

Blinova, Tatiana; Bylina, Svetlana

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Typological analysis of factors reducing rural mortality in Russian regions

Tatiana Blinova – Doctor of Economics, Professor, Deputy director on science of the Institute of Agrarian Problems of the Russian Academy of Sciences (IAGP RAS)

Svetlana Bylina – Scientific Researcher, Institute of Agrarian Problems of the Russian Academy of Sciences (IAGP RAS)

1. INTRODUCTION

1.1. Background

The social-demographic policy measures taken to increase fertility and reduce mortality among the Russian population made life expectancy of Russians grow. However, we are still lagging behind the economically developed countries where life expectancy upon birth exceeds 80 years (Japan, Switzerland, Sweden, France, Italy, Spain, Norway, Austria, etc.). For Russia, especially its rural areas, the figure is incomparably lower. High mortality conditioned by both endogenous and exogenous factors is one of the challenges of today that will restrict the development and modernization of Russian regional economies.

The present rural mortality rate and cause-of-death pattern are, on the one hand, a reflection of problems with the health care and poor availability of medical services and, on the other hand, an indication of low quality of life, poor social health of the population, existing styles of self-preserving behavior and lack of efficient rural development models, which is proven by the relationships derived between mortality and living environment factors and behavioral strategies.

The government of RF set the task to make average life expectancy in Russia reach 75 years by 2025. Herewith, attention is invited to the still unused opportunities of reducing the number of deaths from preventable causes, road accidents, occupational injuries and poisoning, primarily by alcohol. Understanding is reached in the society that the system of prevention and treatment of neoplasm, cardiovascular and infectious diseases needs to be seriously improved, and that tobacco, alcohol and illicit drugs consumption takes away the lives of 500 thousands of our fellow citizens each year without any wars or global disasters.¹ Over the recent years the lifespan of men and women grew owing to the implementation of “Health” social project, modernization of the national health-care system, social-demographic

¹ Report of the Government of RF to the State Duma. April 11, 2012. URL: <http://premier.gov.ru>.

policy measures and fulfillment of the program for setting up high-technology medical centers in Russian regions.

At the same time, mortality among the people living in rural areas remains unacceptably high. Mortality rates and cause-of-death patterns are important indicators of public health mirroring the attitude of the state towards its citizens, the quality of life of the population, the values and social attitudes of different population strata, the rate of development of public health services, the availability of hi-tech medical services, the dominant stereotypes of social behavior and the spiritual condition of the society. Mortality rates and patterns both have social grounds: they alter as the society changes, influenced by these changes, and in turn affect the direction, rates and nature of these transformations. Interregional differences in mortality rates and cause-of-death patterns are to a large extent determined by the social conditions in which people live and work.

1.2. Purpose of this study

The objective of this study is to make a spatial analysis of the rural cause-of-death pattern and its determinant factors and to assess the role and impact of social indicators on mortality reduction.

For this purpose the following research tasks were accomplished:

- an analysis of the rural mortality rate and cause-of-death pattern was made;
- a multidimensional typology of the subjects of RF according to their cause-of-death patterns was developed;
 - the typological groups were characterized by using social, demographic, economic, ecological and behavioral parameters;
 - correlation and regression analyses were made which enabled to single out basic variables explaining rural cause-of-death patterns in different typological groups;
 - interregional comparisons and a comparative analysis were made, and sets of the factors affecting mortality rates and cause-of-death patterns in each typological group were identified to be taken into account by social policy makers.

As a result, the most important rural mortality reducing factors were singled out that cannot be ignored when drawing up regional strategies of rural social development and regional health-care modernization plans.

1.3. Analysis of rural mortality causes

The nature of interrelationships within the complex of social, psychological, economic, ecological, demographic, behavioral, spiritual and moral factors forming health or morbidity is extremely complicated, and their influence on cause-of-death patterns is not only direct and first-hand, but also indirect and mediated, and in general, systemic and poly-determinate. Aside from general patterns of development of the Russian countryside, rural cause-of-death patterns mirror the specific social, economic, demographic, ecological, ethnic and cultural features prevailing in individual subjects of RF. In view of this, it seems important to apply a complex and regionally differentiated approach that takes into account specific social and territorial features in order to improve the public health and availability of hi-tech medical services and, eventually, increase life expectancy.

