UDC [37.014.54:314.114](943.8)(045)
DOI: 10.17238/issn2221-2698.2019.37.22

The education system development as a factor in the demographic growth of the Far North of Russia*

© **Arseniy L. SINITSA**, Cand. Sci. (Econ.), Research fellow
E-mail: sinitsa@econ.msu.ru
Lomonosov Moscow State University, Moscow, Russia

Abstract. The Far North is an important area that, to a great extent, determines the prospects for the socio-economic development of Russia. Nevertheless, no synthetic development program for these regions has been worked out. Existing programs for the development of the Arctic zone of the Russian Federation pay very little attention to demography and education. Based on Rosstat data and expert assessments, the author considers the dynamics of the age and educational structures of the population of the Far North. Special attention is paid to the group under 30 years old since it is the primary consumer of the education services. The author also addresses the question of how the development of the education system affects the demographic and economic development of the Far North. It has been argued that since 1990 the number and proportion of young people have declined significantly and will continue to decline until 2035. The European part of the Far North has a much worse dynamic compared to the Asian one. The educational structure of the population of the Far North is close to the total in the country. Still, the proportion of people with secondary vocational education is higher but declining. It reflects the economic features of this macroregion. The examples discussed in the article prove the development of education will have a positive effect on demographic and economic indicators.
Keywords: *Far North, level of education, educational system, state policy, youth, age structure of the population, educational structure of the population, social and economic development.*

Introduction

In recent years, the Far North[1] has been attracting more and more attention. The reasons for this interest are apparent: the presence of vast reserves of minerals, biological resources, and the exceptional geopolitical importance of the region. It means that the development of the Far North requires the highly-skilled labor force, prepared to live in harsh conditions.

Questions about how the labor market in the North should be arranged (whether it is necessary to attract as many migrants as possible or should the authorities to rely mainly on the local

---

* For citation:
Sinitsa A.V. The education system development as a factor in the demographic growth of the Far North of Russia. *Arktika i Sever* [Arctic and North], 2019, no. 37, pp. 22–50. DOI: 10.17238/issn2221-2698.2019.37.22

[1] Applying the term "Far North" we mean the regions indicated in the Decree of the Council of Ministers of the USSR of November 10, 1967 No. 1029 «O poryadke primeneniya Ukaza Prezidiuma Verkhovnogo Soveta SSSR ot 26 sentyabrya 1967 g. «O rasshirenii l'got dlya lits, rabotayushchikh v rayonakh Kraynego Severa i v mestnostyakh, priravnennykh k rayonam Kraynego Severa»» ["On the Procedure for Applying the Decree of the Presidium of the Supreme Council of the USSR of September 26, 1967 "On the Extension of Benefits for Persons Working in the Far North and in areas equated to the Far North regions"] and the Decree of the Council of Ministers of the USSR of January 03, 1983 No. 12 «O vnesenii izmeneniy i dopolneniy v Perechen' rayonov Kraynego Severa i mestnostey, priravnennykh k rayonam Kraynego Severa, utverzhdennyy Postanovleniem Soveta Ministrov SSSR ot 10 noyabrya 1967 g. N 1029» ["On Amendments and Additions to the List of Far North Regions and Locations Equated to the Far North Regions, approved by the Decree of the Council of Ministers USSR of November 10, 1967, No. 1029"] (modern version), following the administrative-territorial division of 2019.

population, what kind of share should be of each of the groups of the population, etc.) are still not resolved in the scientific literature. To a large extent, it is due to the sizeable interregional differentiation within the Far North for many socio-economic indicators. It does not allow us to consider these regions in a generalized way and forces us to search for each region its own path of development. Nevertheless, everyone agrees that the local population is one of the most important resources, and it must be used in the development of these regions. Despite all the advantages of the shift method of development, it has significant disadvantages. Among them are the depopulation of regions, the final collapse of the economic and socio-cultural infrastructure, predatory attitude to the environment, since this region is not native to newcomers, and they are not concerned about its development. Therefore, at present, one cannot ignore the local context of socio-economic development [1, Pilyasov A.N., Zamyatina N.Yu., p. 8]. To a large extent, it is determined by the behavior of households. Therefore, the development of the corresponding social infrastructure, which includes the education system, comes to the fore.

One of the main functions of the education system is the formation and improvement of the quality of the labor force. All the levels of the system are important since the higher ones are based on the previous ones. It means that its development, as well as its parts, should be one of the priorities of socio-economic policy. The development of the education system is particularly important in the context of population aging and a decrease in the working-age population. Nevertheless, among the development priorities in the official documents of the modernization of the education system, a little space is given.

Education as the priority for the development of the Far North regions

There is no specific concept paper devoted to the social development of the Far North. Therefore, how such a priority as education is fixed in socio-economic policy will be revealed by the example of the Arctic zone of the Russian Federation. In the “Fundamentals of the state policy of the Russian Federation for the period up to 2020 and for the future perspective” (approved by the Order of the President of the Russian Federation of September 18, 2008, No. Pr-1969)”, the main economic interest for the area is the “use of the Arctic zone of the Russian Federation as a strategic resource base of the Russian Federation, providing solutions to the problems of socio-economic development of the country”. However, the authorities of the Arctic regions believe sustainable socially-oriented development, which should affect all areas of life, is necessary. Specialists agree with this approach [2, Zuckerman V.A., Goryachevskaya A.S.].

Expanding the resource base is also the primary goal of the Fundamentals in the field of socio-economic development. In the field of education, the main objective concerns the development of higher education (“ensuring an adequate level of basic and applied research”). It may make it possible to raise the level of education and partially reduce the migration outflow of the population. Still, without the development of previous levels of education, this measure will be much less effective. Moreover, it is not necessary to attract local specialists to conduct research.

Therefore, this goal is rather conditionally aimed at the development of education. Strategic priorities also concern only higher education ("improving public administration ... by expanding fundamental and applied research in the Arctic").

The modernization of the education system is one of the primary measures to implement the state policy in the field of socio-economic development of the Arctic zone of the Russian Federation. But this is only mentioned as one of the directions of modernization of the entire social infrastructure. These directions include healthcare organizations and housing construction. The second measure is the training and retraining of specialists in the system of higher and secondary vocational education for working in Arctic conditions. The third and final measure is the Improvement of educational programs for the indigenous peoples of the Arctic zone of the Russian Federation. As for the field of science and technology, one of the steps is to research various areas of knowledge. Too little is said about the development of the education system for such an important document. It is especially true given that the modern economy is a knowledge economy. The Fundamentals could include other measures related to the development of the education system, such as improving the quality of general education, developing a vocational guidance system, encouraging talented teachers to move to these regions, and others.

It should be noted separately that the "Fundamentals" do not distinguish demographic features and problems of these regions. It is rather strange because without solving demographic issues (e.g., is it necessary to increase or decrease the population, by how much, what demographic structure should it be, etc.), it makes little sense to talk about strategic priorities for the development of regions and the mechanisms for implementing state policy. E.g., in the field of education: in this case, it is impossible to predict the incoming and outgoing flows of the population, the costs of developing the education system, the required number of workers and many other indicators that have a significant impact on the choice of priorities and ways to achieve them.

To implement the "Fundamentals", a "Strategy for the development of the Arctic zone of the Russian Federation and ensuring national security for the period until 2020 (approved by the President of the Russian Federation on 08.02.2013 No. Pr-232)" was developed; and it mostly repeats its provisions. Nevertheless, it notes negative demographic processes and the inconsistency of the network of educational organizations with the nature and dynamics of settlements, which is a threat in the social sphere. Another danger is the lack of an effective training system and the imbalance between the demand and supply of labor in a professional sense. However, among the directions of improving state management of the socio-economic development of the Arctic zone of the Russian Federation, measures aimed at developing the education system were not provided. Such actions were included in improving the quality of life of the population. It also included the modernization of educational infrastructure facilities, the development of education and training, retraining and advanced training in the system of higher and secondary vocational education in several areas, the improvement of educational programs for the indigenous population, and the balancing of the labor market, retraining of able-bodied unemployed. A significant number of are-

as were provided for the development of science and technology. However, they relate to research (incl. international), and not to the development of the education system. In the "Strategy", the provisions of the "Fundamentals" were specified and supplemented, which made it possible to obtain a more suitable document for work.

The action Plans for the implementation of the "Strategy for the development of the Arctic zone of the Russian Federation and national security for the period until 2020" (approved by the Chairman of the Government of the Russian Federation on October 16, 2013, No. 6208p-P16 and on August 30, 2016 (was not published))" contains a list of activities, which will contribute to the achievement of the goals of the "Strategy". However, these documents regarding the education system are incredibly modest. E.g., in the second Plan, only two measures are given that, moreover, have quite inaudible and streamlined formulations: creating conditions for the development of the education system in the Arctic zone of the Russian Federation and providing regions of the Russian Federation that are fully or partially parts of the RF Arctic zone with labor resources following their needs. Activities aimed at the development of science, high technology, and innovations do not include actions aimed at the development of the education system.

The last document that we will consider is the state program of the Russian Federation "Socio-economic development of the Arctic zone of the Russian Federation for the period until 2020" (approved by Decree of the Government of the Russian Federation on April 31, 2014 No. 366). It is one of the mechanisms for implementing the "Strategy". Among the strategic priorities indicated in this program, the development of the education system is not mentioned separately. Among the priority areas, the development of science and technology stands out, but nothing is said about the development of the education system. Perhaps this is included in the comprehensive socio-economic development of the Arctic zone of the Russian Federation. Among the goals and objectives of the program, the development of the education system is absent. When discussing the characteristics of the regions of the Russian Federation related to the Arctic zone of the Russian Federation, and the prospects for their development, education issues are sometimes addressed. Still, they concern only with higher professional education.

