

# **Pediatric Health Care Services in the Arctic Regions of the Republic of Sakha (Yakutia): Medico-Demographic Indicators Particularly in the Delivery of Health Care**

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*Federal laws don't take into account the poor transportation infrastructure, vast territories and low population density in Yakutia which contributes to the rather poor performance of the health care system in the Arctic regions of Yakutia. Traditional lifestyles formed under the influence of specific climatic and geographic factors has resulted in the development of small settlements situated far away from each other and from medical centers. The implementation of "European" approaches to the delivery of health care services to a sparsely populated and vast territory has given birth to a system where remote, rural communities are serviced by a large number of smaller medical facilities and few hospitals with high level care. With the purpose of evaluating the quality of pediatric medical services, and in order to suggest ways to improve the health care system in the Arctic regions of Yakutia, official statistics as well as the results of an anonymous survey of 1904 mothers and 322 medical professionals were analyzed.*

*The analysis of current pediatric health care services revealed some trends: a decrease in the number of hospital beds, poor medical equipment maintenance, a shortage of qualified medical personnel, and increasing morbidity. A revision of current concepts of medical care in the rural areas of the Arctic zone is needed. New models of pediatric health care services should be based on the following principles: wider use of mobile diagnostic medical units, wider use of web-based information exchange (tele-consultation, medical reports), special training of medical professionals in rural areas, the introduction of automated systems for preventive examination, and risk-based optimization for improving the emergency medical system.*

Among the main causes of poor performance of the health care system in the Russian Far North are the lack of a sustainable transportation infrastructure, vast territories and low population density. Presently twelve of the thirty-four regions of Yakutia have a population of less than 10,000. There are 586 small settlements of which 44% are difficult to access. Transportation is a

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significant barrier to health care given that as much as 91.8% of the total area has only a seasonal transport network and 25 of the regions have no steady transportation to Yakutsk or to the neighboring regions (Official site of the Republic of Sakha (Yakutia), 2017: p. “common”). Existing federal laws do not account for these factors which lead to limited availability of affordable healthcare resources for the inhabitants of rural northern regions of the Russian Federation.

For the people who maintain a traditional lifestyle in the many small, sparsely populated settlements or even in tiny groups of chums/tents situated on the tundra or the taiga, they have a long history of living with a bleak climate and the geographic barriers of living far away from other villages and from administrative and medical centers. The transportation infrastructure in the northern regions of Russia is poorly developed. Taking into consideration the known Russian socio-economic realities as well as past experiences of trying to adopt new foreign transportation network development in the United States and Canada, there has been little significant improvement in the provision of transport services or provisions for future change.

The adoption of approaches to development, validation and assessment of health care services which have been developed for the European part of Russia, to a vast territory which is not evenly populated, has given birth to a system where remote rural communities tend to be serviced by a large number of smaller medical facilities, and only a few hospitals with high level care.

Official statistics show that during the last five years, Yakutia has experienced higher population growth rates than other parts of the Russian Federation (Figure 1). Though a decrease in the growth rate was registered during the last 2 years (2014 – 9.2, 2015 – 8.6, 2016 – 7.6 per 1,000 population), the birth rate is still more than double the mortality rate (Official site of the Republic of Sakha (Yakutia), 2017: p. “meditsina”). This trend presumes the health care system will need to make an extraordinary commitment to providing safe, high quality care in the future.

**The purpose** of this study was to evaluate the quality of the existing pediatric medical services and to suggest ways to improve the health care system in the Arctic regions of the Republic of Sakha (Yakutia).

**Methods.** The study was designed as a population-based descriptive study, based on the results of the longitudinal analysis of the state as well as of the national and regional reports of the Yakut healthcare services. A cross-sectional analysis of the quality of pediatric medical services was described through anonymous questionnaires, which were completed by the mothers of children (n=1904) and medical professionals (n=322) during the years 2013 – 2014 (Figure 2).

Ethical approval of the research was granted by the Ethic Committee at the Saint-Petersburg State Pediatric Medical University.