This is paid special attention to in the Concept of the Demographic Policy of the Russian Federation for the Period Ending 2025, which also sets out the stages of implementation of the measures designed to stabilize (2011-2015) and gradually increase the number of the Russian population (by 2025). One of the important tasks of the Russian demographic policy for the period ending 2025 is to increase life expectancy.² As a result of implementation of the first stage of measures, fertility among the Russian population grew and mortality, on the contrary, dropped. The second stage is expected to help reduce mortality from diseases – leading causes of death. Regional health-care modernization programs designed to improve the quality and availability of medical aid to the population (2011-2012) are intended to reform the health-care infrastructure and harmonize it with morbidity and mortality patterns in the subjects of RF.

The leading causes of death among rural residents are cardiovascular diseases (56,5%), followed by external causes, including road accidents of all kinds, accidental alcohol poisoning, murder and suicide (12,1%), and neoplasm (11,6%). The number of deaths from these causes in rural areas exceeds the national rate by almost a quarter (23%). Rural mortality attributed to leading causes of death in 2010 is presented in Figure 1.

Today the countryside is featured by “supermortality” among men of the able-bodied age, which is due to excessive early mortality from unnatural causes (accidents, injuries, murder, suicide) and cardiovascular diseases resulting not only from the unsatisfactory health-care

² Concept of the Demographic Policy of the Russian Federation for the Period Ending 2025 adopted by the Decree of the President of the Russian Federation of October 9, 2007, #1351.

system and medical services, unfavorable working conditions and poor infrastructure, but also from the way of life of different rural social groups and sticking to harmful habits.

Infant mortality from external causes like injuries, poisoning, drowning and road accidents that have nothing to do with morbidity remains high signifying that the environment is unfriendly to children. A particular increase in infant mortality in urban and rural areas was experienced in 2012, which was to a large extent a result of switching to international principles of registration of births.

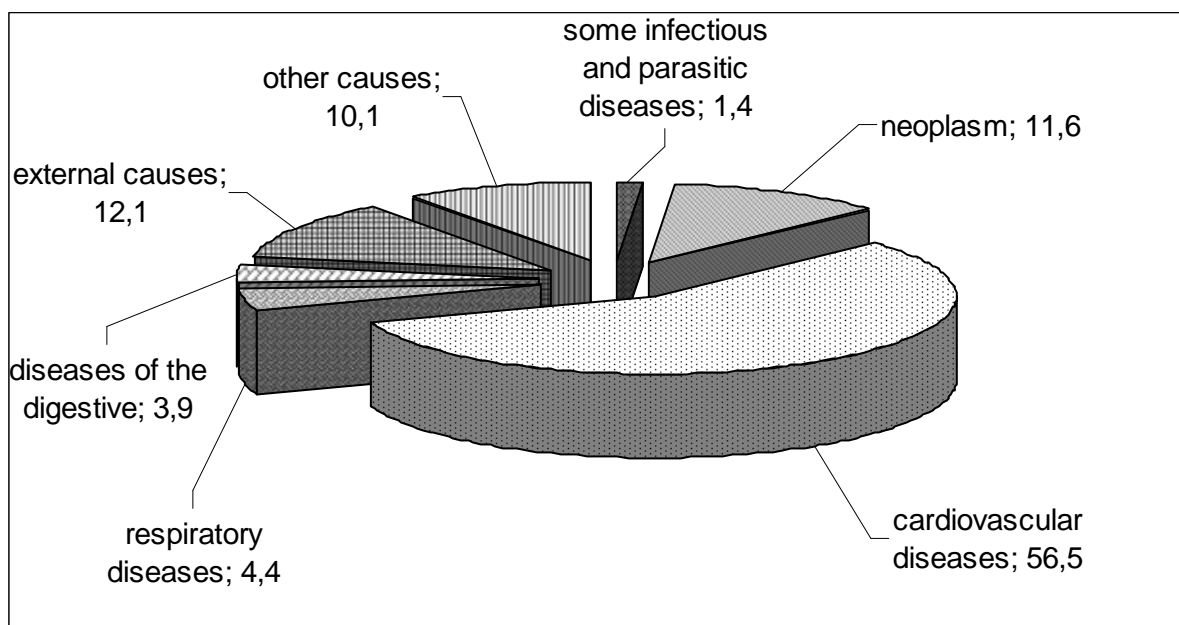


Figure 1. Rural mortality attributed to leading classes of causes of death, 2010, per cent

There are considerable interregional differences in terms of rural mortality rates and cause-of-death patterns in Russia. Therefore, any administrative or policy actions should pay due respect for the social and territorial peculiarities and be regionally differentiated.

