The Yakutian Mortality Rate: region-specific dynamics, main causes and outlook.

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The present paper is concerned with the mortality rate in Yakutia between 1960-2010. The mortality rate is affected by changes in the size and age structure of the population, migration patterns, and socio-economic living conditions. During the period in question there was a change in the rank structure of mortality. The forecast of the mortality rate in Yakutia depends on the pace of economic development and more general well-being of Russian citizens.

Keywords: mortality rate, dynamics, trend, cause of death, population, forecast.

The population mortality rate is a major objective criteria for assessing the status of health and medical care within a region. Also, identifying the causes of mortality makes it possible to assess the current condition and prospects of the demographic situation in the area.

With respect to the dynamics of mortality in Yakutia we can distinguish several periods.

The first is a period of falling mortality rates between 1960 to1980. Prior to 1970 the mortality rate of the republic exceeded the USSR average, attributed to low standards of living in the northern half of the region and poor levels of health care. Since the early 1970s the situation reversed – mortality in the Republic was far below the USSR average, explained by a change in the age structure of the Yakutian population. During this period, due to the rapid industrial development of the Northern territory there was a constant increase in the number of economically active young people coming from outside the Republic. Over the years, new towns were built: Neryungri, Mirniy, Lensk, Udachniyand largecillages-Deputatskiy, Aikhal, Ust-Nera, Solnechniyand others. Thus, between 1960 to 1980 the population of Yakutia grew by almost 1.5 times and continued to grow until 1991, when the total population reached its highest level in the history of the republic (1,119,000). During this period, the average mortality rate decreased by 0.2% per year and reached 8.6% in 1980 (compared to 11.0% in the USSR).

The second period in the 1980s was characterized by first stability, and then a more significant decrease in mortality. The significant reduction in mortality rates begun in 1985, and corresponds to the beginning of the anti-alcohol campaign implemented by MS Gorbachev. By 1987, the Republic had a low mortality rate of 5.9%.

Since the early 1990s (the third period) mortality rates began to increase, primarily associated with demographic changes. These changes were the result of socio-economic and political reforms in the country leading to workforce migration out of the Republic, reducing the overall population. The maximum rates of out-migration were observed in 1991-1994, and by 1995 the overall mortality rate reached 9.8%, 66% higher than in 1987.

Furthermore, since 1996 the mortality rate has continued to increase reaching 8.9% in 1998 (the same level as in 1960). During these years, the economy recorded positive developments.

The mortality rate in the Republic between 2001-2008 was stable at 10.2% and only after 2009 did it start to reduce.

Analysis of the major causes of death show the following changes. Before the migration processes, the leading causes of mortality were accidents, injuries and poisonings, followed by tumors and the then, diseases of the circulatory system. However, since the mid 1960s the main cause of death was cardiovascular diseases (also in Russia overall). Death from external causes shifted to second place, and then tumors occupied a stable third position.

The period between 1960-1990 saw a reduction in mortality due to tumors by 12%, respiratory diseases by 42%, and infectious and parasitic diseases by 8%. On the other hand, mortality from circulatory diseases increased two-fold (from 112.1 to 228.9 per 100,000

inhabitants). In the Russian Federation, mortality from cardiovascular diseases increased 3.2-fold (from 176.9 to 617.4 per 100,000 inhabitants). During the same period, deaths from accidents, poisonings and injuries among yakutians increased by 9.5%, constantly exceeding the overall rate for Russia as a whole. In the early 1960s the mortality rate from accidents, injury and poisoning in the Republic amounted to 150.3 per 100,000 inhabitants (69.3 for the Russian Federation). It reached its highest level in the early 1980s and in 1995 (251.7 and 257.7 deaths per 100,000 inhabitants respectively).

Between 1990-2010 the growth rate of mortality surpassed that of the Russian Federation. The mortality rate in the Republic increased 1.5-fold between 1990-2005 (1.4-fold in the Russian Federation), reaching a high of 10.2 cases per 1000 population, mainly due to cardiovascular disease and accidents, injuries and poisonings. However, following the government's national project "Health" in 2006 we see a decrease in mortality rates.

