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DYNAMICS OF THE MAIN MORTALITY CAUSES FOR THE ADULT POPULATION IN THE NOVGOROD REGION (BEGINNING OF XXI CENTURY)

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The analysis of mortality from major causes — cardiovascular diseases, malignant neoplasms, external causes, which occupy in the structure of the total mortality over 85% in the Novgorod region in the first decade of the XXI century, is presented. The differences in levels of mortality compared with the Russian Federation and the Northwestern Federal District are found out. Since 2004 stable trend of reducing mortality and increasing life expectancy has developed. Despite this, mortality remains high. It is emphasized that significant reduction in levels of both total mortality and the mortality from main reasons may be achieved primarily due to changes in individual human behavior.

Keywords: mortality, main causes of mortality, life expectancy of the population, the dynamics of mortality

Представлен анализ показателей смертности от основных причин – болезней системы кровообращения, злокачественных новообразований, внешних причин, которые занимают в структуре общей смертности более 85% в Новгородской области в течение первых десяти лет XXI века. Выявлены различия в уровнях показателей смертности по сравнению с Российской Федерацией и Северо-Западным федеральным округом. Начиная с 2004 г. сложился устойчивый тренд сокращения смертности и роста продолжительности жизни. Несмотря на это, уровень смертности остается высоким. Подчеркивается, что значительное снижение уровней как общей смертности, так и от основных причин может быть достигнуто прежде всего в результате изменения индивидуального поведения человека.

Ключевые слова: смертность; основные причины смертности; ожидаемая продолжительность жизни населения; динамика показателей смертности

There is a significant distinction in public health of different regions of the Russian Federation due to its various natural and climatic, economical, social, ecological factors and demographic content. Therefore regional research of particular public health ratios becomes extremely important nowadays [3,7,9,12,13].

Mortality takes particular interest among all medical and demographical factors, because its researching is carried out on the basis of national statistics and it can give objective results. The necessity of mortality researching deals with forecast of population size, planning of social and economical development of public health and health care system.

Mortality rate is one of the main sources of medical information; it helps to learn most reliable facts about public health in many countries.

Mortality rate helps to estimate sanitary welfare, natural and climatic features, social, economical and ecological living conditions, regional and age-specific pathology of particular social group.

Materials and research methods

The main document showing mortality rate is «Medical certificate of death» (form №106/u — 08), it is filled in on every case of death. Intensive and extensive ratios can be figured out basing on these data; they characterize total mortality and mortality by gender, age, death causes [2,8,9].

This advanced research of medical and demographic ratios of public health in the Novgorod Region (NR) is based on the data of government statistics for the first years of XXI century (2000-2009). All death causes are given according to the International Statistical Classification of Diseases — ICD-10 [6]. Dynamics of mortality from major causes - cardiovascular diseases, malignant neoplasms and external causes is reviewed in detail. Figures calculated for 1000 (‰) or 100000 ($^{0}/_{0000}$).

Survey results

NR being one of the 9 regions of the Northwestern Federal District (NWFD) takes one of the first three leading ranks (Tver, Pskov, NR) with the highest mortality rate in the Russian Federation (RF).

NR entered XXI century with the rates that was unsatisfactory and extremely differed from those of NWFD and RF. Thus, birth rate being -7.4‰ was on 20.8% less than in RF, and on 2.8% less than in NWFD. Mortality rate being -19.8‰ exceeded the same rate on 28.6% in RF and on 22.2% in NWFD. Since 2001 birth rate has tended to grow in all compared regions, but it still stayed low even in 2009 in NR (RF — 12.4, NWFD — 11.3, NR — 11.2 per 1000).

Mortality rate situation is not so evident. Statistics data show that mortality rate of NR exceeded the same rate of RF and NWFD during 2000-2009 (Table 1). After mortality rate increasing to 23.5‰ in 2003 there was its decreasing to 20.1‰ in 2007 that took it back to rate of 1994 (20.3‰). There was increasing of the rate in NR and NWFD as well in 2008 (from 20.1‰ to 20.9 ‰ and from 15.6‰ to 15.7‰ correspondingly). However, decreasing of the rate was registered in all investigated regions in 2009.

