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Trends in Mortality from Preventable Causes in the Sakha Republic (Yakutia)

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Abstract

A retrospective analysis of the official statistics for the period 1990-2019 was performed in order to study the rates and structure of mortality of the population in the Sakha Republic (Yakutia) (SR(Y)). It has been established that over the past 30 years, the medical and demographic situation in the SR(Y) was characterized by a high birth rate and high mortality of the population in young age groups from preventable causes, primarily external causes. In the structure of the external causes of death, violent deaths ranked first over the entire study period. In the total number of all deaths, people of working age accounted for more than 40%. In the structure of the causes of working-age population mortality, external causes (injuries and poisoning) ranked first over the entire study period, followed by circulatory system diseases and neoplasms. A relatively high mortality rate in children aged 0-17 years from external causes remained, exceeding the average indicator of the Russian Federation by 36% (2018). This fact has an adverse effect on reproduction in the population, as well as the age and sex composition and the formation of the labor force in Yakutia. (**International Journal of Biomedicine. 2020;10(2):169-173.**)

Key Words: premature mortality • external causes • Yakutia • retrospective analysis

Introduction

With a low density (0.3 people per 1 km^2), the population of the Sakha Republic (Yakutia) SR(Y), as of 01.01.2019, totaled 967,000 people. Young age groups dominated in population structure: under working age – 24.7%, working age – 57.7%, over working age – 17.6%. Under the rough division of the constituent entities of the Russian Federation (RF) by the state of health of the population, the SR(Y) falls into the category of those with a positive natural increase and a young population structure, along with such ethnic regions as Yamalo-Nenets and Khanty-Mansi Autonomous Okrugs, and the Republics of Altai and Tyva.[1] Compared with 2010, the average age of the SR(Y) population increased by almost 2 years in 2018, rising to 34.6 years: 33.5 for men and 36.1 for women.

For several decades (1990-2017), the medical and demographic situation in Yakutia was considered more favorable than other regions of the Far Eastern Federal District (FEFD) due to the maintained natural increase of the population. However, Yakutia's situation was also characterized by high mortality from preventable causes in young age groups, primarily injuries and poisoning, against the background of a high birth rate.[2] In 1990-2003, due to mortality and external migration, the population declined by 162.9 thousand people (14.7%). In the subsequent years (2004-2019), the population increased by 17,000 people (1.8%) (Fig. 1). The annual migration from Yakutia decline in that period made by 5,500 people.

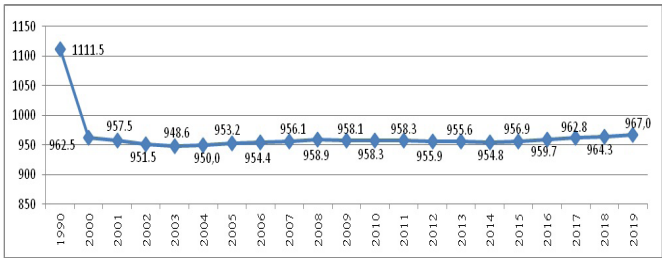

Fig. 1. *Population trends in the SR(Y) (as of the beginning of the years, thousand people).*

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Over the entire study period, the birth rate in the republic greatly exceeded the same indicators of the RF and of the FEFD, of which Yakutia is a part (Table 1). The high birth rate contributed to maintaining the natural population increase in the region, despite the high mortality rate (MR) and external migration. However, in 1990-2018, the birth rate decreased by 30%, which, subsequently, triggered a decreased natural increase of the population by 53.5% (from 12.7 to 5.9 per 1,000 population). The total fertility rate decreased from 2.0 to 1.85 per 1,000 population. By 2018, the number of women of reproductive age had decreased by almost 10%, compared with 2010.[3]

Table 1.