2. EMPIRICAL METHODOLOGY

2.1. Cluster analysis and distinguishing typological groups

The multidimensional typological approach is extensively used in sociology to acquire deeper knowledge of the object of study and identify not only general regularities of its development, but specific features of its interaction with the environment. This study addresses the pattern types of causes of death of rural population existing in the subjects of RF and also their determinant factors. Two kinds of the notion “type” used in empirical sociology can be

found in the literature. Firstly, these are the types known in science and everyday life and, secondly, the types of a latent nature, and each of them can play different functional roles, being the purpose or means of cognition.³ If we follow the abovementioned approach, then the types singled out further in this study are latent and serve the means of cognizing the spatial specificity and regional differentiation of the rural cause-of-death pattern, which can be instrumental in developing efficient social policy measures.

In the basis of our multidimensional typology lies the rural cause-of-death pattern designed according to the nosological profile with leading classes of causes singled out. For the purpose of this study we used a six-component model of the notion “cause-of-death pattern” allowing break down the sample into relatively homogeneous classes supplemented with all-cause mortality. The nosological profile of rural mortality mirrors the ratios between leading classes of causes of death in rural settlements at a given moment of time.

The groups of regions that were singled out have then undergone a comparative analysis employing selected social, economic, demographic, ecological, behavioral factors and variables approximating them, which enabled to find out the specific features of the interrelationship between the mortality pattern and factors of the social environment, conditions and ways of life. The types singled out are attributed to regional communities classified according to a certain criteria and featured by different living conditions, behavioral models, social attitudes, value orientations and spiritual conditions. Having this in mind, we came up with a hypothesis concerning the existence of latent pattern types of causes of death of rural population.

The typological feature “nosological profile of rural mortality”, according to which the subjects of RF were classified, was measured in regional mortality rates (deaths per 100000 of population) by leading classes of causes of death, including cardiovascular diseases, some infectious and parasitic diseases, neoplasm, respiratory diseases, diseases of the digestive and external causes of death. The data was obtained from the official website of the Federal State Statistics Service (Rosstat). To decrease the dimension of the feature space the indicators were aggregated by making a factor analysis using the principal components and statistical SPSS software. As a result of the aggregation, two principal components were derived with the share of the total explained variance equaling 67%. Then a hierarchical cluster analysis by Webb with the Euclidean metric was made. As a result of the classification, the Russian regions were divided into five groups according to the main typological feature reflecting the rate and similarity of cause-of-death patterns for each group. On the basis of this classification

³ Tatarova G.G. *Fundamentals of Typological Analysis in Sociological Research*. Moscow: Higher Education and Science, 2007. 236 p.

of the subjects of RF a social map was drawn up that comprised the singled out types of rural areas broken down by cause-of-death patterns. Table 1 presents the summarized results of the classification, including the number of regions and average parameter values for each typological group. To make our analysis even deeper, alongside the subjects of RF, we also considered the autonomous okrugs (AO) they embrace. The results of our classification were interpreted by comparing the cluster profiles (average values of classification features) of the typological groups between themselves, on the one hand, and by comparing them with the factors determining the rural mortality pattern, on the other hand.

The first classification group is comprised of 10 regions: Amursk, Bryansk, Kaluga, Smolensk, Tver, Tula, Novgorod and Pskov Oblasts, Primorsky Krai and Komi-Perm AO. This group is specific in that (1) the rates of rural mortality from leading classes of causes of death are by far higher than the Russian average (with the exception of Primosky Krai), (2) the average group number of deaths from all causes (per 100000 of population) is the highest, and (3) the regions belonging to this group have the highest rate of mortality from cardiovascular diseases.