Crude mortality rate in NR was 20.4 per 1000 in 2009 exceeding on 43.7% the one in RF and on 34.2% in NWFD. Due to this rate NR changed the third place for the second one (Pskov Region — 20.9‰, Tver Region — 20.0‰). Standardized mortality rate in NR, independent from age structure of population, was 15.8‰ in 2009. It moved NR to the first place in NWFD. It is mentioned that this correlation is representative for both men and women.

Thus, positive changes in demographic processes that begin to show last years concern primarily birth rate and less mortality rate. Crude birth rate in NR has increased on 43.9% for the last 10 years, and crude mortality rate has decreased only on 3.5%.

Most essential factors that aggravate demographic situation in NR are:

— high mortality rate in group of employable population;

— continuing negative impact of changed social and economical conditions on social infrastructure, firstly, healthcare system;

— insufficient standard of living and actual earnings of most social groups;

— high morbidity rate in most of population;

— failure of legislative framework regulating goals and objectives of demographic policy, priority system, implementation arrangements.

Mortality situation both in NR and generally in RF during investigated period (2000-2009) is determined by 3 classes of diseases forming more than 85% of all death cases. However, its breakdown, levels and contribution in total mortality rate are uneven (Table 2).

During this period mortality rate from all death causes in NR has exceeded the same ratio both in NWFD and generally in RF. Assessment of mortality structure showed change of rank places of main population death causes.

Table 1

Crude mortality rate in some regions of the Russian Federation (per 1000)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Russian Federation	**15,4**	**15,6**	**16,3**	**16,4**	**16,0**	**16,1**	**15,2**	**14,6**	**14,6**	**14,1**
Northwestern Federal District	**16,2**	**16,8**	**17,4**	**18,4**	**17,8**	**17,7**	**16,6**	**15,6**	**15,7**	**15,2**
Republic of Karelia	15,8	16,6	17,8	19,9	18,5	18,1	16,8	15,9	16,2	15,4
Republic of Komi	12,0	12,5	13,8	15,6	15,2	15,2	13,8	12,7	12,7	12,8
Arkhangelsk Region	15,5	15,3	16,5	17,9	17,5	17,0	15,8	14,7	14,6	14,4
Nenets Autonomous District	11,5	12,5	11,7	14,1	12,4	12,2	12,9	12,6	12,8	11,7
Vologda Region	15,7	17,1	18,0	19,8	19,1	18,8	17,1	15,9	16,3	16,2
Kaliningrad Region	15,4	16,3	17,5	18,0	18,1	18,1	16,5	15,4	15,3	14,6
Leningrad Region	18,9	20,2	20,6	21,1	20,3	20,3	19,3	18,2	18,0	17,0
Murmansk Region	11,1	11,4	12,4	13,9	13,4	13,4	12,7	11,7	12,0	12,0
Novgorod Region	**19,8**	**20,9**	**21,9**	**23,5**	**22,4**	**22,5**	**21,5**	**20,1**	**20,9**	**20,4**
Pskov Region	22,0	22,5	23,5	24,9	24,2	24,5	23,2	20,8	21,6	20,9
Saint-Petersburg	16,3	16,4	16,6	16,7	16,2	16,0	15,3	14,8	14,6	14,1

Table 2

Main causes of death in 2009

Cause of death	Novgorod Region		Northwestern Federal District		Russian Federation	
	per 100 000	%	per 100 000	%	per 100 000	%
2000						
Total	1984,3	100,0	1620,0	100,0	1540,0	100,0
Cardiovascular diseases	1168,3	58,9	918,6	56,7	852,2	55,3
Malignant neoplasms	242,8	12,2	225,4	13,9	204,4	13,3
External causes of diseases and death	289,2	14,6	242,2	15,0	220,6	14,3
2009						
Total	2042,1	100,0	1521,1	100,0	1416,8	100,0
Cardiovascular diseases	1234,7	60,5	873,2	57,4	801,0	56,5
Malignant neoplasms	230,8	11,3	231,3	15,2	204,9	14,5
External causes of diseases and death	223,8	10,9	164,1	10,8	158,3	11,2

There is high mortality rate in group of employable population in NR as well as generally in RF. Since 2000 this rate has increased having reached its maximum in 2003 — 1212.6; then it has decreased (on 18.9%) to 983.9 $‰$ employable population in 2009. However, mortality rate among both men and women is still high. Contribution of mortality among employable men and women to total mortality also has changed. The highest contribution to total mortality was registered in NR in 2009 (men — 65.9%, women — 22.6%). The great majority of the deceased were men in employable age. Mortality rate among men exceeds the one among women approximately in 3.5 times in NWFD and in 4 times in NR.