During the period 2005-2010 the total mortality rate in the Republic decreased by 3.8% (11.9% in Russia), mainly due to a 15% reduction in mortality from external causes (31% in Russia), infectious and parasitic diseases by 26% (13.6% in Russia). However, there is a doubling of mortality from diseases of the digestive system.

As for mortality from diseases of the circulatory system, the increase in the mortality rate in the Republic between 1990-2010 was 3.5 times higher than in Russia as a whole.

Between 1960-1990 the mortality rate decreased by 25.7%. This period was characterized by a large influx of people of working-age, due to the industrial development of the Northern territories of Yakutia. The total population increased by 2.3 times. However, it changed the ranking of the causes of death. In place of such "traditional" causes of death such as respiratory diseases, diseases of the digestive system, tumors, and infectious and parasitic diseases came new diseases, mainly those of the circulatory system. During this period, deaths from circulatory diseases in Yakutia increased two-fold.

The available statistical sources show the age structure of the population being dominated by people of working age and children. Until 1995, children accounted for almost one-third of the total population, and by contrast, people above working age accounted for only about 9%, with the rest of the population being of working age. While the majority of the population in the Republic are young, and the highest rates of mortality are within older age groups, the overall mortality rate was low compared to the average. However, the true picture is not so good. If the population structure of Russia is taken as standard, then the standardized mortality is higher than the actual, and that for the whole of the Russian Federation.

During the last 20 years (1990-2010) the mortality rate increased by 46.5%. This is explained by an outflow of young people, with a consequent decline in the population by 15%. During this period, the age structure of the population changed in favour of people of working age or older, whose numbers increased by 1.5 times, while the absolute number of children decreased by 1.6 times. Overall, the working-age population fell by 10%. Thus, in the republic, as well as in Russia, there was a trend of population ageing. A linear trend in mortality rates indicates that total mortality from diseases of the circulatory system have not had a tendency to decrease.

According to forecasts by the Federal State Statistics Service, based on an assessment of the resident population of subjects in Russia by sex and age on January 1 2009, and subject to the Concept of Demographic Policy of the Russian Federation for the period up to 2025, the overall mortality rate of the population will depend on the pace of economic development and increasing well-being of Russian citizens.

Analysis of the dynamics of mortality in the Sakha Republic (Yakutia) is the basis for an evaluation of possible future scenarios. A low (pessimistic) scenario considers the deterioration of the socio-economic climate, and results in mortality rates in the Sakha republic (Yakutia) increasing by 1.4 times to reach 13.0 cases per 1000 population by 2030. The middle scenario assumes a slower development of the country so that the mortality rate will remain at a consistently high level. A high (optimistic) scenario, assumes an improving socio-economic

situation in Russia, and that the measures designed to reduce mortality identified in the Concept of Demographic Policy of the Russian Federation until 2025, and the priority national project "Health" are successful. This results in a reduction in the mortality rate to 7.5% by 2030.

Conclusions:

5. Mortality is the most well recorded, and the most informative indicator of the state and dynamics of public health. It is no less useful than other public health indicators, and proves to be very sensitive both to the political reforms in the country and to the state of social and economic conditions.
6. Changes in mortality reflect the number and age structure of the population, which in turn reflects changing migration patterns. Due to the increase in the working age population there was a decrease in mortality within the republic, and subsequently a decrease in the working age population increased mortality rates.
7. During this period there was a change in the rank structure of mortality. In place of such "traditional" causes of death as respiratory diseases, digestive system, tumors, infectious and parasitic diseases have come new, mainly diseases of the circulatory system. Mortality from circulatory diseases in the republic increased by 4 times.
8. The long-term forecast of population mortality rate depends on the pace of economic development and well-being of Russian citizens.

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Table 1.

Proportion ofage groups inthe total population, percent

Years	1979	1989	1995	2000	2005	2010
Youngerworking age (male and female0 -15)						
RF	23,3	24,5	22,7	19,4	16,3	16,1
RS(Y)	31,8	32,6	30,2	27,5	24,2	23,3
In theworking-age (men16 -59,women16 -54)						
RF	60,4	57	57,0	60,2	63,3	62,3
RS(Y)	62	61	60,6	62,6	65,2	64,1
Above working age (men60 andover, women 55 andover)						
RF	16,3	18,5	20,3	20,4	20,4	21,6
RS(Y)	6,2	6,4	9,2	9,9	10,6	12,6

Table 2.