In the Arctic zone of the Russian Federation, all other state programs operate (e.g., the programs "Development of education for 2013–2020" and "Development of science and technology for 2013–2020"). These programs operate on the territory of the Far North, but both are insufficiently represented in there.

The absence of a separate comprehensive development program, where the issues of developing the education system would be separately spelled out, can be explained by a sizeable inter-regional differentiation for the entire Far North. As a result, it is necessary to use regional programs, of which there are many, and they vary significantly in quality, but their consideration requires a separate article. Nevertheless, such a program is necessary because these regions are united by some parameters, especially in the social sphere.

We can conclude that the development of the education system is not among the main priorities, and many essential aspects are not adequately addressed. It primarily concerns the age and educational structures of the population, its dynamics, and characteristics, depending on gender and age. The second insufficiently considered aspect is the dynamics of the number of individual population groups under the age of 30 since they are the primary consumers of the services of the educational system. A knowledge of this information is necessary for predicting labor supply by educational level and development of the educational system. The literature does not explain in detail the impact of education on the socio-economic aspects of the life of the Far North population. When making decisions in the field of state and municipal administration, many nuances are not considered.

In this regard, this work has two objectives. First, we will consider the age and educational structure of the population of the Far North and, based on an analysis of their dynamics, and we will determine the main problems in the development of the education system in these regions, which depend on the demographic factor, as well as ways to solve them. Secondly, we will try to briefly highlight how the development of the educational system can affect the demographic processes of these regions.

Subject and method of research

The authorities in the Far North regions faced a difficult task: they need to provide a high-quality workforce, not only for current needs but also for large-scale economic projects important for the country. Internal and external migrants are actively involved, but the potential of the local population is not used enough to solve the problem. As we will discuss below, the age structure of the population in the Far North is younger than the average for Russia. Therefore, we can assume that a significant amount of emigration, which is much talked about, relates to getting an education. Consequently, increasing the level of education of the population, it is possible not only to cover part of the needs for labor resources but also to solve some social problems, primarily related to unemployment and emigration.

Based on the Rosstat data and expert estimates, we consider the dynamics of the population (incl. promising one, until 2035) of the Far North regions and its educational level. In the statistical bulletin “Social and economic indicators of the Far North and equivalent areas”, data on five- and one-year age groups are not available. Therefore, our census data are from 2002[2] and 2010[3], micro-census 2015[4] , as well as the information received from the Unified interdepart-

[2] Naselenie po polu i vozrastnym gruppam po sub"ektam RF [Population by gender and age groups by regions of the Russian Federation]. URL: http://www.perepis2002.ru/ct/doc/02-02_new.xls. (accessed 11 November 2019); Vse naselenie, gorodskoe, sel'skoe po urovnyu obrazovaniya, polu i vozrastnym gruppam [The entire population, urban, rural by level of education, gender and age groups]. URL: http://www.perepis2002.ru/ct/doc/TOM_03_01.xls (accessed 11 November 2019); Naselenie po urovnyu obrazovaniya, polu i vozrastu po sub"ektam RF [Population by level of education, gender and age by constituent entities of the Russian Federation]. URL: http://www.perepis2002.ru/ct/doc/TOM_03_03.xls (accessed 11 November 2019).

[3] Naselenie po vozrastnym gruppam i polu [Population by age group and gender]. URL: http://www.gks.ru/free_doc/new_site/perepis2010/croc/Documents/Vol2/pub-02-02.xlsx (accessed 11 November 2019); Naselenie po

mental statistical information system (UISIS)[5]. We do not consider the number of students, but age groups to understand at what maximum students should count on the education system.

The statistics database of municipalities is very poor. In the micro-census micro-data database 2015, due to the small sample size for municipalities, there is no data, so we should consider the entire territory to compile dynamic data series. When analyzing the Amur, Tyumen (without AO) regions, the Altai Republic, Trans-Baikal, Perm, and Primorsky Krais were excluded, since the proportion of the population living in the Far North is small. These are mainly rural areas, in which indicators of socio-economic development differ markedly from the regional average. The rest of the regions for several reasons, we consider as the whole. Firstly, the proportion of the population living in the Far North is much higher, and the differences from the regional average are less. Secondly, the majority of residents study in the capital of their regions. Therefore, their education system works to a large extent for the development of the Far North.

Thirdly, in these regions, more universities are in the Far North. By analogy with the Arctic zone of the Russian Federation, we distinguish the European and Asian parts of the Far North. The first includes the Arkhangelsk Oblast, the Murmansk Oblast, the Republic of Karelia, the Komi Republic, and the Nenets Autonomous Okrug. The Asian part of the Far North is the Irkutsk Oblast, the Magadan Oblast, the Sakhalin Oblast, the Tomsk Oblast, the Republic of Buryatia, the Republic of Sakha (Yakutia), the Tyva Republic, the Kamchatka Krai, the Krasnoyarsk Krai, the Khabarovsk Krai, the Khanty-Mansi Autonomous Okrug, the Chukotka Autonomous Okrug, the Yamal-Nenets Autonomous Okrug.

We consider all age groups, but we pay special attention to the dynamics of the population under 30 years. By this time, education has been mostly completed, and the number of those who move to the next level of the education system at older ages is small. The following age groups are most interesting for us: 0–6.5, 6.5–18, 18–23, 0–30 years. Like the other age groups, a group of people younger than 30 years old is subject to cyclical fluctuations associated with the dynamics of the sex and age structure of the population, and a change in the size of this group has a noticeable effect on public policy.

---

vozrastnym gruppam, polu i urovnyu obrazovaniya po sub"ektam RF [Population by age groups, sex, and level of education by constituent entities of the Russian Federation]. URL: http://www.gks.ru/free_doc/new_site/perepis2010/croc/Documents/ Vol3/pub-03-01.xlsx (accessed 11 November 2019).

[4] Naselenie, prinyavshee uchastie v mikroperepisi po polu i vozrastnym gruppam [Population participating in the microcensus by gender and age groups.]. URL: http://www.gks.ru/free_doc/new_site/population/demo/micro-perepis/finish/01/01-01_(%D0%B0%D0%B1%D1%81).xlsx (accessed 11 November 2019); Naselenie, prinyavshee uchastie v mikroperepisi, po polu, vozrastnym gruppam i urovnyu obrazovaniya [Population participating in the micro-census by gender, age group and level of education]. URL: http://www.gks.ru/free_doc/new_site/population/demo/micro-perepis/finish/02/02-01_(%D0%B0%D0%B1%D1%81).xlsx (accessed 11 November 2019).

[5] Chislennost' postoyannogo naseleniya — zhenshchin po vozrastu na 1 yanvarya (chelovek) [The number of resident population - women by age on January 1 (persons)]. URL: https://www.fedstat.ru/indicator/33459 (accessed 11 November 2019); Chislennost' postoyannogo naseleniya — muzhchin po vozrastu na 1 yanvarya (chelovek) [The number of resident population - men by age on January 1 (persons)]. URL: https://www.fedstat.ru/indicator/31548 (accessed 11 November 2019).

The age structure of the Far North population

Fig. 1 represents the dynamics of the number of children in preschool age (0–6.5 years) in 1990–2018. Over the period under review, the number of children decreased throughout the country by 22.5%, but in the regions of the Far North, the decrease was higher - 36.5%. This number decreased notably sharply in the European part (by 51.0%) against 32.2% in the Asian part. Two main reasons for the decline can be distinguished: a decrease in the number of births and the migration of the population of reproductive age to regions with more comfortable living conditions. If we compare urban and rural areas, then in the second, despite a higher total fertility rate, the final decline is more significant due to the emigration of the population. In the Far North, there are fewer differences between the regions, since the population was actively leaving cities as well.

The figure shows three periods: 1990–2001, 2002–2016 (2015 for the European part) and 2016/2017–2018. The main occurred was in the first period when the socio-economic conditions were the most unfavorable. In the country, the number of children decreased by 45.5%, and in the Far North - by 51.6% (56.5% in the European part and 50 % - in the Asian one). Subsequent growth could not compensate for the contraction. By 2016/2017, the number of children in the country increased by only 46.2% and 36.4% in the Far North regions. Growth in the European part was small (only 20.4%). Growth in the Asian part was higher (by 40.7%), but was also below the average for Russia. In 2016/2017, due to a decrease in the number of births, the number of children in preschool age started declining.

Along with continued emigration, the reduction is affected by the fact that small generations born in the 1990s entered their reproductive age, and over time their share in the entire population in the reproductive age has increased. It suggests that in the next 10-15 years, the number of children in preschool age will reduce. In the country, losses in urban areas were much less than in rural areas (18.8% versus 31.4%). In the Far North, the gap was less, since losses amounted to 34.8% in urban areas and 41.3% in rural areas.