Cardiovascular diseases (CVDs) are still main cause of high mortality. This ratio has taken the first place in structure of death causes during the first decennium of XXI century and exceeded the one both in NWFD and Russia; thus, it can be described as supermortality from CVDs in NR. Mortality rate due to CVDs is the highest only in 2 regions from all territorial subjects of RF: they are Pskov Region — 1283.9 $‰$ and Tver Region — 1262.8 $‰$. Contribution of this cause to total mortality has grown in 2009 in comparison with 2000 (from 53.9% to 60.5% correspondingly) being higher than in NWFD and RF (Table 2).

There was essential gender distinction in mortality. During several decennia female mortality from CVDs exceeded male one in 1.5 — 1.8 times. However, the gap decreased and it reached its minimum in 2000 — 0.5% and female leadership has remained till 2001. Then, beginning from 2002 remarkable prevalence of men was registered. Though during investigated period different rate of mortality drawdown both in male and female population has been noted, male leadership in mortality rate still persists. Contribution of this cause to total mortality among women slightly changed and it was more remarkable among men (Table 3). This feature was also admitted by other researchers [1,4,5,11].

Table 3

Ranging of main causes of death among men and women in the Novgorod Region in 2000-2009 (per 100 000 of population of corresponding gender/ % from all causes)

2000		2009	
Men	Women	Men	Women
Total 2295,1 / 100,0	Total 1728,0 / 100,0	Total 2335,3 / 100,0	Total 1807,0 / 100,0
Cardiovascular diseases 1167,7 / 50,9	Cardiovascular diseases 1173,6 / 67,9	Cardiovascular diseases 1241,5 / 53,2	Cardiovascular diseases 1229,3 / 68,0
External causes 488,9 / 21,3	Malignant neoplasms 200,9 / 11,4	External causes 380,0 / 16,3	Malignant neoplasms 196,1 / 10,8
Malignant neoplasms 293,3 / 12,7	External causes 112,8 / 6,5	Malignant neoplasms 274,1 / 11,7	External causes 98,6 / 5,4

CVDs take the first place of all causes of death among employable population. Mortality among employable population has some peculiarities, but generally it has the same tendencies that mortality among whole population. First of all, mortality among employable men from CVDs always exceeded mortality among women in the same age group. At the end of the 90th of XX century this exceeding was more than in 5 times (2000 — in 5.1 times). After reaching maximum registered in 2005 (men — 788.0 $‰$, women — 176.0 $‰$) slow descent of the rates has began. Rates of 2009 in comparison with 2005 declined (on 38.6% in men population and on 48.3% in women population), but both in men and women they have not reached rates of 2000 (men: 2000 — 484.0, 2009 — 568.2 $‰$ employable men; women: 2000 — 94.6, 2009 — 118.6 $‰$ employable women).

Coronary and cerebrovascular diseases, diseases characterized by arterial hypertension and other heart

diseases being 88.1% in 2000 and 92.9% in 2009 are the leading causes of death among all CVDs. As the analysis showed term «other heart diseases» was presented by «alcoholic cardiomyopathy» in more than 50% cases.

During investigated period mortality rate has increased exactly due to other heart diseases showing the degree of acloholization — in 1.6 times (from 90.8 ‰ in 2000 to 144.7 ‰ in 2009), while mortality from coronary disease has grown on 8.4% (from 554.7 ‰ to 601.4 ‰), from cerebrovascular disease — only on 1.2% (from 358.8 ‰ to 363.4 ‰). Also it was noted that mortality from heart attack also has grown (on 34.7%). At the same time diseases characterized by arterial hypertension have consistent tendency to decline – on 8.4% (from 40.6 to 37.2 ‰).

Coronary and cerebral diseases also are the leading causes of death among employable population; its ratio is 64.4%. During analyzed period this ratio has changed especially in female population. Among male population rate of coronary disease decreased on 4.4%, rate of cerebrovascular disease — on 1.5%, while in female population changes were more evident – decrease of mortality from coronary disease on 19.8% and increase of mortality from cerebrovascular disease on 35.5%. Growth of other death causes also was registered (men — on 17.6%, women — on 12.4%).