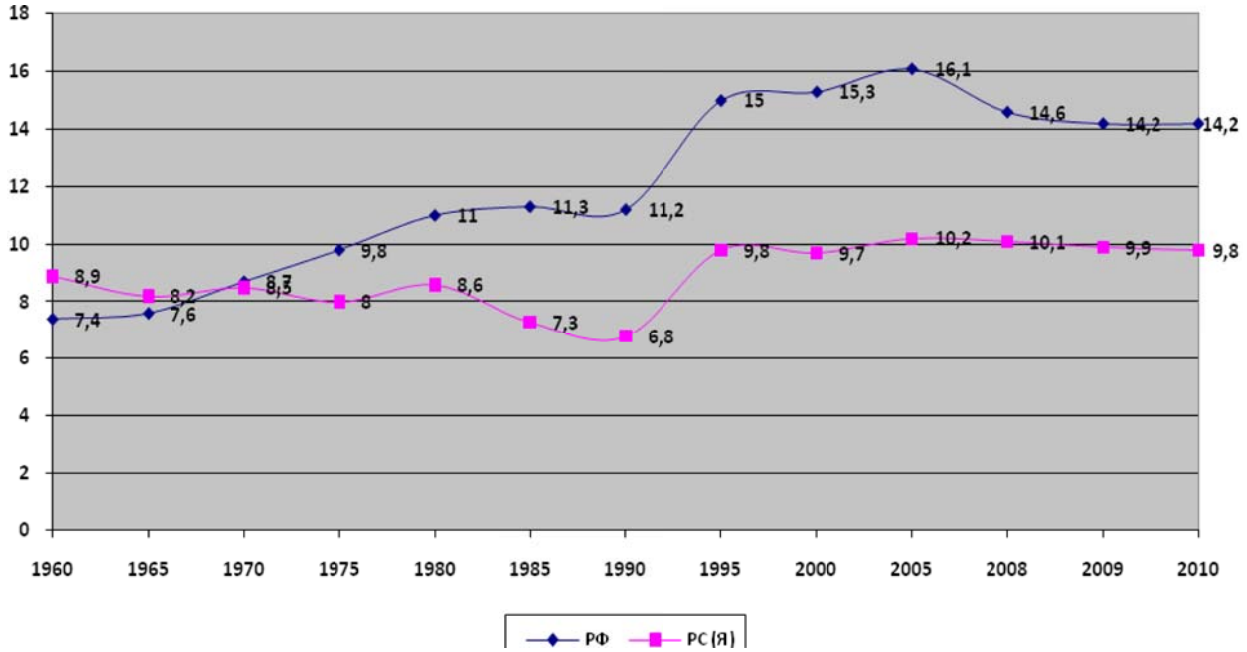
Standardised mortality rates from all causes of death in the Russian Federationand theRepublic of Sakha (Yakutia) (number of deathsper 1,000 population)

Years	2004	2005	2006	2007	2008	2009	2010
RF	15,0	14,9	13,9	13,1	12,9	12,3	12,3
RS(Y)	15,7	15,5	14,3	14,4	14,4	13,7	13,6