Table 1

Regions of RF broken down by leading classes of causes of rural mortality, 2010
(average number of deaths per 100000 of population)

Group	Number of objects	All causes	Leading classes of causes of death					
			Some infectious and parasitic diseases	Neoplasm	Cardiovascular diseases	Respiratory diseases	Diseases of the digestive	External causes
RF	87	1613,9	23,4	186,5	911,8	71,1	62,1	195,4
1	10	2268,8	40,3	220,3	1377,2	84,6	92,1	298,5
2	21	2042,2	17	233,7	1231,8	80,8	71,5	224,7
3	28	1532,4	36,7	161,3	715	81,8	71,5	313,2
4	20	1519,2	21,6	187,6	822,4	62,1	56,3	181,3
5	8	903,2	13,9	113,5	539,2	23,1	40,3	92,2

In addition to that, the first group includes the regions, in which the all-cause rural mortality is the highest in RF: Pskov, Tver, Novgorod and Smolensk Oblasts. As seen from Table 1, this group also has the highest rates of mortality from leading classes of causes of death, except for neoplasm and external causes. Rural mortality from cardiovascular diseases in the regions of the first group is the highest in RF, peaking in Pskov (1946,2 people), Tver

(1734,0), Novgorod (1671,6) and Smolensk (1515,8 people) Oblasts. Thus, the regions of the first group have high rates of rural mortality from leading classes of causes of death, particularly from cardiovascular diseases.

The second classification group includes 21 regions: Arkhangelsk, Belgorod, Vologda, Vladimir, Voronezh, Ivanovo, Kirov, Kostroma, Kursk, Nizhniy Novgorod, Volgograd, Sverdlovsk, Novosibirsk, Oryol, Penza, Ryazan, Tambov, Ulyanovsk, Yaroslavl and Magadan Oblasts and the Republic of Karelia. Like with the regions of the first group, the average group number of deaths from all causes surpasses the Russian average. Rural mortality from neoplasm and cardiovascular diseases is especially high, exceeding the Russian average in all the regions included in the group. Rural mortality from neoplasm in the second group is the highest in Magadan, Ryazan, Kursk Oblasts and the Republic of Karelia. The highest rural mortality from cardiovascular diseases in this group is observed in Nizhniy Novgorod and Vladimir Oblasts, while that from external causes can be seen in Magadan and Kirov Oblasts. Mortality from external causes exceeds the Russian average in 15 regions out of 21. In most of the regions of the second group (13 out of 21) mortality from diseases of the digestive also transcends the Russian average, being the highest in Ivanovo Oblast (122.2 people) (within this group). Magadan Oblast shows the highest mortality from respiratory diseases in the group. 10 subjects of RF belonging to the second group have the rates of rural mortality from the latter cause outstrip the Russian average. At the same time, mortality from some infectious and parasitic diseases in the regions of the second group is below the Russian average, the exceptions being Sverdlovsk, Novosibirsk and Ulyanovsk Oblasts. In general, rural all-cause mortality in the regions of the second group is lower than that in the first group. All in all, we have to admit that the regions of the second group experience high rural mortality, particularly from neoplasm and cardiovascular diseases.

The third group embraces 28 regions of RF: the Republics of Bashkortostan, Komi, Mari El, Udmurtia, Chuvash, Altai, Tiva, Buryatia, Saha (Yakutia), as well as Kaliningrad, Kurgan, Tyumen, Irkutsk, Kemerovo, Sakhalin Oblasts, Transbaikal, Krasnoyarsk, Perm, Khabarovsk Krai, Agin Buriat, Ust-Ordin Buriat, Yamalo-Nenetsk, Nenetsk, Taimir (Dolgano-Nenetsk), Evenk, Koryak, Chukotka Autonomous Okrug and Jewish Autonomous Oblast. In all regions of the third group mortality from external causes (per 100000 of population) exceeds the Russian average, being especially high in Chukotka AO. In most regions of the group rural mortality from diseases of the digestive (19 out of 28) and respiratory diseases (15 out of 28) surpasses the Russian average. The group includes the region having the highest rural mortality per 100000 of population from diseases of the digestive in RF that is Evenk

AO. Mortality from infectious and parasitic diseases outstrips the Russian average in 18 regions out of 28, peaking in Koryak AO. In most of the regions comprising the third classification group rural mortality from cardiovascular diseases is lower than the Russian average with the exception of Koryak AO and Perm Krai. The average group number of deaths from neoplasm is also below the Russian average. The regions of the third group demonstrate the highest rural mortality from external causes.