Thus, against mild changes of cardiac mortality aggravation of its inner scene has occurred, first of all due to growth of mortality from «other heart diseases». It is necessary to note that for employable population cardiac mortality is premature and its causes are clearly not biological [4,9]. Thereby alcohol component should be taken into account presenting not only mortality from alcohol cardiomyopathy (other heart diseases); acloholization increases risk both coronary and cerebrovascular diseases, first of all in women.

Changes in mortality from ***malignant neoplasms (MNs)*** are more controversy than from CVDs.

Mortality from MN was 230.8 ‰ in 2009 being higher than this ratio in RF on 11.2% and the same as in NWFD. During investigated period MNs have changed the third place for the second one switching places with morbidity and mortality from external causes (Table 2) that was due to significant decrease of mortality from external causes. At the same time changes of mortality from MNs are not so evident – rate increased on 5.2%. Contribution of MNs to total mortality also insignificantly changed — 12.2% in 2000 and 11.3% in 2009. In this year men died in 1.4 times more often than women.

There are gender distinctions in mortality from MNs and in ranging of rank places in structure of total mortality. During 2000-2009 MNs in men population have taken steady third place after morbidity and mortality from external causes; among women it was vice versa: MNs have taken the second place while female mortality practically did not change: 2000 — 200.9; 2009 — 196.1 ‰ women (increase on 2.4%), and among men this ratio decreased on 7.0% (Table 3).

It should be mentioned that during the period mortality rate has been changing every year not only among all population (maximum in 2000 — 242.8 ‰, minimum in 2004 — 220.8 ‰), but also in men (maximum in 2003 — 296.2 ‰, minimum in 2002 — 272.4 ‰) and in women (maximum in 2000 — 200.9 ‰, minimum in 2004 — 175.2 ‰); it shows that there is no steady tendency in decrease of mortality from MNs. Increase of mortality from MNs in 2009 in comparison with 2007 has been noted, it was on 10.2%; while among men this ratio firmly has been decreasing.

Employable population has another picture. During analyzed period MNs have taken the third place not only in whole population, but also in men and women. Mortality dynamics also have its own peculiarities. It was found out by comparing 2000 with 2009 that mortality among employable population and women in corresponding age group has decreased from 106.6 to 105.4 ‰ and from 73.3 to 69.2 ‰ accordingly; among men this ratio has increased from 138.5 to 140.0 ‰ men. Prevalence of men mortality over women one has not had great variations during analyzed period having been in 1.5 — 1.6 times.

However, there is no steady decrease or increase of mortality index in all investigated groups of employable population; it is testified by annual variations of its rate.

The leading diseases causing death both in the whole population and employable group of population are MNs of digestive tract, respiratory tract and organs of thoracic cage, breast cancer in women; its portion among all MNs in 2009 was 85.2% in the whole population and 78.6% in group of employable age.

The analysis of standardized ratios of mortality from mentioned causes showed that there was no evident increase of them; that points at the stabilization of the mortality ratios. The picture of mortality from MNs has become more various. The growth of prostate and pancreas cancer, cancer of lips, oral cavity and pharynx are registered.

Mortality from ***external causes (ECs)*** such as traumas, poisoning, burns, murders, suicides significantly differs from death causes from diseases because possibility to decrease rate of mortality from ECs is defined not only by condition of healthcare system, but also by social and economical, technical development of country. During analyzed period rate of mortality from ECs in NR has been exceeding the one in RF generally and in NWFD (Table 2).

The first year of the new century was marked with growth of mortality rate from ECs that had begun in 1999. Maximum of injury mortality (338.1 ‰) was registered in NR in 2003 that exceeded on 44.7% the one in RF and on 28.9% the same rate in NWFD. Among men (580.4 ‰) and women (140.7 ‰) of NR the highest level was marked in the same year; it exceeded similar ratios both in RF (men — in 1.5 times, women — in 1.4 times) and in NWFD (men — in 1.3 times, women — in 1.2 times).