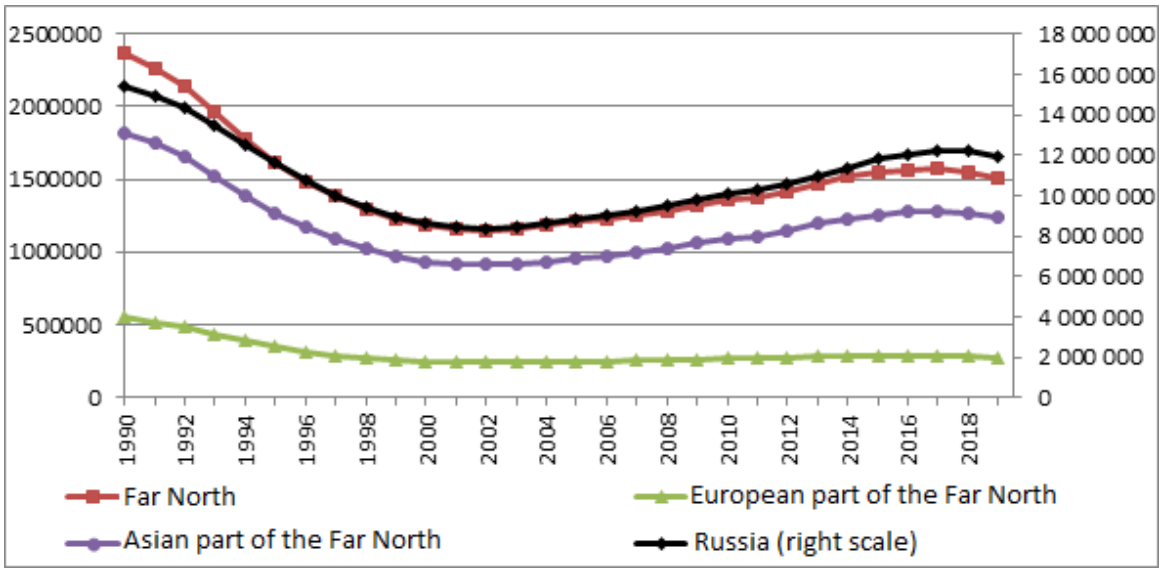

Fig. 1. The number of children in preschool age in the Far North as of January 1, 1990–2019.

If we consider the regional level, then the number of children for the entire period decreased less than in the country as a whole only in the mining Khanty-Mansi Autonomous Okrug (by 13%) and the Yamal-Nenets Autonomous Okrug (by 21.4%), where the extractive industries had a great share, as well as in the areas with a high birth rate - the Republic of Tuva (by 10.3%). In the Tomsk Oblast, with a focus on the mining industry, the decrease was 27.0%. In the remaining regions, the number of children decreased by more than 30%. The most significant decline was in underdeveloped extractive areas with severe living conditions - the Chukotka Autonomous Okrug (by 76.4%) and the Magadan Oblast (by 75.9%). The latter was the only region where the number of children decreased in every period under study. The number of children has also decreased by more than 50% in some extractive industries oriented regions. In Murmansk Oblast the decline was 56.4%, in the Republic of Komi it was 52.3%, and in the agrarian-industrial Kamchatka Krai it was 54.1%

Concerning the number of children at school age (6.5–18 years), the picture is somewhat different. In the country, the number of children at this age increased until the beginning of 1997 (an increase of 9.8%), and only after the small generations of the 1990s began to enter school age, their number began to decline (Fig. 2). The reduction lasted until the beginning of 2013 and amounted to 41.6%. Since 2013, there has been an increase in the number of children in school age, which currently stands at 15%, but will still increase. In general, over the period under review, the number of children decreased by 26.2%, but in urban areas, the losses was slightly higher than in rural areas (27.3% vs. 23.2%).

The regions of the Far North showed more unfavorable dynamics. The initial growth continued only until 1994 and amounted to only 3.8% (2.6% in the European part and 4.2% in the Asian part). Moreover, in seven regions, a decrease was observed in this period. The reduction in the number of children, which began in 1994, continued until the beginning of 2011. This was probably due to the upward trend stopped in 1994, and the number of children did not manage to increase significantly. Compared to the average for Russia, the decline was stronger and amounted to 46.5% (54.9% in the European part and 44.0% in the Asian). Since 2011, growth has resumed, but over a more extended period, the number of children at school age increased less - by 14.2% (10.1% in the European part and 15.2% in the Asian part). For the Asian part, it is the only period when it was able to show values above the national average. In the European part, in all periods, the indicators were much worse than the average. For 1990–2018, the number of children of school age in the Far North decreased by 36.7% (49.1% in the European part and 32.8% in the Asian). However, the upward trend is continuing now. So, the final values will be better. It will be possible to clarify only in five-seven years.

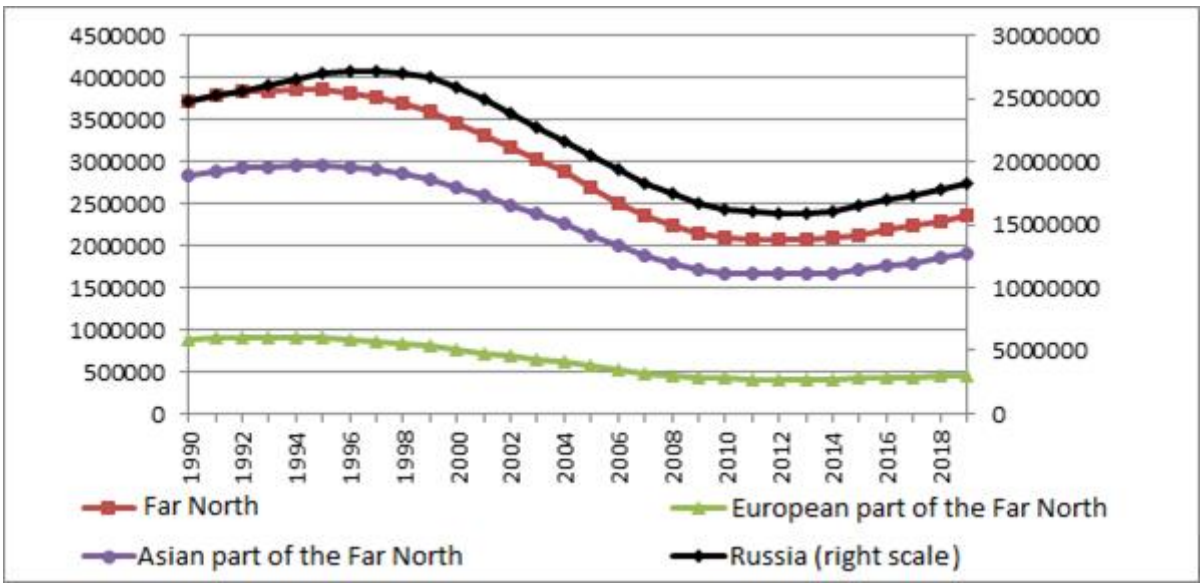

Fig. 2. The number of school-age children in the Far North as of January 1, 1990–2019.

Among the regions with the lowest losses, two should be distinguished: the Republic of Tuva (1.9%) and the Khanty-Mansi Autonomous Okrug (3.0%). In the first region, the high birth rate was decisive against the background of a low standard of living and a high proportion of the rural population. And in the second, a high standard of living was caused by the area's specialization in hydrocarbon production. In the economically prosperous Yamal-Nenets Autonomous Okrug, the losses amounted to 13.3%. In other regions, losses amounted to more than 25%. The most significant declines were in the mining-oriented Magadan Oblast (75.6%) and the Chukotka Autonomous Okrug (76.0%). They are associated with a considerable migration outflow in the 1990s. Losses were rather high in the mining Murmansk Oblast (54.5%), the Sakhalin Oblast (53.2%), the Komi Republic (51.0%), and the agrarian and industrial Kamchatka Krai (55.9%). Migration played a significant role there too. In other regions, losses were less than 50%. Since 2011, an increase in the number of children has been observed in all regions without exception.

The number of young people aged 18–23 (the most likely age for higher education) increased in the country until the beginning of 2006. It is explained by the dynamics of the birth rate (see Fig. 3). The growth was 28.8%, but then it was followed by a decrease of 44.6%. So, over the period under study, the number of young people decreased by 28.7%. In urban areas, the reduction was noticeably more significant compared to rural areas (33.4% vs. 12.2%).

In the Far North, the increase in the number of young people also continued until 2006, but the growth was less and amounted to only 19.2%. In the European part, the growth was very insignificant - only 6.9% vs. 24.1% in the Asian part. The subsequent decrease was higher than in the country (47.1%). Therefore, over the period under study, the reduction was 37.0%, which significantly exceeds the average Russian level. The decline in the European part (54.7%) was much more extensive compared to both the national average and the Asian part (45.4%). As a result, over the period under study, the number of youth in the European part decreased by more than half (by 51.5%), while in the Asian part, the decrease was only 32.3%. If we compare urban and

rural areas, the Far North regions had more losses in both cases, but the urban areas were closer to the average for Russia. For urban areas, losses amounted to 38.2%, for rural areas - 32.4%. In the European part, the indicators were noticeably worse in both urban and rural areas, as the losses were 50.5% and 55.7%, respectively. In the Asian part, losses in urban areas were close to the national average (34.0%), and in rural areas were higher than average, but much lower compared to the European part (25.7%).

