ARCTIC MEDICINE

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FEATURES OF MEDICAL CARE AND MEDICAL-DEMOGRAPRHIC INDICATORS IN THE ARCTIC REGIONS OF THE REPUBLIC OF SAKHA (YAKUTIA)

A net of medical and prophylactic institutions in the Arctic regions of the Republic of Sakha (Yakutia) for the period of 2000-2018, medical and demographic data of indicators are represented in the article. A comparative analysis of indicators for the whole Republic with the Arctic regions is carried out. The main tendencies in changes of the medical and demographic indicators of the Arctic regions of the Republic of Sakha (Yakutia) are revealed. Well-based concepts of the development of medical care in the Arctic regions of the Republic of Sakha (Yakutia) are suggested in the concluding part of the article.

Keywords: birth rate, mortality rate, natural growth of population (natality), air medical services, Yakutia

Introduction. The main reasons for inefficient functioning of healthcare system in the regions of the Far North of the Russian Federation are in its natural climatic features, transport infrastructure, low density of population and medical understaffing associated with vast and unpopulated territories. A present normative legal regulation of healthcare resources in the Arctic regions does not take into account the density of population of the Russian Federation resulting in decreased availability of medical service in such regions. Due to geographic and climatic factors, a historically prevailing lifestyle of the Arctic regions presupposes a great number of low-populated villages located at a great distance from each other as well as away from administrative and medical centers. Nowadays a transport infrastructure in the Arctic regions is underdeveloped, and the tendency of its development does not show any considerable improvement for the next decades. It contributes to the development of a very specific life support system. The medical service in these regions is represented by rural hospitals for any available medical service, there is high demand in emergency service including specialized and air medical services, organization of mobile team for initial and specialized medical service and high level of hospitalization.

Materials and methods: The initial materials are represented by official reports of 'Yakut Republican medical center of informatics and analysis under the healthcare ministry of the Republic of Sakha (Yakutia)' for the period of 2000-2018. All the tables represent the data for the period of 2000-2018. Medical and demographic indcators of the Arctic regions of the Republic of Sakha (Yakutia) for the period of 2000-2018 have been analyzed. Main tendencies of medical and demographic processes in the Arctic regions of the Republic of Sakha (Yakutia) are revealed. Positive and negative trends in medical and demographic indicators are determined.

Results: There are 97 medical institutions in the Arctic regions of the Republic of Sakha (Yakutia). The system of initial in-patient and out-patient healthcare service is represented by 13 central

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Table 1

A net of medical institutions in the Arctic regions of the Republic of Sakha (Yakutia), (2018)

Regions	a	b	c	d	e	f	g	Total
Abiyskiy	1	5	-	-	1	1	-	8
Allaikhovskiy	1	-	-	1	-	3	-	5
Anabarskiy	1	1	-	-	1	-	-	3
Bulunskiy	1	4	-	1	1	2	-	9
Verkhne-Kolimskiy	1	1	-	2	-	2	-	6
Verkhoyanskiy	1	6	1	1	1	11	-	21
Zhiganskiy	1	1	-	-	1	2	-	5
Momskiy	1	1	-	-	-	4	-	6
Nizhne-Kolimskiy	1	2	-	-	1	-	1	5
Olenyokskiy	1	2	-	1	-	-	-	4
Sredne-Kolimskiy	1	8	-	1	1	-	-	11
Ust-Yanskiy	1	4	-		1	5	-	11
Eveno-Bytantaiskiy	1	1	-	-	-	1	-	3
Total for the Arctic regions	13	36	1	7	8	31	1	97

Note: a – Central Republican hospital, b – district hospital, c – city hospital, d – out-patient departments, e – TB dispensaries, f – first-aid and obstetric stations, g – first-aid station.