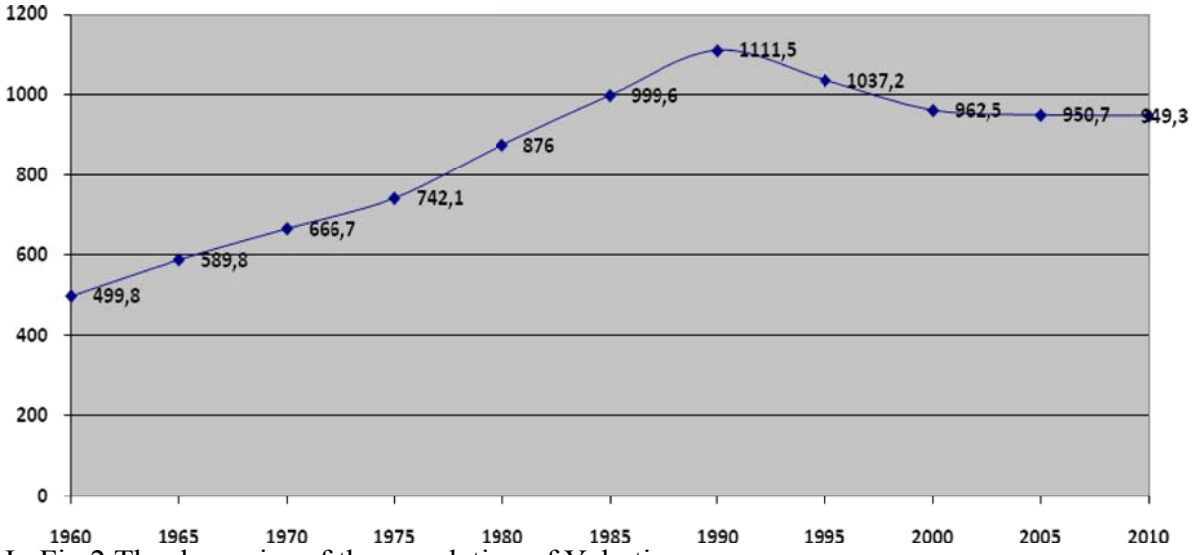
Table 3.

Death ratesby maincauses of deathin the dynamicsfrom 1960 to2010 andthe Russian Federation andthe RS (Y) (number of deathsper 100 thousandpopulation)

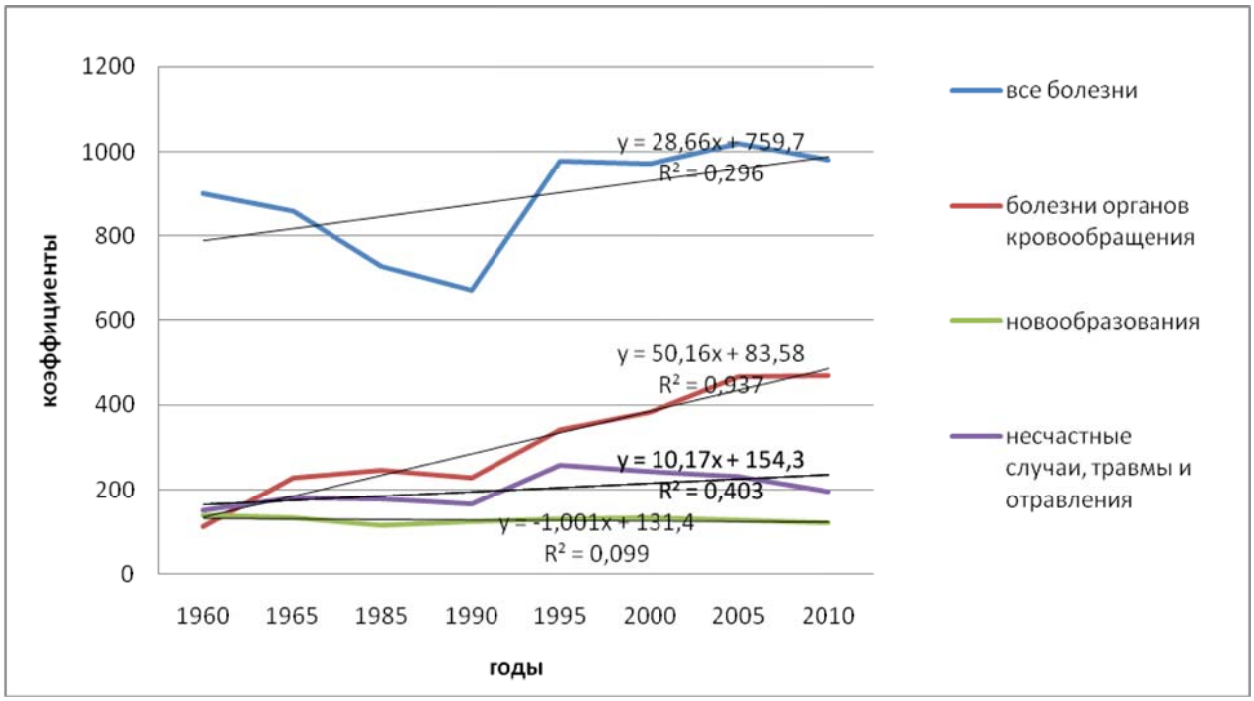
	1959 1960	1964 1965	1985	1990	1995	2000	2005	2010
	The coefficient of total mortality							
RF	762,3	694,2	1130	1120	1497,7	1529	1609,9	1419,2
RS (Y)	901,5	859,2	726,7	669,8	979,7	971,4	1020,3	981,2
Including deaths from circulatory diseases								
RF	187,9	194	633,9	617,4	790,7	846,1	908	805,9
RS (Y)	112,1	229	244,9	228,9	341,8	381,7	466,8	469,5
from tumors								
RF	118,9	124,4	172,9	191,8	203	204,7	201,2	205,1
RS (Y)	138,4	131,2	114	122	130,5	132,6	126,3	120,7
accidents, injuries and poisonings								
RF	69,3	77,3	137,6	133,7	236,8	219	220,7	151,7
RS (Y)	150,3	180,2	178,4	164,6	257,7	243,9	230	195,4
respiratory diseases								
RF	99	68,8	79,5	59,3	73,9	70,3	66,2	52,3
RS (Y)	108,3	86,2	65,7	40,8	51,3	43,3	36,4	34,9
from diseases of the digestive system								
RF	34,7	24,7	30,3	28,7	46,1	44,4	65,5	64,4
RS (Y)	45,2	30,9	33,4	26,1	55,5	45,8	46,3	55,7
from infectious and parasitic diseases								
RF	66,2	37,6	17,2	12,1	20,7	24,9	27,2	23,5
RS (Y)	15,2	87,9	27,6	14	20,4	15,2	15,4	11,4