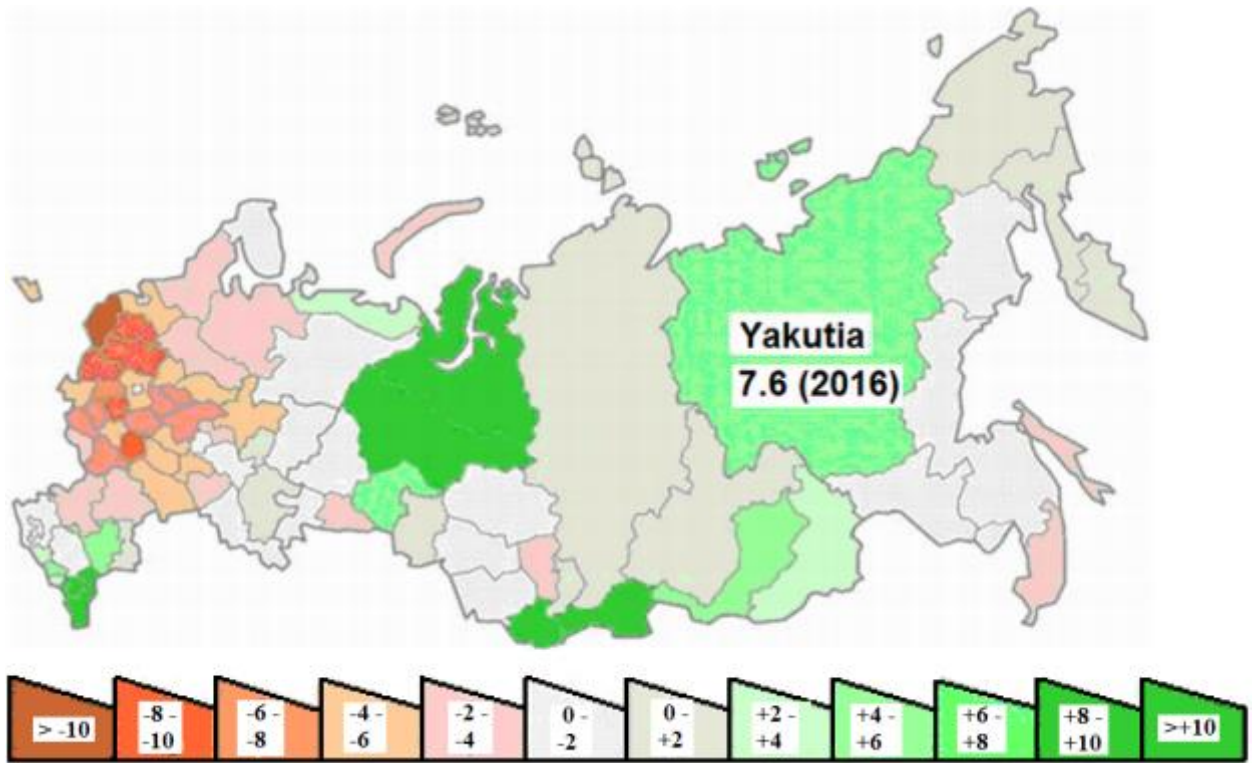


Figure 1. Natural population growth rates in Russia (per 1,000 population) in years 2011 - 2015.

