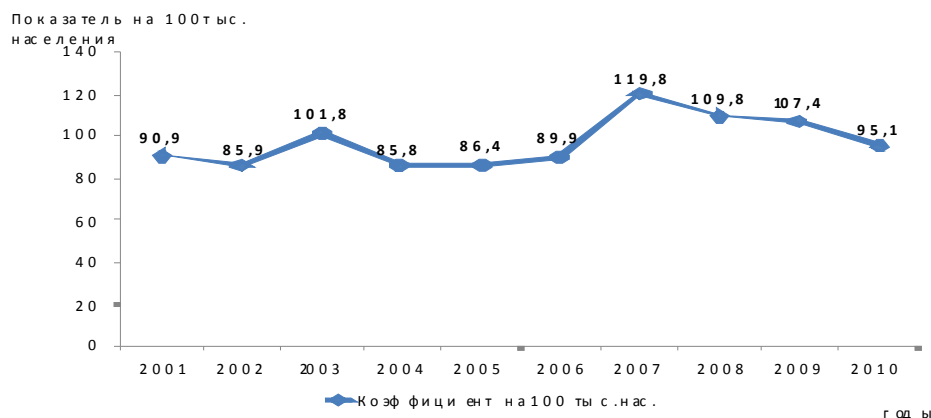
Regions (cities)	Number of road accidents by years (absolute figure)									
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Yakutsk	317	281	342	274	272	265	464	452	502	395
Neryungri	117	123	152	139	112	111	135	89	70	60
Aldansky	77	83	98	67	73	86	82	71	77	63
Lensky	50	52	52	47	44	45	41	41	38	37
Megino-Kangalassky	27	24	41	30	32	39	57	46	46	58
Mirninsky	56	69	67	76	74	74	79	74	50	47
Khangalassky	35	36	40	34	32	28	37	27	21	24

Table 2

**Most dangerous sections of M-56 federal motorway (2010)**

Direction of M-56 federal motorway	Region	Section of M-56 federal motorway (km)
Yakutsk - Kolyma	Megino-Kangalassky	23-25
	Churapchinsky	133, 173-174, 179-182, 185-186
Never - Yakutsk	Neryungrinsky	488

**Figure 2. Road accident rate pattern per 100 ths people in the Sakha Republic (Yakutia) 2001-2010**



Factor per 100 ths  
people

Rate per 100 ths people

years

Table 3

**Trends of total mortality rate and road accident mortality for the period 2001-2010**

Years	Total mortality rate in the RF*	Total mortality rate in the SR(Y)*	Road accident mortality rate in the RF**	Road accident mortality rate in the SR(Y)**
2001	15,6	10,2	21,1	18,2
2002	16,2	10,2	22,9	18,9
2003	16,4	10,2	24,6	17,4
2004	16,0	10,2	23,9	17,1
2005	16,1	10,2	23,6	18,8
2006	15,2	9,7	22,9	18,7
2007	14,7	9,7	23,4	13,5
2008	14,6	10,1	21,1	13,6
2009	14,2	9,8	18,4	14,3
2010	14,2	9,8	18,6	12,5

\* - per 1000 people

\*\* - per 100,000 people

Table 4

**Share of road accident deaths in the structure of external cause mortality (2000-2010)**

Years	Deaths of external causes (absolute number)	Deaths of road accidents (absolute number)	Road accidents deaths		
			Absolute figure	Share in * (%)	Share in ** (%)
2000	2341	175	161	6,9	92,0
2004	2230	197	162	7,3	82,2

2005	2186	209	179	8,2	85,6
2006	2055	212	178	8,7	84,0
2007	1941	140	128	6,6	91,4
2008	1975	147	129	6,5	87,8
2009	1870	148	136	7,3	91,9
2010	1872	138	119	6,4	86,2

*\* - external causes**\*\* - road accidents*