Table 2

Medical staff and medical staff provision (medical and paramedical personnel) in the Arctic regions of the Republic of Sakha (Yakutia). 2018

Regions	Medical personnel				Paramedical personnel			
	Established staff number	Actual staff number	Medical staff provi sion. %	Medical staff provision per 10 000	Established staff number	Actual staff number	Medical staff provi sion. %	Medical staff provision per 10 000
Abiyskiy	29	15	51.7	37.7	72	64	88.9	160.8
Allaikhovskiy	22	11	50.0	40.6	48.5	34	70.1	125.6
Anabarskiy	18.75	9	48.0	25.0	38.5	30	77.9	83.4
Bulunskiy	56.25	26	46.2	31.2	141	79	56.0	94.7
Verkhne-Kolimskiy	27.5	15	54.5	37.0	65.25	39	59.8	96.3
Verkhoyanskiy	61.5	37	60.2	33.2	209.25	155	74.1	139.2
Zhiganskiy	26.5	22	83.0	52.7	58.5	46	78.6	110.1
Momskiy	22	16	72.7	40.3	70.5	58	82.3	146.0
Nizhnekolimskiy	35.25	19	53.9	44.3	97.5	50	51.3	116.6
Olenyokskiy	28.5	24	84.2	57.9	61.5	52	84.6	125.4
Srednekolimskiy	47.25	31	65.6	41.8	117.25	100	85.3	134.7
Ust-Yanskiy	59.25	34	57.4	48.4	153	81	52.9	115.3
Eveno-Bytantaiskiy	14	9	64.3	31.8	33	31	93.9	109.7
Total for the Arctic regions	448	268	59.9	39.6	1165.75	819	70.3	121.0
The Republic of Sakha (Yakutia)	6489.5	4947	76.2	51.2	13414.5	11044	82.3	114.2

regional hospitals, 36 district hospitals, 1 city hospital, 7 out-patient departments, 8 TB dispensaries, 31 first-aid and obstetric stations and 1 first-aid station (Table 1).

448 of medical staff of physicians is required for the Arctic regions, in fact only 268 specialists were occupied by the end of 2018; the hospitals are understaffed 59.9%, this number is lower than the mean value for the Republic (76.2%). The medical staff provision per 10 000 of population was 39.6 in 2018, and it was 42.9 and 41.8 in 2016 and 2017 respectively.

The total capacity of medical organization in the Arctic regions is 673 day-and-night beds it is 7.5% of the total hospital bed fund of the Ministry of healthcare of the Republic of Sakha (Yakutia). Since 2013 the number of day-and-night beds reduced by 24.5% (219 beds). A bed provision for 10 000 of population is 99.4%, which means that totally the number is higher than in the Republic (the total Republican index is 91.8%).

The analysis of dynamics of the health service indicators for the Arctic regions showed high demand of such kind of medical assistance and increased by 110% (from 2.8% to 5.9%) since 2000 (Table 3).

At the beginning of 2019 there were 68 159 people, or 7% from the total number of population, living in the Arctic regions of the Republic. The number of population in the Arctic regions has reduced by 29.1% or 27997 people since 2000 (Table 4).

The children population in the Arctic regions has reduced by 30.8% or 7947 children since 2000 (Table 5).

The number of the labour potential in the Arctic regions reduced by 23.0% or 11200 people since 2005 (table 6).

The birth rate in the Arctic regions varies from 8.8 (Verkhnekolimskiy region) to 23.6 (Olenyokskiy region) per one thousand in 2018. The number has decreased in dynamics by 0.6% (from 14.5% to 14.3%). However the birth rate number in the Arctic regions is steadily higher than the average level of the whole Republic (table 7).

The mortality rate in the Arctic regions varies from 7.5 (Abiyskiy region) to 13.5 (Verkhnekolimskiy region) per one thousand in 2018. The number has reduced by 5.7% in dynamics (from 10.5 to 9.9). The mortality rate indices are higher in the Arctic regions than in the whole Republic (table 8).