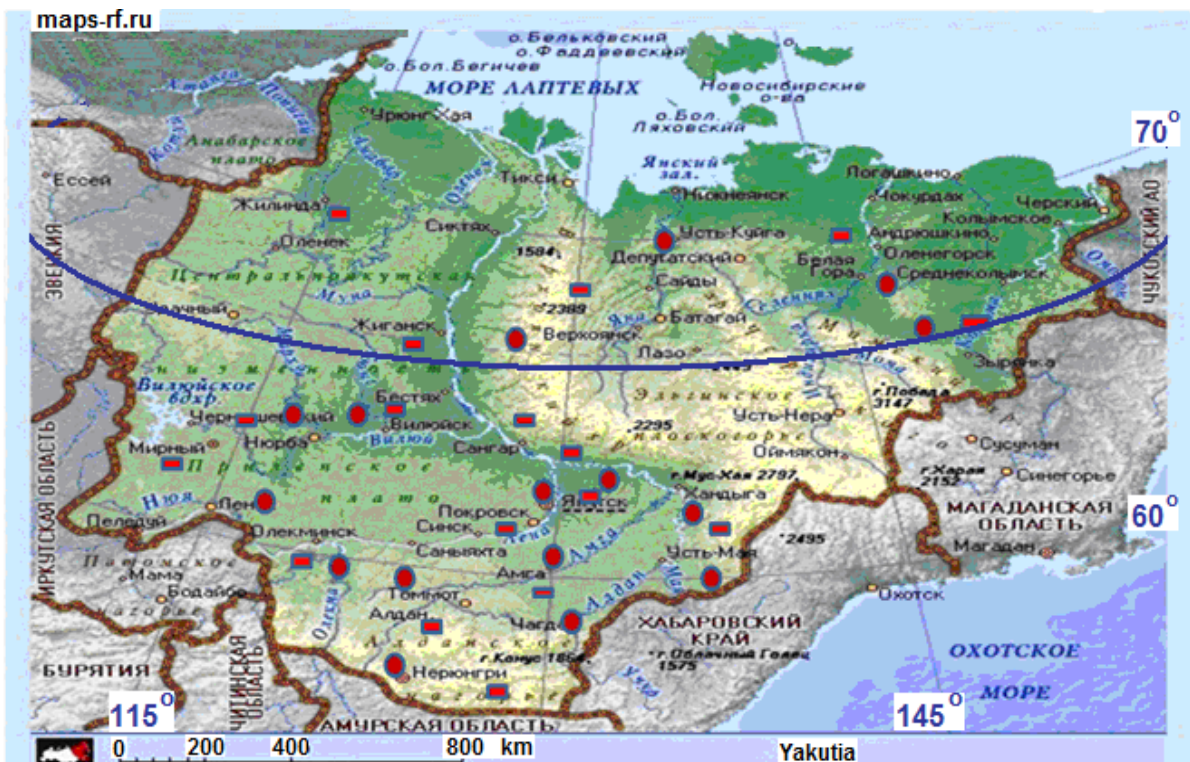


Figure 2. Settlements where the survey was carried out through questionnaires completed by medical professionals (■) and mothers (●). Blue line – Arctic circle.

The questionnaire was designed according to the recommendations of Farris P.W. et al. (2010) and was used to provide an anonymous community survey. Questionnaires were completed by respondents without assistance. The questionnaires for families inhabiting rural areas (n=1415) consisted of 75 questions (88% closed-ended), for families living in the city of Yakutsk (n=489) 103 questions (83% closed-ended); and for medical professionals (rural areas n=226, Yakutsk n=96) it consisted of 47 questions (83% closed-ended).

To determine if there was a significant difference between proportions, a two-sample t-test for percentages (independent samples) was used (Statistics calculator, StatPac, ver. 4).

**Results.** According to official statistics, in the beginning of 2015 the population of the Arctic regions of Yakutia was estimated to be about 26,194 with 6,557 children aged less than 15 years and 1,186 adolescents among them (Table 1).

Table 1. Estimated population of the Arctic regions of Yakutia in the beginning of 2015

Region	Total population	Adults	Younger than 15 years	Aged 15-17 years
Allaikhovsky	2733	1886	712	135
Anabarsky	3387	2185	1024	178
Bulunsky	8404	6111	1953	340
Nizhnekolymsky	4426	3097	1149	180
Ust'-Yansky	7244	5172	1719	353
<b>Arctic regions of Yakutia, total</b>	<b>26194</b>	<b>18451</b>	<b>6557</b>	<b>1186</b>
<b>Yakutia, total</b>	<b>956896</b>	<b>698674</b>	<b>221119</b>	<b>37103</b>

The number of practicing pediatricians is shown in Table 2. The coverage of pediatricians to serve the community has decreased from 22.2 per 10,000 population in 2011, to 16.8 per 10,000 in 2015 (with a total for Yakutia of 17.4). This decrease is consistent with Yakutia's negative trend for the number of physicians and nurses (Figure 3) and is associated with a reduction in the number of hospital beds (Figure 4).

Table 2. Number of pediatricians in the Arctic regions of Yakutia in years 2011 – 2015

Region	Number of pediatricians				
	2011	2012	2013	2014	2015
Allaikhovsky	2	2	2	2	2
Anabarsky	1	1	1	1	1
Bulunsky	8	9	6	6	6
Nizhnekolymsky	1	1	1	1	1
Ust'-Yansky	6	5	4	4	4
<b>Arctic regions of Yakutia, total</b>	<b>18</b>	<b>17</b>	<b>13</b>	<b>13</b>	<b>13</b>
<b>Yakutia, total</b>	<b>497</b>	<b>472</b>	<b>458</b>	<b>445</b>	<b>...</b>