Birth and mortality rates in the SR(Y), FEFD, and RF in 1990-2019

Territory	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019*
Total birth rate (number of births per 1,000 population)										
SR(Y)	19.6	15.3	13.7	14.3	16.8	17.0	16.0	14.5	13.7	13.2
FEFD	15.4	10.4	9.7	11.5	13.2	13.9	13.3	12.1	11.9	11.1
RF	13.4	9.3	8.7	10.2	12.5	13.3	12.9	11.5	10.9	10.1
Total MR (number of deaths per 1,000 population)										
SR(Y)	6.7	9.8	9.7	10.2	9.8	8.5	8.4	8.1	7.8	7.8
FEFD	8.2	12.8	13.2	15.3	13.8	12.6	12.5	12.1	12.0	12.2
RF	11.2	15.0	15.3	16.1	14.2	13.0	12.9	12.4	12.5	12.3

**- preliminary data*

The working age category dominated the age structure of the republic's population (57.7% in 2019). Over the study period, the number of people over working age increased by more than twofold (from 70.3 to 170.1 thousand), due to a decrease in the number of working-age people by 16.3%, children and adolescents – by 32.8% (Table 2). Still, the number of people in this category was almost 1.5 times less than the number of people under working age. The challenge of the global population aging—that is, those over working age making up a higher percentage of the population—is observed primarily in developed countries with low birth rates and high life expectancy. In Yakutia, the aging process is considerably slower due to the high premature mortality rate, especially in the male population.

Table 2.

The population structure changes in the SR(Y) (abs. number in thousand people and share as of the beginning of the years)

Age categories	1990	2000	2005	2010	2015	2019	Increase (decline)
Under working age	356.2 32.6%	271.2 28.2%	236.5 24.9%	220.9 23.3%	233.2 24.4%	239.4 24.7%	-116.8 -32.8%
Working age	667.4 60.9%	597.0 62.0%	616.7 64.9%	609.0 64.1%	579.2 60.5%	557.5 57.7%	-109.9 -16.3%
Over working age	70.3 6.7%	94.3 9.8%	97.5 10.2%	119.5 12.6%	144.5 15.1%	170.1 17.6%	+ 99.8 142.0%
Total	1111.6	962.5	950.7	949.3	956.9	967.0	-144.6 -13%

There is evidence that the aging process has begun in Yakutia: The share of children and adolescents decreased from 32.6 to 24.7%; the share of people of working age decreased from 60.9 to 57.7%; there was redistribution of working-age people toward older ages; and the share of people over working age significantly increased (from 6.7 to 17.6%).

Mortality is a sufficiently sensitive indicator of socio-economic living conditions and healthcare quality. Compared with fertility, mortality is more susceptible to external influences; it can be reduced in a shorter time (within 3-5 years) than fertility can be increased (10 or more years). In addition, high mortality contributes greatly to depopulation (65%); therefore, influencing mortality, one can obtain more remarkable results and significantly reduce the progress of depopulation, although this will not solve the population demographic problems completely.[4] Preventable mortality is an integral indicator of the performance of the health system. Not being a precise parameter, it gives a certain idea of the quality and effectiveness of medical services and public health policies in a country, and raises the possibility of certain problems in the health system.[5]

The demographic history of Yakutia witnessed two periods of increasing mortality rates in the republic: first – the years 1990-1995 (addition rate of 46%, from 6.7 to 9.8 ‰), second – the years 2000-2005 (addition rate of 5%, from 9.7 to 10.2 ‰).[6] Next, after a period when the indicator stabilized at the level of 9.3‰–9.8‰, since 2013 it decreased to 7.8‰ in 2019. Despite the positive trend, over the study period mortality was the most pressing issue in the population policy of the republic. In this respect, a further study of mortality remains relevant.

The aim of our research was to study the current trend in mortality from preventable causes in the SR(Y) and its influence on the medical and demographic situation in the region.

Materials and Methods

The following information was used in the study: data from the Territorial Authority of the Federal State Statistics Service in the SR(Y), medical death certificates (form 106/u-02), and forensic medical examination reports. A retrospective analysis of statistical data was performed with statistical, analytical, and mathematical methods, as well as comparative analysis methods.