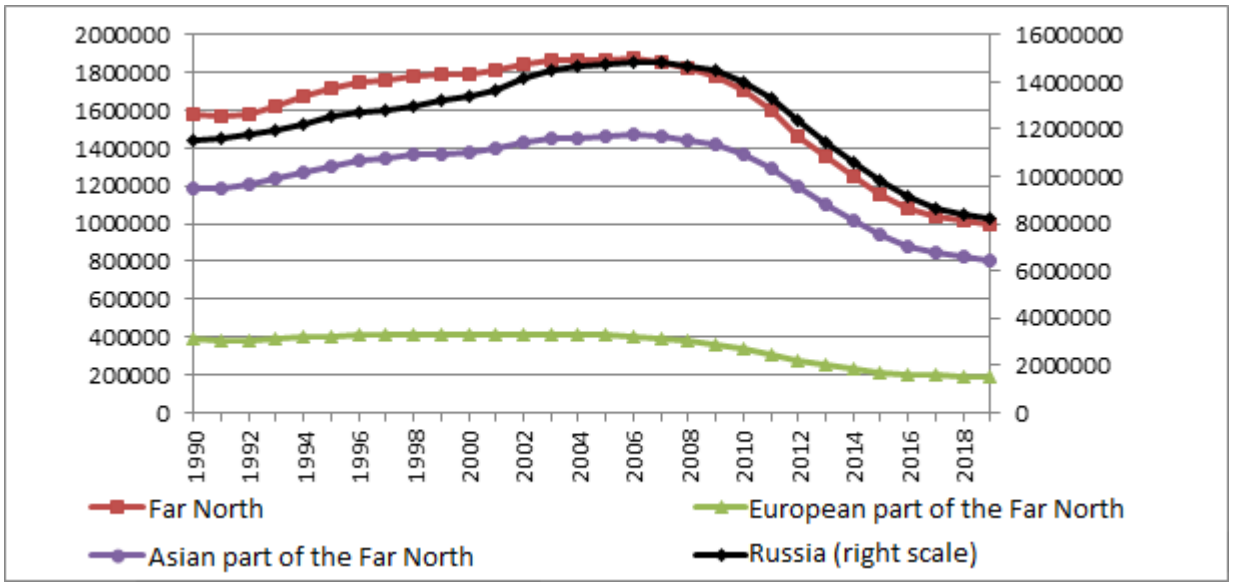

Fig. 3. The number of young people aged 18–23 in the Far North as of January 1, 1990–2019.

Interterritorial differences concerning the dynamics of the size of this group are the largest among all considered age groups. This situation can be explained by the fact that it is the most dependent on migration, which is associated with education. In the Khanty-Mansi and the Yamal-Nenets Autonomous Okrugs, a significant total increase was noted: 31.3% and 33.8%, respectively. It is the only case of the final rise in all regions and for all age groups. However, it was due to a growth of more than 120% in the first period. Relatively small losses were noted in the Nenets Autonomous Okrug (14.3%) and the Republic of Sakha (Yakutia) (20.7%). Other regions have lost more than a third of youth. The most significant losses were in the Magadan Oblast (75.8%) and the Chukotka Autonomous Okrug (66.7%). The Murmansk Oblast (57.1%), the Komi Republic (53.7%), and the Kamchatka Krai (56.5%) lost more than half of young people aged 18–23.

Although there were periods of increase for certain age groups, the overall population under 30 noticeably decreased between 1990 and 2018 (see Fig. 4). In the country, the reduction was 23.7%. At the same time, the size of this group increased only in 2014, when the population of the Republic of Crimea and the city of Sevastopol was considered. During all other years, the number declined. In urban areas, the reduction amounted to 23.5%, and in rural areas - 24.2%, which suggests a steady population decline in different regions. The share of the population under the age of 30 in the entire population also decreased over this period. If on January 1, 1990, it was 44.6%, then on January 1, 2019, it was only 34.2%. In urban areas, the share was initially lower (38.1%)

and decreased to 29.1%, while in rural areas it was higher (44.5%), but the decrease was close to (up to 35, 2%).

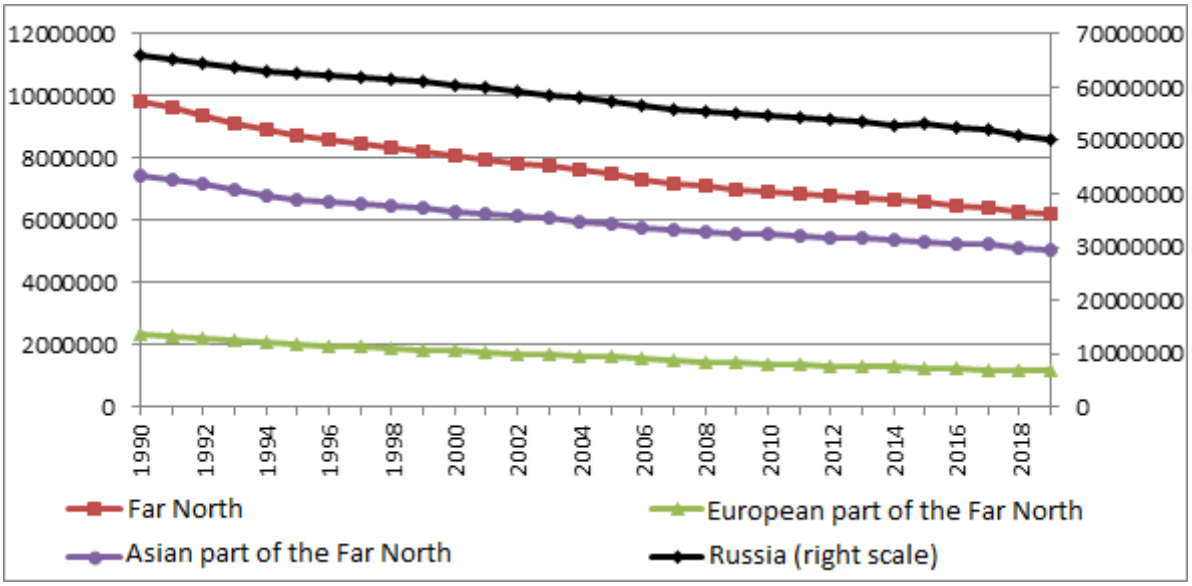

Fig.4. The number of people under the age of 30 in the Far North as of January 1, 1990–2019.

In the Far North, the share of youth also decreased. And the number of youth reduced every year under study without exception. The decrease was noticeably more significant and amounted to 36.7%. Regions lost 51.5% of youth in the European part, while only 32.1% in the Asian part, which is also a significant amount. In urban areas, losses were generally lower (35.9%). It applies to both the European and Asian parts, where losses amounted to 49.4% and 31.4%, respectively. In rural areas, the losses were higher (39.6%), but the regions located in the European part of the Far North lost 59.7% of the population under the age of 30, while in the Asian part, the losses were significantly less - 34.3% of youth.

The proportion of young people in the entire population in the Far North was initially much higher (50.3%), and the difference between the European (48.5%) and Asian (51.0%) parts was insignificant. In the period under study, the decrease in its share in the Far North was stronger. At the end of the period, it amounted to 37.5%. The differences between the European and Asian parts of the Far North increased due to a more considerable decrease in the share of youth in the European part, whereas of January 1, 2019, it amounted to 33.8% compared to 38.5% in the Asian part. The share of young people in the European part fell below the national average. The differences between urban and rural areas were insignificant throughout the entire period. At the beginning of the period, the share of youth in urban and rural areas was 49.9% and 51.6%, respectively, and at the end of the period - 37.1% and 38.7%. In urban areas, the differences between the European and Asian parts did not exceed three to four percentage points (48.5% and 50.4% in 1990, 34.4% and 37.9% in 2019), while in rural areas they increased from similar values to almost ten percentage points (48.3% and 52.6% in 1990, 31.0% and 40.3% in 2019).

At the territorial level, the smallest losses were noted in the Khanty-Mansi Autonomous Okrug (9.7%) and the Republic of Tuva (11.9%). In the first case, it is associated with a high stand-

ard of living, which prevented emigration. And in the second, it was due to a high birth rate. Relatively small losses were in the Yamal-Nenets Autonomous Okrug (20.7%) and the Republic of Buryatia (26.6%) - regions with a high share of extractive industries, as well as in the local center of attraction - the Tomsk Oblast (24.5%). In other regions, losses amounted to more than 30%. The most significant declines were in the Magadan Oblast (76.1%) and the Chukotka Autonomous Okrug (76.4%). They were caused by active emigration. Migration led to significant losses in the Murmansk Oblast (56.9%), the Sakhalin Oblast (50.9%), the Komi Republic (54.0%), and the Kamchatka Krai (55.7%). In other regions, youth losses were less than 50%.

Summing up the results of this section, we note that in 1990-2018, the Far North areas suffered a substantial demographic loss. It negatively affected the prospects for their development. At the beginning of the period, the share of youth and their age groups were higher compared to all country statistics. Active migration and a decrease in the birth rate led to the fact that at the beginning of 2019, its share became small. In regions with a high standard of living oriented toward mining, the situation is generally better. The transport accessibility helped to preserve the population since losses were predominantly higher in areas with lower transport accessibility. However, the deterioration of economic conditions had a more significant impact on the European part of the Far North. In the European part, losses are higher compared with the Asian part. Damages are also higher in urban than in rural areas.

Further prospects for the dynamics of this age group remain negative. Based on the population forecast until 2050, made under the direction of V.N. Arkhangelsky [3], and our revaluation, we can argue that its number until 2035 will continue to decline.

By the end of 2035 in the country, the number of young people under 30 will be approximately 44.7–48.0 million people, and its share will change from 32.4% to 34.8%. It means that the decline in numbers will continue. Until 2022, it will be very sharp (up to 48.5–49 million people). In 2026–2031, due to the demographic wave, the decline will slow down and will be insignificant (about 250-300 thousand people). After that, it will continue at a faster pace. If current trends continue, the main contribution to the decline will be made by a group younger than 6.5 years old (it will decline throughout the entire period and by the end will decrease by more than a third). The number of children at school age will increase until 2025, and then will decline rapidly. The number of young people aged 18 - 23 will increase from 2023 until the end of the period, and the growth will be significant.