From the beginning of 2004 decrease of mortality from ECs was registered in all investigated regions. Mortality rate of NR in 2009 in comparison with 2003 descended to 230.8 ‰ (on 51.0%), while in RF and NWFD it decreased on 55.3% and 60.1% correspondingly; thus this process has been developing more slowly. Notable decrease of mortality rate has led to changing of

ECs contribution to total mortality (in NR — from 14.6% to 10.9%) and its moving from the third place to the second. However NR is still leading in mortality from ECs. Also decrease of mortality rate in NR was registered both among men — 380.0 $‰_{0000}$ and women — 98.6 $‰_{0000}$. Male mortality exceeded female one in 3.8 times.

Tendency of changes mortality from ECs among employable population coincides with mortality of all population in all investigated regions: maximum in 2003 (in RF — in 2002) much exceeding in NR (417.5 $‰_{0000}$ employable population that exceeded on 30.8% the one in RF and on 45.7% the same one in NWFD); exceeding of mortality among men (in 4.5 — 4.9 times) in all analyzed time periods; significant decrease of ratios in 2009 in comparison with 2003 (NR — on 34.2%; RF — on 33.4%; NWFD — on 39.1%); persistent leading of NR in mortality from ECs in 2009 — 275.9, in RF – 188.1, NWFD — 191.8 $‰_{0000}$ employable population.

The leading causes defining death scene are car accidents, accidental alcohol poisoning and effect, premeditated self-injury (suicides), aggression (murders) which composed 55.7% among all population and 57.8% among employable population in 2009. Rate of mortality from all causes among men in much higher than among women; the greatest distinction was defined in premeditated self-injury (suicides) — in 5.6 times among all population and in 5.8 times among employable one.

Decrease of rate of mortality from ECs in 2009 in comparison with 2003, when maximum of all causes was registered, was mostly defined by reduction of mortality from accidental alcohol poisoning (–46.1%), murders (–24.4%), car accidents (–20.2%) and suicides (–14.9%).

Among employable population decrease of rate of mortality from all causes is more expressed, thereat reduction of accidental alcohol poisoning comprises 47.6%, murders — 27.4%, car accidents — 23.1%, suicides — 16.7%.

Process of reduction of mortality from ECs has gender distinctions: accidental alcohol poisoning is leading both in men (–49.3%) and women (–32.1%); the rest ranks at men are murders (–22.9%), suicides (–17.9%), car accidents (–15.4%), while at women they are car accidents (–29.9%), murders (–27.1%), and suicides (–11.3%).

Life expectancy of population (LE) is the most summarizing characteristics of present mortality rate. Beginning with 2005 this rate has tended to grow, composing 68.7 years in 2009, including men — 62.8 and women — 74.7. The difference is 11.9 years that should be considered as extremely big gap and does not occur in any developed countries. At the same time generally in Russia this rate is lower on 10 — 16 years than in economically developed countries.

During all investigated period LE was lower in NR than in RF and NWFD. Since 2000 this rate has marked tendency to decrease, having reached minimum in 2003 (60.8 including men — 53.8, women — 69.64 years; the gap was huge and comprised 15.7 years); it was associated with maximum mortality. Reduce of mortality that has begun in 2004 led to growth of LE, which was 64.5, men — 57.7, women — 71.8, gap — 14.1 years in 2009. Despite increase LE still remains on 4.2 years less in NR than in RF and NWFD.

It should be noted that NR is one of the territorial subjects of RF (including autonomous districts of Siberian and Far Eastern Federal Districts) with the lowest LE among men and huge gap of LE between men and women — 14.1 years.

Taking all the aforesaid into consideration the following can be distinguished. NR as RF and NWFD has persistent tendency of mortality reducing and LE growth defined by all age groups of employability and all causes of death since 2004. However, all positive changes in improving of health status go on slowly. Nevertheless prospects of social and economical health improvements define prerequisites and growth conditions of life expectancy in 2009. Further understanding of concrete causes that promote preserving of high mortality rates in different population groups is required. It becomes evident that success in disease and mortality control can be achieved due to changes in lifestyles and attitude to health. The initiative must proceed to people because nowadays sources of danger for health and life are outside the influence of medicine: they are in nutrition, environment, habits, behavior and lifestyle. Therefore new policy of struggling with mortality requires concerned individual activity of population leading to environment, lifestyle improvement, and health care, eradication of bad habits and implementation of good ones.

Significant mortality decrease can be achieved as a result of deep changes not only in individual behavior, but also in attitude of society, government to health care and people's life that have to find reflection in rising costs for health care service.

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