The fourth classification group is represented by 20 regions: Astrakhan, Leningrad, Lipetsk, Moscow, Rostov, Orenburg, Samara, Saratov, Omsk, Tomsk, Chelyabinsk Oblasts, Altai, Kamchatka and Krasnodar Krai and the Republics of Adige, Dagestan, Kalmikia, Moravia, Tatarstan and Khakassia. Mortality from external causes, respiratory diseases, diseases of the digestive and infectious diseases on average for the group is lower than that for the regions of the first three groups and the Russian average. Mortality from cardiovascular diseases is also lower than the Russian average in all regions of the group, except for the Republic of Tatarstan and Lipetsk, Omsk and Rostov Oblasts, but is higher than that in the regions comprising the third classification group. Rural mortality from neoplasm in 11 regions out of 20 exceeds the Russian average, being the highest in the group in Altai Krai and Tomsk Oblast. In the regions forming the fourth classification group rural mortality from all causes is lower than the Russian average. The results of the classification show that the average rates of mortality (people per 100000 of population) from leading causes of death in the group is lower than the Russian average, with the exception of deaths from neoplasm.

The fifth group is comprised of eight regions having the rates of rural mortality from all leading causes of death lower than the Russian average. These are Murmansk Oblast, the Republics of Ingush, North Osetiya, Kabardino-Balkaria, Karachayev-Cherkessia, Chechnya, Stavropol Krai and Khanti-Mansi AO. Of all the classification groups of regions the rates of rural mortality in the regions included in the fifth group are the lowest.

Comparing the singled out typological groups with the social-economic, ecological, demographic and behavioral characteristics of the subjects of RF gives an idea of the features and ways the mortality pattern interconnects with the conditions and way of life, social behavior stereotypes and tendency to bad habits among the population of different areas.

2.2. Analysis of the rural mortality reducing factors

Cause-of-death patterns stem from complicated combinations of multiple conditions and factors, each of which varies by region. For instance, large cities like Moscow and St. Peters-

burg enjoy better access to hi-tech medical services, while the availability of the latter in rural areas is still problematic. Employment patterns and unemployment rates, working conditions, safety of the environment, living standards, affordable housing markets, ecological situations and natural-climatic conditions are different for the subjects of RF. The need for health-care services, effective demand for hi-tech medical services and their supply patterns are usually not balanced in the regions and fail to match the available resources. We support Y. Ivanova, who argues that the state the health-care system is in and dominating strategies of self-preserving behavior of the population are important factors determining the mortality rate.⁴ Obviously, life expectancy can be noticeably increased by reducing mortality from preventable causes. “About 200 thousand people die each year from the causes that could have been prevented.”⁵ Most authors believe that the level of public health – an important indicator of the quality of life – depends on social-economic conditions and factors, such as the amount of population incomes, living conditions, availability and quality of medical services, availability or lack of a good job, bad habits like the use of alcohol, tobacco and illicit drugs, crime, migration mobility and site improvement.⁶ Unlike individual mortality, which depends on a vast variety of accidental factors, population mortality is to a large extent a reflection of the living conditions and result of the influence of economic, social, ecological, ethnic and cultural, natural-climatic and other factors, a most important of which is the spiritual evolution of the society.

At this stage of the study we fulfilled three groups of tasks. Firstly, we chose the empirical indicators to characterize the singled out groups of the subjects of RF by using the parameters that had not been applied when developing our typological grouping. Secondly, we singled out the social determinants that meet the “manageable factors” criteria. Thirdly, we analyzed the influence the specific features and development peculiarities of the subjects of RF produce on the rural mortality pattern. Determinants of mortality are the factors that, aside from direct causes in the form of various classes of diseases, affect the population mortality. In this context, mortality determinants are complexes of the social conditions and prerequisites, the combined effects of which increase the risk of mortality. Having this in mind, for the purpose of this study we distinguish between the direct causes of mortality (classes of dis-

⁴ Ivanova Y.I. Russian Male Mortality (Causes and Regional Differences) / *Sotzis*, 2010. # 5. P. 87-99.