Concerning the Far North, a slightly different picture is expected. Population under the age of 30 will decrease to 5.4–5.8 million people, but this decrease due to higher migration will take place without a flat site in the middle of the period. At the end of the period, the proportion of youth will be 36.1%–38.7%. The contribution of the main age groups to the overall youth population dynamics will be approximately the same as for the country as a whole.

The educational structure of the population of the Far North

As it was noted in the previous section, the age structure of the population of the Far North is younger than in the country as a whole, while the educational structure is close to the national average (see Table 1). It is necessary to consider the characteristics of the economy of the Far North that require a significant number of workers with secondary vocational education to understand whether it is good or not.

Table 1

The educational structure of the population of Russia and the regions of the Far North

	Postgraduate	**Higher vocational**	**Incomplete higher**	**Secondary vocational**	**General (secondary full)**	**Lower education**
	All the population					
	2002					
Russian Federation	0.3	15.7	3.1	39.8	17.5	22.5
Far North	0.2	14.5	3.0	42.5	17.9	21.2
European part	0.2	12.9	2.3	46.7	15.6	21.8
Asian part	0.2	15.0	3.2	41.2	18.6	21.1
	2010					
Russian Federation	0.6	22.1	4.4	35.7	17.7	16.5
Far North	0.6	20.5	4.3	37.2	17.8	16.5
European part	0.5	18.1	3.3	41.4	15.9	17.0
Asian part	0.6	21.2	4.6	36.0	18.4	16.3
	2015					
Russian Federation	0.4	25.3	2.8	40.1	17.8	13.2
Far North	0.4	24.3	2.9	41.1	17.7	13.2
European part	0.2	20.8	2.1	46.1	16.1	14.2
Asian part	0.5	25.3	3.1	39.5	18.2	12.9
	Population under the age of 30					
	2002					
Russian Federation	0.2	10.2	6.7	31.6	25.2	25.1
Far North	0.1	9.3	5.7	31.4	25.5	27.4
European part	0.1	8.3	4.4	36.0	22.3	28.4
Asian part	0.1	9.7	6.1	30.1	26.4	27.1
	2010					
Russian Federation	0.6	19.7	11.8	27.0	20.3	17.8
Far North	0.6	17.4	10.1	27.5	21.1	20.2
European part	0.5	15.5	8.1	32.7	18.7	20.6
Asian part	0.6	17.9	10.6	26.2	21.8	20.1
	2015					
Russian Federation	0.3	25.1	7.6	28.4	20.7	17.5
Far North	0.3	21.9	6.9	29.3	21.1	20.1
European part	0.1	19.5	5.1	36.0	17.9	21.1
Asian part	0.3	22.6	7.4	27.6	21.9	19.8

Note: if the sum per line is less than 100%, the balance falls on those who had not indicated their level of education.

The table proves that the proportion of the population with postgraduate education grew but continued to remain less than one percent, and the differences between the country and the Far North regions were insignificant [6]. Growth among those under 30 years old was slightly higher.

In higher vocational education, three trends can be distinguished, which explain the increase in the share of the population with such training with a decrease in the proportion of the population aged 18–23 years.

Firstly, Russia's entry into the Bologna process led to the emergence of two new levels in higher education (bachelor's and master's degrees). Each is a complete higher education, but the duration of studies for a bachelor's degree is shorter than for a specialist. As a result, the share of specialists is decreasing. So, if in 2010 the share of specialists among the entire population was 93.4%, and in the Far North it was 93.8%, then in 2015 it amounted to 91.5% and 92.8%, respectively. Among young people under 30 years old, the figures are even more revealing: 84.6% and 87.1% in 2010, and 80.3% and 82.2% in 2015. At the same time, not everyone has opportunities or want to be a master.

Secondly, it is an increase in the number of private universities and the introduction of the Unified State Exam, resulted in a decrease in the requirements for entering a university and made it easier to get higher education.

Thirdly, despite a certain devaluation of higher education due to a decrease in the quality of education, the prestige of higher education has increased both because of the requirements of employers and because of a reduction in the prestige of industrial worker jobs.

In the Far North, the proportion of people with higher education is below the national average by about one and a half to two percentage points. Still, it is due to low values in the European part, which are four to five percentage points lower than the national level, while the differences between the Asian part and the whole country do not exceed one percentage point. It should be noted that the differences in the age group younger than 30 were initially not so significant, but they increased significantly over time. This may indicate the emigration of the population with higher education from the Far North regions or difficulties with getting a higher education for the population that lives there. In the future, it will negatively affect the socio-economic development of this macro-region and the whole country.

The share of the population with incomplete higher education is stable, but overall it has increased slightly over the entire period. There are many reasons for the dynamics presented in Table 1, but the most likely is the financial one, esp. the 2008 crisis.

Despite a small increase in the share of the population with secondary vocational education in the country, in the Far North, it decreased. The specific of the northern areas is that their development requires, first and foremost, qualified workers and mid-level specialists. Therefore, such a decrease, along with the possibility of structural adjustment of the economy, the prerequi-

[6] The decline in 2015, we tend to explain by a small sample, and not by a deterioration in the educational structure of the population.

sites for which are currently not visible, may mean a slowdown socio-economic development. This issue requires much closer attention, especially by professions, so that we will consider it briefly enough.

During the period under review, the share of the population of Russia trained for mid-level specialists increased from 27.1% to 30.9%. In the Far North, growth was less: from 29.2% to 31.5%. It is primarily due to a smaller increase in the Asian part (from 29.0% to 31.1%), while in the European part, the growth rate was close to the average for Russia: from 29.6% to 32.9%. Among young people under 30, the proportion of the population with specialized secondary education is expectedly lower, and the growth is less: in the country, it increased from 20.8% to 21.6%, and in the Far North - from 20.4% to 21.8%. The differences between both parts of the Far North in this indicator are considerable: in the European part, growth was from 21.4% to 25.2%, while in the Asian part - from 20.2% to only 20.9%.

The share of the population trained under the training programs for workers in the entire population decreased from 12.7% in 2002 to 9.1% in 2015. This negative trend was also noted in the Far North regions, where the share decreased from 13.3% to 9.6%. In both parts, the decrease was the same (by 3.8 percentage points): from 17.0% to 13.2% in the European part and from 12.2% to 8.4% in the Asian part. The proportion of the population with this level of education among young people under the age of 30 years is lower, and its decline is more significant. So, in Russia, it decreased from 10.8% to 6.7%, and in the Far North - from 11.0% to 7.5%: from 14.6% to 10.7% in the European part and from 9.9% to 6.7% in the Asian part.

The share of the population with complete secondary education is stable and is decreasing very slowly everywhere except the European North, where it is gradually increasing. As for the population under 30 years old, the proportion of people with complete secondary education decreased very rapidly. This is a positive trend because the economy needs professional workers.

During the period under review, the share of the population with a lower level of education decreased almost twice. In addition to the general increase in the level of education, the retirement of older people, many of whom had a low level of education, and a decrease in the share of young people in the entire population played a role. It is also a positive trend.

The table shows that the shares of the population with complete secondary education and lower levels of education in the country as a whole and the Far North are close. The main differences are concentrated in groups with vocational education and training. The lower share of the population with higher education is offset by those with secondary vocational education. It reflects the structure of the economy and its need for labor, that is, both demographic and economic factors influence the level of education. The decline in the share of the population with secondary vocational education is a negative trend, which carries significant risks for the economy, as an imbalance is formed between supply and demand in the labor market. As a result, the implementation of large economic projects will be in jeopardy due to a shortage of labor force with the required qualifications.

The impact of the education system on the socio-economic and demographic development of the Far North regions

The development of the education system will positively affect the socio-economic and demographic indicators of the Far North. At the same time, it will help saturate the economy of these regions with young qualified specialists, because they experience a more acute shortage of workers than the country [4, Elizarov V.V. et al., p. 43]. Moreover, such saturation is necessary for the northern regions for the successful adaptation of local communities and economic systems to the requirements of the new global technological paradigm [5, Zaikov K.S. et al.].

The literature notes an inverse relationship between the level of education and birth rate [6, Maleva T.M., Tyndik A.O.; 7, Arkhangelskiy V.N., et al.]. However, such a connection is far more complicated. Moreover, it may be absent [8, Kravdal Ø., Rindfuss R.R.; 9, McRay J., Royer H.] (a more detailed analysis of the literature on this issue is in [10, Zhuravleva T.L., Gavrilova Y.A.]). We believe that concerning birth rate, the need for children, living standards and other factors (e.g., the level of development of the region) in the Far North has a stronger effect than the level of education, and its contribution to the decline in birth rate will be less significant, especially that people go to the Far North mainly to work. Our confidence is based on the fact that in regions with a high share of the urban population (e.g., the Murmansk Oblast and the Arkhangelsk Oblast), the birth rate is low. In the areas with a high birth rate, the process of raising the level of education will be extended over time. Such an impact will be less noticeable due to the significant migration movement and other factors.

The level of education of migrants and the host population can both stimulate migration and hinder it [11, Lee E.S.]. But in the case of the Far North, the low level of access to quality education is one of the important factors that stimulate emigration [12, Popova O.V.; 13, Rudenko D.Yu.] and contribute to the attraction of workers from other regions of Russia. The age structure of the population of the Far North is younger. Therefore, the outflow of the population caused by the insufficient development of the education system occurs in a larger volume, and it is a more severe threat to these regions than for the country. An additional complication is that the vast majority of those who left do not want to return to their homes after graduating.