Results and Discussion

A retrospective analysis of the main causes of mortality in Yakutia in 1990-2018 revealed that at the beginning of the study period, the top three positions were taken by circulatory system diseases (CSD), external causes, and neoplasms; in 2015-2018, external causes moved to the third position after neoplasms (Table 3).

The three leading causes of death (CSD, neoplasms, and external causes) accounted for almost 79% of total deaths in 2018(67.0% in 1990). The analysis of the changes in mortality rates from these causes in 1990-2018 revealed the following (Table 4):

As of 2018, in comparison with the starting indicators of the study (1990), we observed:

1) An increase in the MR from neoplasms by 14.6% (from 122.0 to 139.8 per 100,000 population). The mortality of men from this class of diseases (161.3 per 100,000 population) was 26% higher than in women (119.5 per 100,000 population).

2) An increase in the MR from CSD by 54.7%, with maximum values observed in the period 2005-2010. The present period showed a positive trend: in 2014-2018, the mortality from CSD decreased by 12.9%. There were certain gender differences: the mortality of men from this class of diseases (412.7 per 100,000 population) was almost 1.5 times higher than in women (298.6 per 100,000 population)

3) A significant reduction in the mortality from external causes by 25.5% (from 164.6 to 122.6 per 100,000 population). The MR of men from injuries, poisoning and other consequences of external causes (202.5 per 100,000 population) was 4 times higher than in women (47.3 per 100,000 population); however, the rate of decrease in men's mortality amounted to 24.8% (from 269.2 to 202.5 per 100,000 population), whereas in women – 19.1% (from 58.5 to 47.3 per 100,000 population)

Table 3.

Mortality ratios in the SR(Y) by some main causes (per 100,000 population)

Causes by classes	Years					
	1990	2000	2005	2010	2014	2018
Some infectious and parasitic diseases	14.0	15.2	15.3	11.4	10.6	13.6
Neoplasms	122.0	132.6	125.8	120.7	128.2	139.8
Circulatory system diseases	228.9	381.7	465.1	469.5	406.3	354.0
Respiratory diseases	40.8	43.3	36.3	34.9	27.9	28.5
Digestive system diseases	26.1	45.8	46.1	55.7	37.1	38.7
Injuries, poisoning, and some other consequences of the impact of external causes	164.6	243.9	229.2	195.3	155.0	122.6

Table 4.

Trends in MR from neoplasms, CSD and external causes (1990-2018) (per 100,000 population)

Years	RF			FEFD			SR(Y)		
	Neoplasms	CSD	EC	Neoplasms	CSD	EC	Neoplasms	CSD	EC
1990	194.4	618.7	134.0	…	…	…	122.0	228.9	164.6
2000	203.2	840.0	219.0	172.9	655.7	260.5	132.6	381.7	243.9
2005	201.2	908.0	220.7	182.1	786.7	281.8	126.3	466.8	230.0
2010	205.1	806.4	151.7	191.0	735.8	202.5	120.7	469.5	195.4
2014	202.0	659.5	129.4	190.4	638.5	165.8	128.2	406.3	155.0
2018	203.0	583.1	98.5	201.0	525.4	141.5	139.8	354.0	122.6

EC- External causes

Among 11 regions of FEFD, the SR(Y) has the lowest MR, including those from neoplasms, CSD, and respiratory and digestive diseases (Table 5).

Table 5.

Population mortality in the SR(Y), FEFD, and RF from main causes in 2018 (per 100,000 population)