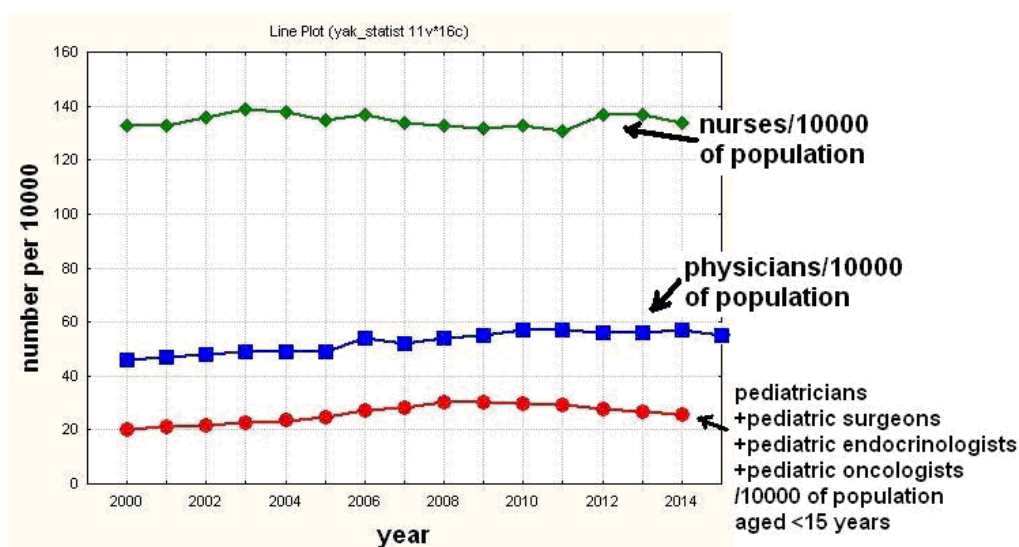


Fig. 3. Number of physicians and nurses in the Republic of Sakha (Yakutia) in years 2000 – 2015

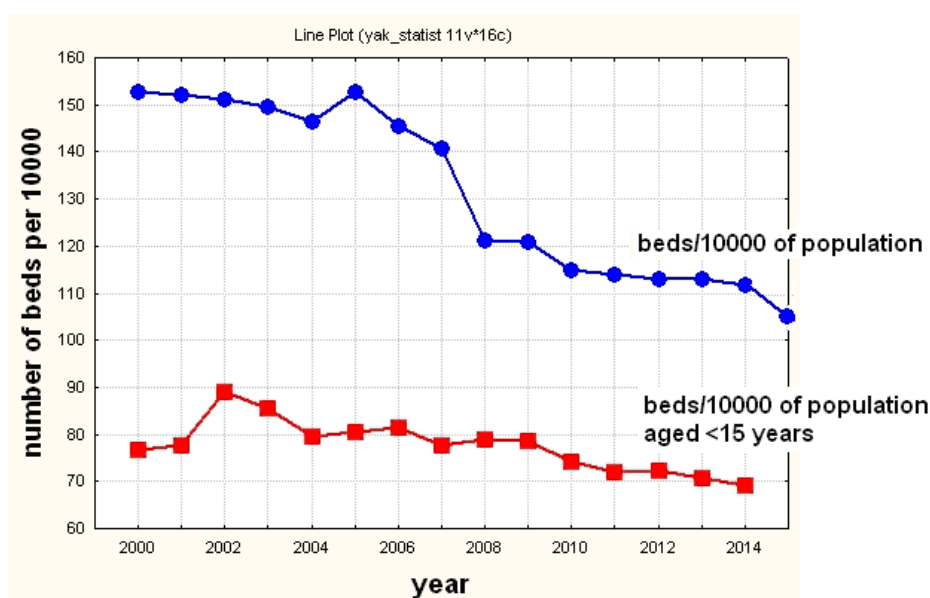


Fig. 4. Number of hospital beds in the Republic of Sakha (Yakutia) in years 2000 - 2015

The total number of births in Arctic regions is reported as 450 – 500 per year, with a crude birth rate higher than in the Russian Federation and in all of Yakutia (Table 3).

Table 3. Birth rate in the Arctic regions of Yakutia in years 2011 – 2015

Region	number per 1000 population				
	2011	2012	2013	2014	2015
Allaikhovsky	18,1	17,3	17,1	23,7	19,6
Anabarsky	19,7	18,8	23,2	22,1	20,5
Bulunsky	17,0	15,6	15,9	14,2	14,0
Nizhnekolymsky	17,0	16,7	18,5	18,3	17,9
Ust'-Yansky	19,7	16,5	16,6	20,1	17,9
<b>Arctic regions of Yakutia, total</b>	<b>18,3</b>	<b>16,9</b>	<b>18,2</b>	<b>19,7</b>	<b>17,9</b>
<b>Yakutia, total</b>	<b>17,1</b>	<b>17,8</b>	<b>17,5</b>	<b>17,8</b>	<b>17,1</b>
<b>Russian Federation, total</b>	<b>12,6</b>	<b>13,3</b>	<b>13,2</b>	<b>13,3</b>	<b>13,3</b>

The main causes of dissatisfaction of mothers with the quality of pediatric health care services in rural regions of Yakutia are presented in Table 4.