This is evident by student survey data. Based on a survey of 2,797 students from 9 territorial universities, it was found that 51.6% of respondents intended to stay where they studied after graduation, and the volume of potential migratory flow of graduates was estimated at 30–33% [14, Varshavskaya E.Ya., Chudinovskikh O.S., p. 42]. Moreover, after graduation, no more than 16–18% of graduates planned to return home (to the city they lived before university) [14, Varshavskaya E.Ya., Chudinovskikh O.S., p. 46]. Returning home means economic losses, but higher chances of a job by profession, as well as housing and social connections. According to respondents, they are good enough reasons to take such a step [14, Varshavskaya E.Ya., Chudinovskikh O.S., p. 57]. However, the potential volume of external migration (from Russia) from regional universities is low and amounts to about 5–6% [14, Varshavskaya E.Ya., Chudinovskikh O.S., p. 44].

Researchers from Belarus came to similar conclusions. However, in their case, the capital university was considered [7]; therefore, the results obtained, even more noticeably illustrate this trend: only 11.4% of all nonresident students plan to return to their locality. At the same time, only every tenth student from the countryside and the small town, every sixth student from the district center, and every second student from the regional center plans to return home [15, Denisov A.Yu. et al., p. 319].

Studies in the Far North regions, in general, confirm the above trends and figures, although they also noted regional specifics. Based on a sample of 4,024 students, the proportion of people wishing to leave the region in which they studied was 54%. Moreover, in the Arkhangelsk Oblast and the Murmansk Oblast, where transport access is better, the proportion of people wishing to emigrate is higher. And in the Republic of Sakha, the Krasnoyarsk Krai and the Chukotka Autonomous Okrug, where it is more difficult to leave, this proportion is much lower [16, Maksimov A.M. et al., p. 71]. However, if you look at the answers about the desire to leave the study area, considering the place of residence before entering the university, the percentage of people who wish to do it, provided that the student lives in another settlement of the study region, is the lowest - only 48.9% [16, Maksimov A.M. et al., p. 73], although this figure is significant. Probably, the answers here also vary greatly depending on the region in question, but the article does not provide information in this section, which is a drawback. It is noted in the works that with an overall migration growth of the Russian population with higher and secondary vocational education in the Arctic regions, a significant migration outflow of such a population is observed [17, Sokolova F.Kh.]. Such a study could clarify the situation and answer the question of whether graduates leave other regions who have received education and return to their homes either in connection with employment, or whether residents of the Arctic and northern regions leave. In the meantime, we can assume that qualified young people are reluctant to travel to small settlements, which are quite a lot in the Far North due to the specifics of the economy, preferring to stay in larger ones. At the same time, at the expense of full-time graduates of Arctic universities, provided they are guaranteed employment, the economy of the Arctic zone of the Russian Federation receives only 30% of the total annual additional need for personnel with higher education [18, Sigova S.V., Stepus' I.S.]. And more than 40% of university graduates employed in the Arctic are graduates of universities of the other regions [19, Shabaeva S.V. et al.]. A good overview of this issue (the number of Arctic programs both in universities located in the Arctic zone of the Russian Federation and outside it, the number of students studying in them and other aspects) is given in [20, Gorokhov et al.]. The provision rate in secondary vocational education is 40-50% [21, Stepus' I.S., p. 74]. In the Far North, located outside the Arctic zone of the Russian Federation, the education system is also not able to satisfy all the needs of the economy.

[7] In the article by Varshavskaya E.Ya., Chudinovskikh O.S., it is noted that for metropolitan universities, the figures they presented on the number of potential internal migrants would most likely be even lower.

Raising the level of education will also contribute to solving one of the most acute problems of modern Russia - increasing life expectancy. For the Far North regions, this problem is significant, since life expectancy there is lower than the average in Russia [8].

It is not easy to assess the impact of the level of education on the socio-economic indicators that determine the level of health. And the presence of higher education does not mean that a person's health will necessarily be better compared to those who do not have one since a causal relationship largely depends on personal life circumstances [22, Hayward M.D. et al.]. Several studies argue that one can speak of a direct correlation between education and life expectancy [23, Lleras-Muney A.; 24, Lutz W., Skirbekk V.; 25, van Kippersluis H. et al.]. But most likely, the relationship between them is indirect. Education is only the basis for other factors to increase life expectancy [26, Arendt J.N.; 27, Clark D., Royer H.; 28, Davey Smith G. et al.; 29, Kröger H. et al.; 30, Lager A.C. J., Torssander J.].

Advances in medicine over the past 70–80 years have gone hand in hand with the increasing accessibility of education to a broader population. According to the theory, school education provides necessary skills (reading, writing, and communication), and teaches logical thinking, a critical approach to information and making plans. A high level of education allows getting a better-paid job, which helps to provide better living conditions, nutrition, and medical care. At the same time, based on their experience and knowledge, more educated people try to lead a healthier lifestyle. Besides, education affects health through emotional aspects [31, House J.S. et al.]. Finally, among more educated people, the proportion of married people is higher, which also positively affects life expectancy. We believe that adjusted for climatic features. These provisions are also applicable to the regions of the Far North.

There are enough works devoted to the influence of education on mortality [32, Pyankova A.I., Fattakhov T.A.]. Still, the question is to what extent the increase in life expectancy is caused not by a general decrease in mortality, but by a change in the educational structure of the population, rarely [33, Jasilionis D. et al.; 34, Luy M. et al.]. A significant number of these works are devoted to the realities of Russia [35, Kharkov T.L. et al.; 36, Shkolnikov V.M. et al.]. In the last one, based on the calculation of mortality tables by the level of education, conclusions are drawn about the significant effect of changes in the educational structure of the population on the increase in life expectancy. In Russia from 1988–1989 to 1998–1999, despite a general decrease in life expectancy, an improvement in the educational structure led to an increase in life expectancy in men aged 30 years by 0.79 years, and in women by 0, 65 years. [36, Shkolnikov V.M. et al.]. For the economically developed countries of the West, the growth was slightly more significant. For the period from 1990–1991 to 2010–2011 life expectancy in the population at the age of 30 in Italy, Denmark and the USA, due to changes in the level of education, increased in men by 1.1, 1.0 and 0.6 years, and in women by 0.7, 1.1 and 0.4 years [34, Luy M. et al.]. We can assume that in Russia,

[8] Ozhidaemaya prodolzhitel'nost' zhizni pri rozhdenii [Life expectancy at birth]. URL: https://www.fedstat.ru/indicator/55386 (accessed 11 November 2019).

the increase in life expectancy due to the improvement of the educational structure of the population for this period also amounted to about one year. For the Far North, it was more since the educational structure of the population there was initially worse, and mortality rates in Russia for people with low education is not only higher, but also deteriorating against the background of an increase in the life expectancy of a highly educated population [32, Pyankova A.I., Fattakhov T.A.].

The development of the education system will also have a positive impact on improving the economic situation in the regions of the Far North. It applies to both micro and macro levels. By the micro-level, we mean the increase in the incomes of the population. The macro-level implies the development of the economy in regions and localities with a higher share in the entire population of students at all training levels.

The level of education has a significant impact on the likelihood of employment in the Far North. In foreign northern European countries, the demand for highly skilled workers with specific competencies is growing. Still, due to higher wages, low-skilled migrants go there in large numbers [37, Giltman M.A., p. 106]. Concerning the Russian Far North, the question of what kind of workforce is the most demanded at present is not considered in detail. In this regard, the study of M.A. Giltman, based on a sample labor force survey for 2010–2015 using logit models, assessed the probability of being employed. It allowed determining conditions for the coincidence of supply and demand in the labor market of the northern areas. The level of education was one of the indicators of analysis. Despite the limitations associated with the structure of the Rosstat data, the author was able to draw several important conclusions. So, it was argued that economic activity in the North was higher, but the share of unemployed was slightly higher than the national average. At the same time, the initial hypothesis that less qualified and competitive workers are more likely to be employed in the North was rejected. The adoption of the hypothesis was probably influenced by the lack of all the necessary data. However, despite the structure of the economy, secondary and higher education increases, and primary education reduces the likelihood of being employed in the northern regions compared to the rest of Russia.

A survey completed in 2012 at two Mexican universities located in monofunctional cities (single-industry towns) revealed the contribution of higher education to the economy of the towns where they were found. A direct contribution is that everyday expenses that are invested in the local economy account for at least 67% of all student expenses. An indirect contribution is to create jobs for people who serve students (incl. education, since the integrated university community and students, make up 140% of their number), to sell goods and services to these people (in the USA, every 4–5 students create one additional place of work in the service sector). Also, due to the creation of educational organizations at universities (e.g., schools), the educational system is developing [38, Makagonov P.P. et al., p. 112–113].

Finally, there are significant social effects that arise when universities implement their “third function”. It is understood as “a combination of specific services based on actions and opportunities that serve for the good of society” [39, Markhl M., Pausist A., p. 7]. Examples of such

effects are in [40, Kudryashova E.V., Sorokin S.E.]. Among them are economic (creating workplaces and training), social (transforming the urban environment, holding cultural and social events, providing access to their infrastructure, socializing young people), and educational (implementing the principle of "education for all" - from a preschool child to a senior citizen).

Other examples can be cited (on the connection between the level of education and graduation and similar ones [41, Semenikhina V.A. et al.]). They will demonstrate the importance of raising the level of education for the Russian economy. For the Far North, the need to develop an education system (primarily professional) is even more urgent, since these regions are vital for the development of the country.

Main conclusions and recommendations for the state policy

The study showed that although the Far North is very important for the socio-economic development of Russia, the issues of social development of these regions are not a priority. So, in the primary conceptual documents devoted to the development of the Arctic zone of the Russian Federation, very little attention is paid to the education system, and there is no separate document on the Far North. It is a drawback of the program, since the number and proportion of young people under the age of 30 are declining, and the forecast for its dynamics is also negative. An additional complication is that the population changes in a wave-like manner and a period of low numbers follows a period of high numbers. The education system should be prepared for such fluctuations, and this cannot be achieved without considering the demographic factor in the development programs of this macro-region. Other demographic features (e.g., focal population distribution) have been known for a long time and are generally considered by the authorities.