Territory	Total deaths	including from:					
		Some infectious and PD	Neoplasms	CSD	RD	DSD	EC
RF	1,245.6	23.6	203.0	583.1	41.6	65.0	98.5
FEFD	1,203.1	23.1	201.0	525.4	53.2	74.2	141.5
Republic of Buryatia	1,074.3	21.9	191.1	445.9	61.3	62.5	147.7
SR(Y)	784.1	13.6	139.8	354.0	28.5	38.7	122.6
Zabaikalsky Krai	1,229.4	20.2	202.0	510.8	85.7	57.4	166.5
Kamchatka Krai	1,126.2	14.0	163.4	562.6	47.9	71.7	124.7
Primorsky Krai	1,345.0	35.9	235.9	640.7	52.3	84.9	116.3
Khabarivsk Krai	1,283.5	24.2	191.7	617.0	43.9	82.8	136.5
Amur Oblast	1,338.3	17.0	204.6	460.0	44.7	83.4	177.3
Magadan Oblast	1,136.2	7.0	195.6	497.0	63.1	82.7	133.9
Sakhalin Oblast	1,265.7	15.1	241.3	374.8	56.1	123.3	168.0
Jewish Autonomous Oblast	1,366.8	28.0	234.2	779.1	63.4	72.7	141.6
Chukotka Autonomous Okrug	1,104.9	44.4	167.7	440.4	40.4	78.8	252.5

RD - Respiratory diseases; DSD - Digestive system diseases; EC- External causes; PD - parasitic diseases.

Compared with the average data for the RF over the study period, the MR from external causes in the RS(Y) was higher (according to the 2018 data – by 19.7%). As for the structure of external causes of mortality, Yakutia had high mortality rates from accidental alcohol poisoning, accidental drowning, suicides and homicides. In 2018, these values exceeded the respective figures of both the RF as a whole and the FEFD (Table 6).

Table 6.

MR from some external causes in 2018 (per 100,000 population)

Territory	Total deaths	including from:				
		All kinds of traffic injuries	Accidental alcohol poisoning	Accidental drowning	Suicides	Homicides
RF	98.5	13.0	7.5	3.3	12.4	5.4
FEFD	141.5	16.5	6.8	5.4	20.8	11.4
SR(Y)	122.6	12.1	10.1	12.8	23.9	14.3

The preliminary 2019 data show a certain positive trend: decreased mortality from traffic accidents from 12.1 to 8.6 per 100,000 population, from suicides – from 23.9 to 22.8, homicides – from 14.3 to 13.6.

External causes are certainly preventable causes of premature mortality. In terms of preventability, first come the causes of death depending on lifestyle and prevention of risk factors (82% for men and 67% for women). Injuries and poisoning accounted for 54% of all preventable death losses in Russia. More than half (52.6%) of all deaths from external causes, including 72.2% of homicides and 42.1% of suicides, were alcohol-related.[7] According to the Ministry of Internal Affairs of Yakutia, alcohol-related homicides and suicides in the region made up 90% and 42%, respectively. In 2019, the MR from accidental alcohol poisoning in the republic amounted to 15.1 per 100,000 population (cf. the figure for the RF at 7.9 per 100,000 population, for FEFD - 6.7). In general, a number of studies have shown that preventable deaths account for 40% of the total, with their share in the working age reaching 70%.[6]

The comparison of the mortality rates of working-age people from the main classes of causes in Yakutia in 2019 established a positive trend. Since 1996, the MR of the working-age population in the republic consistently exceeded the figures for the RF. The situation in 2019 appears to be more favorable, except for the mortality from external causes (Table 7).

Table 7

Mortality of working-age population in the SR(Y), FEFD, and RF from main causes in 2019* (per 100,000 population)

Territory	From all causes	including from:					
		Some infectious and PD	Neo-plasms	CSD	RD	DSD	EC
RF	466.9	32.8	70.7	140.4	16.9	45.3	108.1
FEFD	588.0	28.7	78.7	171.8	28.2	59.5	167.5
SR(Y)	457.6	17.0	58.5	151.6	13.6	38.7	144.6

**preliminary data; RD - Respiratory diseases; DSD - Digestive system diseases; EC- External causes; PD - parasitic diseases.*

By individual factors of external causes, the MRs of the working-age population in Yakutia from accidental alcohol poisoning (15.1 per 100,000 population) and suicides (33.9) were almost twice as high as the average in Russia (7.9 and 14.8, respectively), from homicides (21.0) – almost 3 times as high. These figures also significantly exceeded the same indicators of the FEFD (Table 8).