The natural increase of population in the Arctic regions varies from -4.7 (Verkh-

Table 3

The dynamics of indices of the air medical services in the Arctic regions of the Republic of Sakha (Yakutia)

Regions	2000	2005	2010	2015	2016	2017	2018	%
Abiyskiy	5.5	7.1	3.7	6.3	4.9	7.4	4.8	
Allaikhovskiy	6.8	11.4	4.0	3.7	2.2	2.2	4.8	
Anabarskiy	0.8	5.4	4.8	5.9	3.8	4.2	3.4	
Bulunskiy	0.7	8.9	10.2	9.8	10.1	8.8	10.1	
Verkhnekolimskiy	0.9	3.3	4.7	8.9	3.8	6.7	3.7	
Verkhoyanskiy	1.2	9.0	6.8	7.9	6.8	8.6	6.0	
Zhiganskiy	8.1	5.2	2.2	1.6	2.4	2.4	4.0	
Momskiy	1.7	4.3	4.0	5.5	5.6	4.4	4.0	
Nizhnekolimskiy	1.7	2.9	3.8	5.0	3.7	4.2	4.0	
Olenyokskiy	3.5	2.7	4.2	9.1	4.8	4.0	6.6	
Srednekolimskiy	2.1	10.5	13.1	8.4	8.6	10.8	11.4	
Ust-Yanskiy	0.7	9.2	5.1	7.6	6.3	8.1	7.7	
Eveno-Bytantaiskiy	2.8	7.9	12.2	9.0	9.0	8.6	5.7	
Mean number for the Arctic regions	2.8	6.7	6.1	6.8	5.5	6.2	5.9	+110
Republic of Sakha (Yakutia)	1.5	1.5	1.4	1.6	1.5	1.5	1.5	

Table 4

The number of population living in the Arctic regions of the Republic of Sakha (Yakutia), absolute numbers

Regions	2000	2005	2010	2015	2016	2017	2018	%
Abiyskiy	5228	4649	4112	4125	4095	4058	4018	
Allaikhovskiy	4421	3203	2904	2733	2682	2718	2716	
Anabarskiy	3757	4113	3682	3387	3431	3500	3567	
Bulunskiy	10420	9495	9366	8404	8366	8404	8339	
Verkhnekolimskiy	6662	5314	4712	4287	4288	4220	4123	
Verkhoyanskiy	15928	12695	11765	11528	11371	11385	11352	
Zhiganskiy	4849	4187	4047	4246	4258	4238	4222	
Momskiy	5243	4699	4383	4218	4139	4099	4073	
Nizhnekolimskiy	8147	5460	4879	4426	4386	4366	4290	
Olenyokskiy	4206	4111	4026	3967	3983	4009	4072	
Srednekolimskiy	9415	8240	7774	7497	7538	7512	7499	
Ust-Yanskiy	15097	9398	8262	7244	7242	7202	7075	
Eveno-Bytantaiskiy	2783	2781	2811	2798	2778	2782	2813	
Total for the Arctic regions	96156	78345	72723	68860	68557	68493	68159	-29,1%
The Republic of Sakha (Yakutia)	962479	950668	949400	956896	959700	962835	964330	-0,2%

Table 5

The number of the children population in the Arctic regions of the Republic of Sakha (Yakutia), absolute numbers

Regions	2000	2005	2010	2015	2016	2017	2018	%
Abiyskiy	1541	1182	937	1048	1017	975	964	
Allaikhovskiy	1072	679	620	712	687	694	698	
Anabarskiy	1256	1230	1094	1024	1030	1051	1057	
Bulunskiy	2812	2140	2044	1953	1947	1960	1924	
Verkhnekolimskiy	1659	1047	878	837	851	846	820	
Verkhoyanskiy	4229	3216	2749	3046	3027	3009	2970	
Zhiganskiy	1352	1031	931	1219	1246	1239	1229	
Momskiy	1735	1391	1230	1306	1305	1268	1254	
Nizhnekolimskiy	1892	1085	948	1149	1158	1165	1142	
Olenyokskiy	1517	1299	1085	1199	1214	1214	1220	
Srednekolimskiy	2966	2196	1858	2065	2090	2074	2065	
Ust-Yanskiy	2952	1807	1430	1719	1744	1770	1733	
Eveno-Bytantaiskiy	799	784	724	774	759	766	759	
Total for the Arctic regions	25782	19087	16528	18051	18075	18031	17835	-30,8
The Republic of Sakha (Yakutia)	251287	217105	206200	221119	223900	226449	226891	