The educational structure in the Far North regions is close to the national average, and the differences are noticeable only between population groups with vocational education. The proportion of the population with higher education is lower, which reflects the specifics of economic activity in the Far North regions. Nevertheless, the share of the population with secondary vocational education has declined, and the share of the population with higher vocational education has increased. It may threaten economic development, as it leads to a shortage of labor in the industry.

Specific efforts are made to develop the educational system in the Far North regions and provide them with labor. In general, what is being done is well known, so we will focus on what can help to solve the problems of improving the quality and quantity of the workforce, but it is affected in insufficient volume.

Firstly, both in the Far North and beyond, it is necessary to widely apply the practice of targeted recruitment in educational institutions of a professional level. The target recruitment mechanism provides a relatively high level of intention to return. However, without solving the socio-economic problems of the Far North, the likelihood of leaving such a person after the end of the contract is higher, since a change of residence for him is familiar. It will help to provide labor for

long-term projects that are being implemented in the Far North. In this case, educational institutions located outside the Far North should train specialists for special programs that take into account the specifics of the work process in appropriate conditions. The help of teachers from the Far North for their development and reading would not be superfluous.

Secondly, support is needed for individual subject areas, primarily mathematics, physics, chemistry, biology, computer science, and technology. Their importance for the creation of industry cannot be overestimated. Support should be provided not only to schools and vocational education organizations but also to institutions of additional education, as well as study groups on relevant topics. It can take the form of distance Olympiads, creation of libraries, attracting well-known specialists in their fields of knowledge to write literature, and encouraging talented children, students, and teachers.

Thirdly, further development of the Internet and simplification of access to it among the population is necessary. In the Far North, the implementation of such programs can have a significant effect, as it will increase the level of education of young people and reduce its outflow, which arises from the need to get an education in another region and improve the quality of the educational process. Educational organizations located in the Far North and beyond will be able to cooperate on a closing basis, e.g., using the portal "Open Education"[9]. For individual lecture courses to be fully or partially developed considering the features of the Far North and read by remotely recognized specialists from leading universities, whose works are published in leading foreign journals, there are no technical obstacles. This practice can be applied when creating a new branch of the university or when joining one university to another in the framework of reducing the number of weak universities. It can also be used to update the content of curricula and taught courses.

There are fewer similar projects for school education, but they also exist. E.g., there is a course of lectures "Science in the Regions"[10], which was created with the participation of the Moscow Institute of Physics and Technology. It explains several topics in algebra, geometry, physics, chemistry, and biology for grades 8–10 of high school. In the lectures, not all the critical issues are discussed, but if there is an order from the state, these courses can easily be supplemented with missing material. It is not necessary to conduct all subjects and classes in a remote format, but such materials can significantly help teachers in the process of preparing for lessons.

Also, the development of digital technologies will improve access to knowledge not only for students but also for all the population. People will be able to not only listen to lectures given by high-level professionals (incl. in foreign languages) but also read high-quality scientific and popular science literature. In our opinion, the effect will be most significant if the state creates Internet portals in various subject areas, e.g., in the field of agriculture and veterinary medicine for small

[9] Portal «Otkrytoe obrazovanie» [Portal "Open Education"]. URL: https://openedu.ru/ (accessed 11 November 2019).
[10] Nauka v regiony [Science to the regions]. URL: https://www.youtube.com/channel/UCWyqrBRPgT33TUtbMQsyHqw/featured (accessed 11 November 2019).

farms, farming, and financial literacy, or teaching the theoretical part of the basics of providing the first help (with the consolidation of practical skills under the control of physicians). Something similar in the form of magazines was implemented back in the Russian Empire and the USSR. Even in the 1990s, “Sdelay Sam” (“Do-it-yourself”) magazines were published. At present, the development of the Internet will make it possible to bring such projects to a fundamentally new level and make them accessible to broader segments of the population.

At the end of this section and the whole article, it should be noted that the development of the education system in the Far North is necessary, as it increases the cultural and educational levels of the population, allows to solve some social problems and improve living conditions. Nevertheless, it is wrong to emphasize state policy only on the development of the education system. The regions of the Far North will not be able to benefit from this improvement without a comprehensive development of the economy as a whole, linking the parameters of supply and demand on the labor market and the availability of a system of subsidies that adequately reflects the harsh living conditions, as they will face the “brain drain”. Their education system will train qualified personnel who will try to move to other regions after graduation. It means that all the costs of providing education will fall on the areas of the Far North while the labor force will be used in regions, which have been able to create more attractive conditions for work and life. As a result, the pace of socio-economic development in the areas of the Far North will be much lower compared to potential ones. It should also be noted that the incoming flow of specialists who are going to work in the Far North is significant, and it can be said that the regions of the Far North are partly in a favorable position, as they take advantage of the labor force trained in the other areas. However, this flow partially corrects the failures that are observed in the education system and can solve problems only partially. Without the modernization of the education system, the outflow of youth will continue as well as the imbalance in the labor market.

Acknowledgments and funding

This work was prepared as part of the RFBR grant No. 19-010-00867 A “The system of education in the regions of the Extreme North: present state, problems, and perspectives of development and modernization”.

References

1. Pilyasov A.N., Zamyatina N.Yu. Novaya teoriya osvoeniya (prostranstva) Arktiki i Severa: polimasshtabnyy mezhdistsiplinarnyy sintez [The new theory of the Arctic and Northern development: multi-scale interdisciplinary synthesis]. *Arktika i Sever* [Arctic and North], 2018, no. 31, pp. 5–27. DOI: 10.17238/issn2221-2698.2018.31.5
2. Tsukerman V.A., Goryachevskaya A.S. Sistema podgotovki i perepodgotovki upravlencheskikh kadrov dlya kompleksnogo razvitiya Arkticheskoi zony Rossiiskoy Federatsii [System of training and retraining of managerial staff for the comprehensive development of the Arctic zone of the Russian Federation]. *MIR (Modernizatsiya. Innovatsiya. Razvitie)* [MIR (Modernization. Innovations. Development)], 2015, vol. 6, no. 4, pp. 35–42. DOI: 10.18184/2079-4665.2015.6.4.35.42

3. Arkhangel'skiy V.N., Danilova I.A., Dmitriev R.V., Khasanova R.R. Perspektivy demograficheskogo razvitiya Rossii do serediny veka [Prospects of the demographic development of Russia until the mid-century]. *Narodonaselenie*, 2017, no. 3 (77), pp. 24–36. DOI: 10.26653/1561-7785-2017-3-2
4. Elizarov V.V., Dmitriev R.V., Efremov I.A. L'goty v regionakh Krainego Severa: sokhranit' nel'zya otmenit' [Facilities in the Russian Far North: to be, or not to be]. *Uroven' zhizni naseleniya regionov Rossii* [Standard of Living of the Population of the Regions of Russia], 2015, no. 3 (197), pp. 36–48.
5. Zaikov K.S., Kondratov N.S., Tamitskaya E., Kuprikov M. Yu., Kuprikov N.M. Need analysis of college educated labor resources in the Russian Arctic. *IOP Conference Series: Materials Science and Engineering,* vol. 483, no. 1. DOI: 10.1088/1757-899X/483/1/012016
6. Maleva T.M., Tyndik A.O. Lovushka nizkoi rozhdaemosti v Moskve: vysokoobrazovannye bezdetnye? [The low birth rate trap in Moscow: highly-educated childfrees?]. *Region: ekonomika i sotsiologiya* [Region: Economics and Sociology], 2014, no. 2 (82), pp. 116–136.
7. Arkhangel'skiy V.N., Zin'kina Yu.V., Shul'gin S.G. *Rozhdaemost' u zhenshchin s raznym urovnem obrazovaniya: tekushchee sostoyanie i prognoznye stsenarii* [Birth rate differentiation according to female education levels in Russia: current situation and forecast scenarios]. *Narodonaselenie* [Population], 2019, vol. 22, no. 1, pp. 21–39.
8. Kravdal Ø., Rindfuss R.R. Changing relationship between education and fertility: a study of women and men born 1940 to 1964. *American Sociological Review*, 2008, vol. 73, no. 5, pp. 854–873. DOI: 10.1177/000312240807300508
9. McRay J., Royer H. The effect of female education on fertility and infant health: evidence from school entry policies using exact date birth. *American Economic Review*, 2011, vol. 101, iss. 1, pp. 158–195. DOI: 10.1257/aer.101.1.158
10. Zhuravleva T.L., Gavrilova Ya.A. Analiz faktorov rozhdaemosti v Rossii: chto govoryat dannye RMEZ NIU VShE? [Analysis of fertility determinants in Russia: what do RLMS data say?]. *Ekonomicheskii zhurnal VShE* [The HSE Economic Journal], 2017, vol. 21, no. 1, pp. 145–187.
11. Lee E.S. Theory of migration. *Demography*, 1966, vol. 3, no. 1, pp. 47–57.
12. Popova O.V. Tendentsii migratsii molodezhi v Respublike Sakha (Yakutiya) [Trends in youth migration in the Republic of Sakha (Yakutia)]. *Dinamika i inertsionnost' vosproizvodstva naseleniya i zameshcheniya pokolenii v Rossii i SNG* [Dynamics and inertia of reproduction of the population and replacement of generations in Russia and the CIS]. Ed. by A.I. Tatarkin, A.I. Kuzmin. Ekaterinburg, Institute of Economics, Ural Branch of the RAS Publ., 2016, pp. 399–403. (In Russ.)
13. Rudenko D.Yu. Analiz demograficheskikh protsessov v rossiiskoi Arktike [Analysis of demographic processes in the Russian Arctic]. *MIR (Modernizatsiya. Innovatsiya. Razvitie)* [MIR (Modernization. Innovations. Development)], 2015, vol. 6, no. 4, pp. 51–57. DOI: 10.18184/2079-4665.2015.6.4.51.57
14. Varshavskaya E.Ya., Chudinovskikh O.S. Migratsionnye plany vypusknikov regional'nykh vuzov Rossii [Migration intentions of graduates of Russia's regional higher educational institutions]. *Vestnik Moskovskogo universiteta. Seriya 6. Ekonomika* [Moscow University Economics Bulletin], 2014, no. 3, pp. 36–58.
15. Denisov A.Yu., Belov A.A., Kotlenok N.F. Migratsionnye ustanovki studentov-vypusknikov ochnoi formy obucheniya na primere BGU [Graduands' migration policy of full-time tuition through the example BSU]. *Sotsiologicheskiy al'manakh,* 2013, no. 4, pp. 317–325.
16. Maksimov A.M., Zaikov K.S., Tamitskiy A.M. Migratsionnye nastroeniya studencheskoi molodezhi v kontekste sotsial'no-ekonomicheskogo razvitiya Rossiiskoi Arktiki [Migration attitudes of student youth in the situation of the Russian Arctic' social and economic development]. *Issledovaniya molodykh uchenykh: ekonomicheskaya teoriya, sotsiologiya, otraslevaya i regional'naya ekonomika.* [Researches of young scientists: economic theory, sociology, industrial and regional economics. Collection of articles]. Ed. by. O.V. Tarasova, A.A. Goryushkin. Novosibirsk, IEOPP SO RAS Publ., 2017, pp. 69–78. (In Russ.)
17. Sokolova F.Kh. Migratsionnye protsessy v Rossiiskoi Arktike [Migration process in the Russian Arctic]. *Arktika i Sever* [Arctic and North], 2016, no. 25, pp. 158–172. DOI: 10.17238/issn2221-2698.2016.25.158
18. Sigova S.V., Stepus' I.S. Kadrovoe obespechenie prioritetov razvitiya Arkticheskoi zony Rossii — vklad sistemy vysshego obrazovaniya [Recruitment needs for the Russian Arctic Zone priorities de-