⁵ Prokhorov B.B., Ivanova Y.I., Shmakov D.I., Scherbakova Y.M. *Demographic and Health Forecasting*. Moscow, MAKS Press, 2011. 355 p.

⁶ Prokhorov B.B. *Regions of Russia on the Way to the Health-Demographic Future // Problems of Forecasting*. 2011. # 1. P. 115-135.

eases that caused death) and the factors (social, economic, demographic, ecological, behavioral) increasing the risks of mortality. It should be noted that the negative synergetic effects of the interaction of causes, prerequisites, factors and conditions of mortality, different combinations of which form in the subjects of RF acting together, are different. That is to say that morbidity from different classes of causes leads (or not) to mortality, given there are some certain conditions that can be shaped and changed by taking public policy measures. Table 2 presents the social-economic characteristics of the typological groups singled out earlier.

Table 2

Main social-economic characteristics, group averages

Indicators	1 st group	2 nd group	3 rd group	4 th group	5 th group
Number of deaths from all causes per 100000 of rural population	2265,8	2042,2	1548,1	1519,2	903,2
Fraction of people of retirement age in total rural population, per cent	26,4	25,9	16,6	21,4	14,4
Number of alcoholics registered with health-care settings per 100000 of population, people	1953,2	1906,6	1828,3	1535,7	790,5
Number of registered criminal acts per 100000 of population	3839,6	4961,9	6142,9	6109,5	2177,3
Number of nurses per 100000 of population, people	105,4	116,8	119,7	105,8	105,9
Number of physicians per 100000 of population, people	45,5	46,4	47,5	46,7	45,3
Unemployment rate, per cent	8,3	8,7	10,5	8,6	18,5
Number of population having incomes below the subsistence minimum, per cent	16	16	17	16,9	17,8

As seen from the Table, the group averages for alcoholics registered with health-care settings decrease from the first to the fifth group demonstrating a tight feedback with rural mortality. In the regions of the third group, having the highest rate of rural mortality from external causes, the situation with the safety of their social environments is the worst, which manifests itself in the number of registered criminal acts per 100000 of population, high income differentiation among the population and rather high unemployment rates. The number of physicians and nurses at health-care settings grows from the first to the third group. The gross regional product per capita increases from the regions of the first group to those belonging to the third group, where its value is the highest (it should be taken into account that the latter group includes Tyumen Oblast and Chukotka AO having the greatest GRP values

among the subjects of RF). The fraction of population of retirement age on average falls from the first to the fifth group.

Typological grouping of the subjects of RF according to their rural cause-of-death patterns is not only of academic interest within empirical sociology enabling to single out types of a latent nature, but has a certain practical sense as it allows specify the “controlled” and “manageable” parameters for each group of the regions included in the sample.

The influence of social factors on rural mortality patterns was examined from the inter-regional standpoint by pursuing two research strategies. In the first one the influence of social factors was compared to that of demographic, economic and ecological ones, while the second strategy implied considering only social factors comparing them with each other. For that purpose we evaluated the regression equations that, in the former case, included four groups of indicators – social, demographic, economic and ecological – representing the general situation in the region, and in the latter case we considered only social parameters. In order to approximate the social-economic factors we employed the following indicators and variables available from the statistical database.

Firstly, the attitude of the state towards its citizens’ health quantitatively measured in the amount of consolidated budget spending on health care, physical culture and sport, which, in fact, is an indication not only of the rate of social-economic development, but also of the fraction of the funds the society is ready to spend to improve its members’ health. Government spending on health care in economically developed countries formed 8.8% of the GDP in France, 8.0% in Germany, 8.4% in Denmark and 7.2% in Norway in 2008. For Russia the figure is noticeably lower making 3.7% of the GDP in 2010.⁷ Governments of developed countries efficiently elaborate and take actions primarily seeking to reduce preventable mortality. Radical improvement of the health-care system, prevention and diagnostics of endogenous diseases and promotion of mass sports activities can help reduce the mortality rate. It seems essential to proceed with the implementation of the program for construction of modern medical centers, including multifunctional ones, augmenting the volumes of hi-tech medical aid. Although health-care spending is an important mortality reducing factor, the relationship is hardly linear as the subjects of RF with comparable volumes of such spending have different mortality rates, which points at the influence of some other factors of no less importance.