Table 6

The number of the labour potential in the Arctic regions of the Republic of Sakha (Yakutia), absolute numbers

Regions	2000	2005	2010	2015	2016	2017	2018	%
Abiyskiy	…	2688	2353	2284	2240	2233	2189	
Allaikhovskiy	…	2017	1741	1492	1457	1468	1467	
Anabarskiy	…	2391	2051	1975	1996	2015	2026	
Bulunskiy	…	6148	5824	5282	5132	5147	5036	
Verkhnekolimskiy	…	3432	2938	2483	2440	2335	2263	
Verkhoyanskiy	…	7853	7226	6552	6361	6334	6286	
Zhiganskiy	…	2547	2398	2315	2308	2238	2191	
Momskiy	…	2631	2424	2184	2077	2050	2039	
Nizhnekolimskiy	…	3534	3039	2467	2390	2348	2277	
Olenyokskiy	…	2272	2279	2199	2188	2163	2199	
Srednekolimskiy	…	4917	4778	4022	3978	3933	3883	
Ust-Yanskiy	…	6470	5466	4239	4172	4063	3897	
Eveno-Bytantaiskiy	…	1609	1594	1602	1570	1549	1556	
Total for the Arctic regions	…	48509	44111	39096	38309	37876	37309	-23,0
The Republic of Sakha (Yakutia)	…	616724	609000	579209	571800	566053	560256	

nekolimskiy region) to 11.7 (Eveno-Bytantaiskiy region) per one thousand in 2018. The indicators have increased by 2.3% in dynamics (from 4.3 to 4.4), however it should be noted that the indicators are lower than the average rate for the whole Republic (table 9).

Annual analysis of the natural increase of the Arctic population shows that in Bulunskiy, Ust-Yanskiy, Srednekolimskiy and Nizhnekolimskiy regions an average number is not high. There is an annual population loss in Verkhnekolimsk, which tends to increase in dynamics.

Conclusion: The analysis of the period 2000-2018 shows the following negative trends for the Arctic regions of the Republic of Sakha (Yakutia):

Low medical and paramedical personnel provision and understaffing;

Low bed provision;

Decreasing density of population, including labor potential, and children population respectively;

Relatively high mortality rate indicators.

The following positive trends have been noticed in the Arctic regions of the Republic of Sakha (Yakutia) since 2000:

Positive natural increase of population;

Relatively high indicators of birth rate;

Decrease of mortality rate.

One of the key points is high demand in air medical services.

To increase the accessibility and the quality of the medical aid in the Arctic regions population of the Russian Federation it is necessary to introduce such legal term as "the Arctic model of healthcare service". Such attitude will enable to differentiate the norms according to the extents and financing, taking into account specific territorial features. It will require development of federal normative acts, regulating the concept of rural hospitals for the regions of the Far North and the Arctic regions, with the establishment of the norms of medical staffing, institutional capacity, financing, organizing mobile medical aid and improvement of mobile medical service, including unrestricted use of air medical services for urgent and emergency cases.

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Table 7

Birth rate in the Arctic regions of the Republic of Sakha (Yakutia), per 1000

Regions	2000	2005	2010	2015	2016	2017	2018	%
Abiyskiy	15.4	10.6	15.1	13.6	9.6	13.6	12.5	
Allaikhovskiy	15.3	17.3	12.4	19.6	18.1	14.7	13.6	
Anabarskiy	19.7	20.3	17.9	20.5	20.8	21.8	16.2	
Bulunskiy	14.6	11.9	15.2	14	14.1	14.3	11.4	
Verkhnekolimskiy	10.0	10.1	10.3	11.7	12.0	11.0	8.8	
Verkhoyanskiy	15.0	15.5	18.7	19.8	18.3	16.8	13.5	
Zhiganskiy	12.6	19.9	22.4	22.8	17.9	18.0	16.9	
Momskiy	17.3	19.2	17.9	23.2	18.0	17.6	14.4	
Nizhnekolimskiy	11.6	12.8	14.3	17.9	15.5	12.9	14.5	
Olenyokskiy	11.6	13.7	24.1	22.1	22.5	22.8	23.6	
Srednekolimskiy	13.9	12.8	17.5	19.3	15.1	16.3	13.4	
Ust-Yanskiy	9.0	10.3	11.9	17.9	17.6	15.5	13.2	
Eveno-Bytantaiskiy	22.6	11.5	16.8	16.1	18.3	17.9	22.0	
Average number for the Arctic regions	14.5	14.3	16.5	18.3	16.6	16.2	14.3	-1.3
The Republic of Sakha (Yakutia)	13.5	14.3	16.8	17.1	16.0	14.5	13.7	