*Table 4.* Quality of pediatric health care services in rural regions of Yakutia:  
The main causes of mothers' dissatisfaction

<b>№</b>	<b>Causes of dissatisfaction</b>	<b>% of surveyed mothers</b>
1	Shortage of pediatric medical subspecialists	88.2
2	Lack of medical equipment	71.7
3	Unsatisfactory condition of medical equipment	65.7
4	Lack of essential medicines	60.2
5	Lack of enough qualified pediatric medical specialists	39.8
6	High prices of medicines	36.6
7	Poor laboratory diagnostics	16.5
8	Unsatisfactory organization of health care services	11.4

The results of the survey of medical professionals (Table 5) confirm to a great extent the results of the survey of mothers presented in Table 4 adding one more important position: a lack of nurses, identified by 19.7% of respondents.

*Table 5.* Quality of pediatric health care services in rural regions of Yakutia:  
the main causes of dissatisfaction of medical professionals

<b>№</b>	<b>causes of dissatisfaction</b>	<b>% of surveyed medical professionals</b>
1	Shortage of pediatric medical subspecialists	71.5
2	Unsatisfactory condition of medical equipment	59.0
3	Lack of essential medicines	41.6
4	Shortage of nurses	19.7

A shortage of pediatric medical specialists and nurses together with a lack of medical equipment and unsatisfactory condition of operative equipment, combined with growing numbers of children with health problems is a great challenge for the existing system of health care. As a consequence, many children must travel long distances to Yakutsk or other towns for health care services. The survey shows that many families have no opportunity to travel for care because of: absence/poor conditions of roads (36.2%), financial constraints (34.0%), long travel distances (8 – 10 hours) (23.7%) and a lack of transport (6.1%).

To improve the situation and to alleviate dissatisfaction, mobile groups of pediatric medical professionals were organized in order to help local pediatricians. Almost half (52%) of the surveyed mothers point out that the time allowed for examination by specialists of those groups is too short to be adequate for diagnostics and treatment; 22% and 20% conclude that the set of subspecialists is too small and the wait times to see those specialists are too long.

Alongside the problems of chronic pathology management is the problem of management of acute conditions. In Yakutia, the Center for Disaster Medicine controls the air ambulance, and thus is responsible for evacuation of inhabitants from rural regions in cases of medical emergencies. An analysis of official reports from this center reveals divergent trends for the years 2013-2015

(Table 6). Within those years, the total number of evacuations has slightly increased (2013 vs. 2015: +5%) as a result of more frequent (+76%) evacuations associated with pregnancies and deliveries. This increase cannot be neutralized by the decline in other positions including the number of pediatric and surgical evacuations (-19% and -12% respectively). The decrease in the number of evacuations to regional hospitals (43.4% in 2013 vs 38.4% in 2015) and the corresponding increase in the number of evacuations to Yakutsk can be interpreted as a negative tendency confirming the degradation of regional medicine. Thus, more than 95% of flights associated with pediatric emergencies are now directed not to regional hospitals, but to Yakutsk.

*Table 6.* Main causes of evacuation of the inhabitants of rural regions of Yakutia by air ambulance in years 2013 – 2015

<b>Main causes of evacuation</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
Total number of evacuations	1594	1547	1632
among them particularly:			
- pediatric cases	643	550	521
- pregnancies and deliveries	118	106	208
- surgical cases	418	389	368

**Conclusions.** The findings of the existing pediatric health care services in the Arctic regions of the Republic of Sakha (Yakutia) demonstrate downward, negative trends. These trends include a decrease in the number of hospital beds, poor medical equipment maintenance, and a shortage of qualified medical personnel. These issues contribute to poor health care services which leads to dissatisfaction of families and medical professionals.

One of the approaches to improving health care services is the revision of the existing concept of medical care in the rural areas of the Arctic zone. Our results show that the possibility of a new concept or model of pediatric health care services should be based on the following principles:

1. Wider use of mobile diagnostic medical units,
2. Wider use of web-based information exchange (tele-consultation, medical reports),
3. Special training of health professionals in rural areas,
4. Introduction of automated systems for preventive children's care, and
5. Risk-based optimization for improving the emergency medical system.

This model of health care services must provide an individualization of health care in terms of local regulations as well as different financial supports, taking into account the common pathology profiles for the individual region.

The first step requires the development of federal regulations including standards of care, autonomous institutions and financial capacities.

## References

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