⁷ Health Care in Russia. 2011: Stat. comp. / Rosstat. - Moscow, 2011. - 326 p.

Secondly, availability and affordability of high-technology medical and recreational services depends not only on the rate of development of the social infrastructure in the region, but on the level of incomes of its population as well. The indicator we used here is the number of population having incomes below the subsistence minimum as percentage of the total population, the number of which varies by the subjects of RF. It is generally known, that low incomes limit the opportunity to receive both high-technology health-care services and conventional paid medical services. For this reason low-income population groups have to go in for self-medication, demonstrating indifference to their health. Sociological surveys show that those belonging to these groups are less likely to seek professional medical help and more often self-medicate. Although official poverty has dropped compared to the past period, in a number of regions it still remains much higher than the national average. It is now understood by the leadership of the country that families with children are most likely to find themselves in the “poor” category and that they get even poorer with every next birth. Expertise shows that the risk of poverty for complete families having two children makes about 50% and reaches about 70% for that with three or more children.⁸

Thirdly, we take into account the unemployment rate calculated by using the International Labor Organization’s (ILO) methodology. Since a considerable part of the loss is comprised of the unemployed, social groups living on the verge of poverty and marginal population strata that have lost their life prospects, eliminating poverty and reducing unemployment seem a sine qua non in reducing rural mortality. The influence of poverty, income distribution patterns and unemployment, housing conditions, environmental safety and individuals’ social position on health, morbidity and mortality is a subject of sociological studies in Russia and abroad.⁹

Fourthly, we consider the people’s attitude towards their health and the individuals’ social responsibility for their own health and bad habits. Here we used the parameters depicting certain aspects of the way of life. To analyze the interregional differences we applied two indicators: (1) the number of alcoholics registered with health-care settings per 100000 of population, and (2) the number of drug addicts registered with health-care settings per 100000 of population. Giving an idea of behavioral characteristics of different population groups in the region, these indicators mirror their propensity to bad habits. It is well known that supermortality from alcohol and illicit drug addiction has reached alarming levels in Russia and remains a

⁸ D. Medvedev’s speech at an enlarged meeting of the State Council on April 24, 2012. URL: <http://www.kremlin.ru>.

⁹ Giddens Anthony. Sociology. Fourth Edition. Moscow. - 2005.

national problem still to be solved. In view of this, immediate measures should be taken to restrict alcohol consumption, promote healthy way of life and establish reasonable consumer culture. Economically developed countries have various active social movements for a “healthy society”, intensively promote the “healthy lifestyle” and make increasingly daring attempts to influence the young people’s choice of lifestyles and behavioral models. As a result, their life expectancy is on the rise, while mortality is in decline.

Fifthly, we pay due respect for the safety of the social environment represented by the number of registered criminal acts per 100000 of population. Obviously, our social policy should not only aim at improving the availability of free medical aid and quality of paid services, but also at providing safe living conditions allowing prevent mortality from external causes.

Sixthly, we account for the staffing of health-care settings measured in the number of physicians and nurses per 100000 of population.

To approximate the demographic and economic indicators we used fractions of retired people in the total population (demographic ageing degree) and GRPs per capita characterizing the regional levels of economic development and also amounts of investments in health-care fixed assets. Although many authors strongly advocate the existence of an inverse relationship between mortality and regional rate of economic development measured in GRP per capita, we believe the relationship is not that indisputable and certainly not linear. For instance, in Chukotka AO we can see high mortality coexisting with a high GRP per capita.

Ecological characteristics of regional development were represented by the impact of economic activities on the environment and natural resources (wastewater discharge to surface water, air pollution). The aforementioned parameters were included in the regression equation as of 2009, i.e. with a lag of one year from the rural mortality rates.

To single out the dominant factors we made a regression analysis within our typological groups and plotted dependencies of mortality rates on the indicators considered. Models were built for RF as a whole and separately for the groups of regions singled out when classifying the rural areas according to leading classes of causes of death. Finally we picked out the dependencies with regression coefficients of 5 per cent significance and multiple determination coefficients exceeding 0.7. Analysis of the resulting regression dependencies allows us to conclude the following.