velopment — higher education system value]. *Universitetskoe upravlenie: praktika i analiz* [University Management: Practice and Analysis], 2015, no. 5 (99), pp. 19–29.
19. Shabaeva S.V., Stepus' I.S., Khoteeva E.A. Vozmozhnosti subarkticheskikh vuzov dlya resheniya kadrovykh problem Arktiki [Opportunities of Subarctic higher education institutions to solve personnel problems in the Arctic]. *Universitetskoe upravlenie: praktika i analiz* [University Management: Practice and Analysis], 2017, vol. 21, no. 4, pp. 106–115. DOI: 10.15826/umpa.2017.04.054
20. Gorokhov A.M., Zaikov K.S., Kondratov N.A., Kuprikov M.Yu., Kuprikov N.M., Tamickij A.M. Analysis of scientific and educational space of the Arctic Zone of the Russian Federation and its contribution to social and economic development. *European Journal of Contemporary Education*, 2018, vol. 7, no. 3, pp. 485–497. DOI: 10.13187/ejced.2018.3.485
21. Stepus' I.S. Strategicheskoe razvitie ekonomiki Arkticheskogo makroregiona i ego obespechennost' kadrami so srednim professional'nym obrazovaniem [Strategic development of the economy of the Arctic macroregion and its vocational secondary education staffing requirement]. *Regional'naya ekonomika: teoriya i praktika* [Regional Economics: Theory and Practice], 2016, no. 11, pp. 66–80.
22. Hayward M.D., Hummer R.A., Sasson I. Trends and group differences in the association between educational attainment and U.S. adult mortality: implications for understanding education's causal influence. *Social Science & Medicine*, 2015, vol. 127, pp. 8–18. DOI: 10.1016/j.socscimed.2014.11.024
23. Lleras-Muney A. The relationship between education and adult mortality in the United States. *Review of Economic Studies*, 2005, vol. 72, no. 1, pp. 189–221.
24. Lutz W., Skirbekk V. *How education drives demography and knowledge informs projection. IIASA Interim Report*. IIASA, Laxenburg, Austria: IR-13-016, 31 p.
25. Van Kippersluis H., O'Donnel O., Van Doorslaer E. Long-run returns to education: does schooling lead to an extended old age? *Journal of Human Resources*, 2011, vol. 46, no. 4, pp. 695–721. DOI: 10.1353/jhr.2011.0006
26. Arendt J.N. Does education cause better health? A panel data analysis using school reforms for identification. *Economics of Education Review*, 2005, vol. 24, no. 2, pp. 149–160. DOI: 10.1016/j.econedurev.2004.04.008
27. Clark D., Royer H. The effect of education on adult mortality and health: evidence from Britain. *American Economic Review*, 2013, vol. 103, no. 6, pp. 2087–2120.
28. Davey Smith G., Hart C., Hole D., MacKinnon P., Gillis C., Watt G., et al. Education and occupational social class: which is the more important indicator of mortality risk? *Journal of Epidemiology & Community Health*, 1998, vol. 52, no. 3, pp. 153–160. DOI: 10.1136/jech.52.3.153
29. Kröger H., Pakpahan E., Hoffmann R. What causes health inequality? A systematic review on the relative importance of social causation and health selection. *The European Journal of Public Health*, 2015, vol. 25, no. 6, pp. 951–960. DOI: 10.1093/eurpub/ckv111
30. Lager A.C.J., Torssander J. Causal effect of education on mortality in a quasi-experiment on 1.2 million Swedes. *Proceedings of the National Academy of Sciences*, 2012, vol. 109, no. 22, pp. 8461–8466. DOI: 10.1073/pnas.1105839109
31. House J.S., Landis K.R., Umberson D. Social relationships and health. *Science*, 1988, vol. 241, no. 4865, pp. 540–545.
32. P'yankova A.I., Fattakhov T.A. Smertnost' po urovnyu obrazovaniya v Rossii [Mortality by educational level in Russia]. *Ekonomicheskii zhurnal VShE* [The HSE Economic Journal], 2017, vol. 21, no. 4, pp. 623–467.
33. Jasilionis D., Jdanov D., Leinsalu M. Der Zusammenhang von Bildung und Lebenserwartung Mittel- und Osteuropa. Max-Planck-Gesellschaft / Generalverwaltung (eds): Jahrbuch der Max-Planck-Gesellschaft 2007: Tätigkeitsberichte, Zahlen, Fakten. München: Max-Planck-Gesellschaft zur Förderung der Wissenschaften, 2007, pp. 103–108. (In Germ.)
34. Luy M., Zannella M., Wegner-Siegmundt C., MinagawaY., Lutz W., Caselli G. The impact of increasing education levels on rising life expectancy: a decomposition analysis for Italy, Denmark, and the USA. *Genus*, 2019, vol. 75, article 11. DOI: 10.1186/s41118-019-0055-0
35. Khar'kova T.L., Nikitina T.Yu., Andreev E.M. Zavisimost' prodolzhitel'nosti zhizni ot urovnya obrazovaniya v Rossii [Dependence of life expectancy on the educational levels in Russia]. *Voprosy statistiki*, 2017, no. 8, pp. 61–69.

36. Shkolnikov V.M., Andreev E.M., Jasilionis D., Leinsalu M., Antonova O.I., McKee M. The changing relation between education and life expectancy in central and eastern Europe in the 1990s. *Journal of Epidemiology and Community Health*, 2006, vol. 60, no. 10, pp. 875–881. DOI: 10.1136/jech.2005.044719
37. Gil'tman M.A. Zanyatost' na Severe Rossii: analiz na osnove mikrodannykh [Employment in the North of Russia: microdata analysis], *Zhurnal Novoi ekonomicheskoi assotsiatsii* [Journal of the New Economic Association], 2017, no.3 (35), pp. 103-124.
38. Makagonov P.P., Figueroa A.R., Espinosa S.R. On the economic contribution of specialized higher education institutions to the development of monofunctional cities. *Studies of the Russian economic development*, 2018, vol. 29, no. 1, pp. 79–85. DOI: 10.1134/S1075700718010094
39. Markhl M., Pausist A. Metodologiya otsenki tret'ei missii universitetov [Third mission indicators for new ranking methodologies]. *Nepreryvnoe obrazovanie: XXI vek* [Lifelong Education: XXI Century], 2013, no. 1. DOI: http://dx.doi.org/10.15393/j5.art.2013.1949
40. Kudryashova E.V., Sorokin S.E. «Tret'ya missiya» v strategiyakh razvitiya arkticheskikh universitetov [“The third mission” in the Arctic universities’ development strategies]. *Arktika i Sever* [Arctic and North], 2019, no. 34, pp. 20–43. DOI: 10.17238/issn2221-2698.2019.34.20
41. Semenikhina V.A., Karelin I.N., Koritskiy A.V. Otsenka sotsial'noi normy otdachi obrazovaniya v Rossii s uchetom prodolzhitel'nosti zhizni [Estimating social rate of return on education in Russia in view of life expectancy]. *Vestnik NGUEU*, 2014, no. 3, pp. 120–138.