By gender, the mortality of working-age men in Yakutia from accidental alcohol poisoning (22.4 per 100,000 population) was more than 1.5 times higher than the Russian average (12.8), from suicides (54.2 against 24. 9) – 2 times as high, from homicides (34.6 versus 11.0) – 3 times as high. The MR of working-age women in Yakutia from the above reasons also exceeded the same indicators for Russia as a whole: from accidental alcohol poisoning (6.9 per 100,000 population against 2.4) by 2.8 times, from suicides (11.0 against 3.6) by 3 times, from homicides (5.7 against 2.9) by 2 times.

Table 8.

The structure of external causes of mortality of the working-age population in the SR(Y) in 2019*(per 100,000 population)

Territory	Mortality from external auses	including from:			
		All kinds of traffic injuries	Accidental alcohol poisoning	Suicides	Homicides
RF	108.1	16.0	7.9	14.8	7.2
FEFD	167.5	21.1	6.7	25.5	17.0
SR(Y)	144.6	12.2	15.1	33.9	21.0

**-preliminary data*

The constantly unfavorable situation with child mortality is one of the serious problems of the demographic situation in the SR(Y). In retrospect, there was an increase in the standardized MR for adolescents aged 15-17 years in 1999-2008 by 30 times (from 0.04 per 1,000 children aged 15-17 years in 1999 to 1.2 ‰ children of the corresponding age in 2008).[8] In 2014, the mortality in the age of 0-17 years for both genders amounted to 108.6 per 100,000 population of the corresponding age and exceeded the figure of the RF by 20.8% (86.0). In the structure of causes of death in children aged 1-14 years, external causes (65%) ranked first, followed by congenital anomalies (6.8%), and nervous system diseases and CSD (4.9% each). At the age of 15-17 years, 90.6% of all deaths occurred in external causes, 6.3% - from CSD, 3.1% - from nervous system diseases. In the structure of deaths from external causes in this age group, suicides were the main cause (42.7% in 2008, 46.9% in 2012, and 34.1% in 2014); the following ranking places were occupied by homicides (13.3%), and traffic injuries(6.7%). The figure of suicidal deaths at the age of 0-17 years in 2014 was 9.0 per 100,000 population of the corresponding age and 3 times higher than the average indicator of the RF (in 2013 – 7.1, in 2012 – 9.9). The standardized MR from suicides in this age group (19.8 per 100,000 people) was by 8.1% higher than the Russian level.

The recent data on the child MR at the age of 0-17 years in Yakutia still showed higher values than the average for the RF; according to the 2018 data, it amounted to 23.9 per 100000 population of the corresponding age, which was 36% higher than the same indicator for the entire country (Table 9).

Table 9.

Child mortality in the ages 0-17 from external causes in 2012-2018 (per 100,000 population of the respective age)

Territory	2012	2013	2014	2015	2016	2017	2018
RF	23.2	21.3	21.1	18.2	16.6	15.3	15.3
SR(Y)	41.2	34.6	35.1	32.1	19.9	20.1	23.9

At the same time, there was a clearly negative trend in child mortality; in the period 2012-2018 it decreased by 42% (throughout the RF by 34%).

In conclusion, the study of the trends in the mortality rate suggests that a high share of losses from external causes in young age groups remains a specific feature of the population mortality in Yakutia. Certainly, there are some positive changes in the demographic situation; yet, the high rate of violent deaths is still pressing, being the most negative and acute problem; it is also a marker of the existing social disadvantage in the region.

The main trends that have a negative impact on the demographic situation and formation of the labor force in the republic are as follows:

- High rates mortality among the working-age population of both genders;
- The dominance of preventable external causes of death (accidents, poisoning, injuries) in the mortality structure of the working-age and child population;
- The decline in the labor force due to a consistent child MR (in the 1990s generation, small-numbered as it is, both in the urban and rural areas) with an increased share of retired people and a subsequently greater demographic load on the working-age population.

Competing Interests

The authors declare that they have no competing interests.

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