For rural Russia in general the mortality affecting parameters are the social responsibility of the state for its citizens’ health (spending on health care, physical culture and sport), GRP per capita, unemployment rate, social safety of the environment, individuals’ social re-

sponsibility for their own health, and bad habits. For the regions of the first group having high rural mortality from leading classes of causes of death and for the regions of the second group having high rural mortality from cardiovascular diseases and neoplasm the most important factor is the spending on health care, physical culture and sport. For the regions of the third group that are featured by high rural mortality from external causes the most significant factors are the social safety of the environment, consolidated budget spending on health care, physical culture and sport, and percentage of the population having incomes below the subsistence minimum. For the regions of the fourth and fifth groups, united due to the paucity of the latter, the rural mortality affecting factors are the ecological situation in the region, safety of the environment, way of life, consolidated budget spending on health care, physical culture and sport, and staffing of health-care settings. Social responsibility of individuals for their own health and commitment to bad habits appear important for all the typological groups. As for the ecological safety the situation is the worst in the regions of the second and fourth groups, which is proven by high mortality from neoplasm, respiratory diseases and that of the digestive. Demographic ageing of the population augments the burden on regional health-care systems: age-related diseases are a matter of increasing concern, which cannot be ignored. Furthermore, morbidity and mortality risks are considerably higher for older age groups.

Hence, the resulting models linking rural mortality with social, economic, demographic, ecological and behavioral characteristics of the subjects of RF allow differentiate and tailor the regional strategies for improving the rural population's health, reducing mortality and increasing life expectancy.

Because of the lack of precise approximating parameters this study omits the factors of spiritual condition of the society that determine the lifestyle and are most important from the standpoint of reducing mortality. At the same time, the sociological surveys performed in different regions of the country show that prospects for the future, faith in the future and favorable social atmosphere are important for increasing life expectancy and reducing mortality. We accounted for their indirect influence on the behavioral characteristics and lifestyles of different population groups.

3. CONCLUSIONS AND POLICY IMPLICATIONS

The results we obtained allow us conclude that (1) the social characteristics of a region and its mortality rate are interrelated, (2) the rural mortality reducing social policies should be drawn up and pursued by applying regionally differentiated approaches, and (3) the state

should assume greater responsibility for the national health-care system, and its citizens – for their own health. This study is of a practical significance as it enables to identify the rural mortality reducing factors and conditions forming the given nosological profile depicting the cause-of-death patterns for regions belonging to certain typological groups.

Our multidimensional typological approach made it possible for us to make a spatial analysis of the rural cause-of-death pattern and assess the influence of different factors, including the behavioral ones, on rural mortality in Russian regions. Comparing the typological groups singled out as a result of the cluster analysis with the social, economic, ecological, demographic and behavioral characteristics of the subjects of RF enabled to find out the peculiarities and features of the interrelationship between the mortality pattern and the living conditions, lifestyles, social behavior stereotypes and commitment to bad habits of the population of different areas. As a result, the most important rural mortality reducing factors were revealed, which should not be ignored when developing regional rural social development strategies and regional health care modernization plans. Mortality in Russia is incomparably higher than that in economically developed countries, and mortality among the rural population is higher than that among the urban one. Reduction of the supermortality can produce most rapid effects in a short term. At the same time, it should be taken into account that examining the mortality reducing factors, conditions and prerequisites is an interdisciplinary task that should be performed in a systemic way. The cause-of-death pattern for Russian regions is a resulting outcome of a combination of factors mirroring the demographic situation, state of the health-care system, availability of medical and recreational services, ecological safety, living standard and quality of life, behavioral characteristics, commitment to bad habits and many other factors in their many other combinations. An important role is played by the social atmosphere and spiritual evolution of the society, which were omitted from our analysis and not included in the regression equation owing to difficulties with their quantification and lack of approximating parameters. At the same time, factors of the value sphere, positive social attitudes, confidence in the future, positive feelings of hope and vision of the future play an important role in encouraging a healthy way of life and self-preservation behavior, which ultimately changes the pattern and reduces the rate of mortality. Conducting sociological research in this direction seems certainly promising.