Table 8

Mortality rate in the Arctic regions of the Republic of Sakha (Yakutia), (per 1000)

Regions	2000	2005	2010	2015	2016	2017	2018	%
Abiyskiy	11.3	12.1	10.6	11.2	15.7	12.9	7.5	
Allaikhovskiy	10.5	13.2	15.7	11.4	7.4	12.5	11.4	
Anabarskiy	11.6	11.7	10.3	9.1	8.1	7.1	7.0	
Bulunskiy	9.9	10.1	12.0	8.6	8.1	8.0	8.2	
Verkhnekolimskiy	10.2	13.3	16.0	12.4	13.2	13.9	13.5	
Verkhoyanskiy	11.5	14.6	13.8	11.7	9.8	11.5	10.8	
Zhiganskiy	9.8	12.7	13.8	13.6	9.7	9.5	10.5	
Momskiy	10.2	14.7	14.3	10.3	10.0	10.5	8.2	
Nizhnekolimskiy	10.3	15.2	15.2	15	11.0	11.6	9.1	
Olenyokskiy	7.9	12.9	11.9	10.3	7.0	10.1	12.9	
Srednekolimskiy	10.3	11.5	14.2	9.4	12.1	10.5	10.9	
Ust-Yanskiy	9.5	11.4	10.9	13	12.2	12.9	9.4	
Eveno-Bytantaiskiy	14.1	10.0	10.8	9.3	9.4	10.7	10.3	
Average number in the Arctic regions	10.5	12.6	13.0	11.2	10.4	10.9	9.9	-5.7
The Republic of Sakha (Yakutia)	9.6	10.2	9.8	8.5	8.4	8.1	7.8	

Table 9

Natural population growth in the Arctic regions of the Republic of Sakha (Yakutia), per 1000 population

Regions	2000	2005	2010	2015	2016	2017	2018	%
Abiyskiy	4.0	-1.5	4.5	2.4	-6.1	0.7	5.0	
Allaikhovskiy	4.8	4.1	-3.3	8.2	10.7	2.2	2.2	
Anabarskiy	7.6	8.6	7.6	11.4	12.7	14.7	9.2	
Bulunskiy	4.7	1.8	3.2	5.4	6.0	6.3	3.2	
Verkhnekolimskiy	-0.5	-3.2	-5.7	-0.7	-1.2	-2.9	-4.7	
Verkhoyanskiy	3.5	0.9	4.9	8.1	8.5	5.3	2.7	
Zhiganskiy	2.8	7.2	8.6	9.2	8.2	8.5	6.4	
Momskiy	7.1	4.5	3.6	12.9	8.0	7.1	6.2	
Nizhnekolimskiy	1.2	-2.4	-0.9	2.9	4.5	1.3	5.4	
Olenyokskiy	9.1	0.8	12.2	11.8	15.5	12.7	10.7	
Srednekolimskiy	3.8	1.3	3.3	9.9	3.0	5.8	2.5	
Ust-Yanskiy	-0.4	-1.1	1.0	4.9	5.4	2.6	3.8	
Eveno-Bytantaiskiy	8.5	1.5	6.0	6.8	8.9	7.2	11.7	
Average number for the Arctic regions	4.3	1.7	3.5	7.2	6.2	5.4	4.4	+2.3
The Republic of Sakha (Yakutia)	3.9	4.1	7.0	8.6	7.6	6.4	5.9	

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