In Fig.1 Changes in totalmortalityin the Russian Federation and and the Republic of Sakha (Yakutia), %.



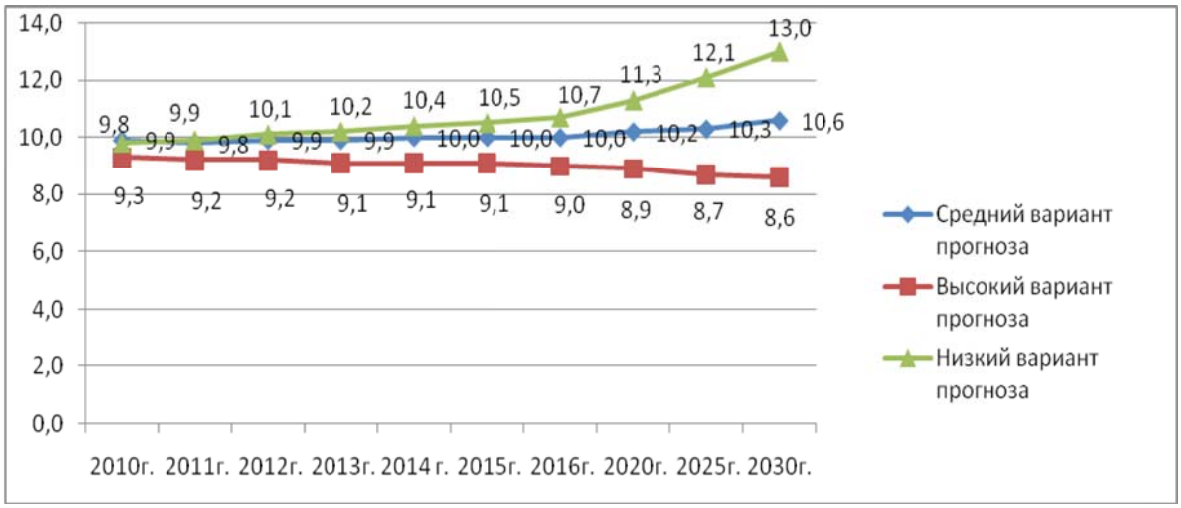
In Fig.2 The dynamics of the population of Yakutia.



y- the equationofthe trend linechart

R2 - value ofthe reliability ofapproximation

In Fig. 3 Trends in basic indicators of mortality in the Sakha Republic (Yakutia) in the dynamics of c 1960-2010 years.



IN FIG.4. FORECAST TOTAL MORTALITY OF THE POPULATION OF THE RS (Y)