



INFANT MORTALITY IN RUSSIAN FEDERATION AND INFLUENCE ON ITS DYNAMIC FACTORS

© D.O. Ivanov, Yu.S. Aleksandrovich, V.I. Oryol, D.V. Prometnoy

St. Petersburg State Pediatric Medical University, Ministry of Healthcare of the Russian Federation, Russia

For citation: *Pediatrician (St. Petersburg)*, 2017;8(3):5-14

Received: 21.03.2017

Accepted: 26.04.2017

Minimizing infant mortality (IM) is the primary national objective of the Russian Federation. **Aim:** This study aimed to analyze IM indicators in the Russian Federation and identify factors that influence the dynamics of IM. The level of leading regional indicators of socioeconomic development and provision by doctors and hospital beds in the Russian Federation was studied and compared with the similar factors in foreign countries. **Materials:** Official and operative reports of Rosstat for 2011-2016 were assessed. **Results.** The coefficient of IM was 6.0 per 1000 live births in the Russian Federation, and varied from 4.8-9.2 in federal districts. The indicator increased in 2012 in connection with the transition to a new system of newborn registration. The indicator witnessed a permanent decline in 2016 and revealed a negative correlation between the regional bulk products and the coefficient of IM and a positive correlation with the overall IM. However, the relationship among the indicators of IM and the size of the region, the number of highways, the number of patients per one hospital bed or assigned to one doctor could not be established. **Conclusion.** In the Russian Federation, IM is higher than that in developed countries; has permanent tendency to decline; correlates with regional bulk products; does not depend on transport availability, provision with doctors, and hospital beds; and is determined by the organization and the quality of medical care.

Keywords: infant mortality; coefficient of infant mortality; absolute infant mortality; risk factors for infant mortality.

МЛАДЕНЧЕСКАЯ СМЕРТНОСТЬ В РОССИЙСКОЙ ФЕДЕРАЦИИ И ФАКТОРЫ, ВЛИЯЮЩИЕ НА ЕЕ ДИНАМИКУ

© Д.О. Иванов, Ю.С. Александрович, В.И. Орёл, Д.В. Прометной

ФГБОУ ВО «Санкт-Петербургский государственный педиатрический медицинский университет» Минздрава России

Для цитирования: *Педиатр.* – 2017. – Т. 8. – № 3. – С. 5–14. doi: 10.17816/PED835-14

Поступила в редакцию: 21.03.2017

Принята к печати: 26.04.2017

Снижение младенческой смертности (МС) – важная государственная задача. **Цель:** анализ показателей МС, выявление факторов, влияющих на ее динамику путем изучения уровня ведущих региональных индикаторов социально-экономического развития, обеспеченности врачами и стационарными койками и сопоставление показателей Российской Федерации с зарубежными. **Материалы:** официальные и оперативные отчеты Росстата за 2011–2016 гг. **Результаты.** Коэффициент МС в 2016 г. составил 6,0 на 1000 живорожденных и варьировал в федеральных округах от 4,8 до 9,2. В связи с переходом на новую систему регистрации новорожденных показатель увеличился к 2012 г. К 2016 г. наблюдалось его устойчивое снижение. Выявлена отрицательная корреляция величины валового регионального продукта и коэффициента МС и положительная корреляция указанного показателя и абсолютного показателя МС. Не выявлено зависимости между показателями МС и площадью территории, плотностью автодорог с твердым покрытием, количеством человек на 1 койку/1 врача. **Выводы.** МС в Российской Федерации выше, чем в развитых странах мира, имеет устойчивую тенденцию к снижению, коррелирует с величиной валового регионального продукта, не зависит от транспортной доступности и обеспеченности врачами и стационарными койками, определяется организацией и качеством оказания медицинской помощи.

Ключевые слова: младенческая смертность; коэффициент младенческой смертности; абсолютный показатель младенческой смертности; факторы риска младенческой смертности.

BACKGROUND

Reduction of childhood mortality is one of the most important government public health care goals. The majority of child deaths occur during the first year of life: 40% in the early neonatal period and 30% in the post-neonatal period [18]. Approximately 55%-65% of all deaths in the age group 0-14 years are registered among children below the age of one year [7]. The significance of infant mortality (IM) is underlined by its high contribution to overall childhood mortality [4, 9, 14]. IM rate (IMR) is one of the main health indicators that reflect healthcare priorities and performance of social insurance programs [3].

Aim. This study was undertaken to analyze the rate of IM in the Russian Federation and identify the factors that affect its dynamics through an assessment of the main regional indicators of socio-economic development and sufficiency of physicians and hospital beds. A comparison of the evaluated parameters with those in other countries is also conducted and relevant inferences have been drawn.

MATERIALS

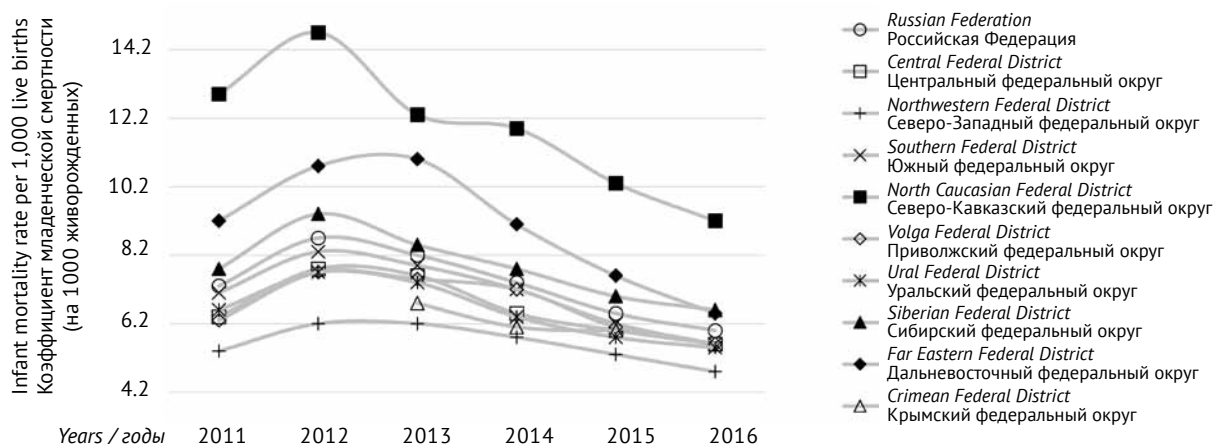
We used official statistical reports and publications of the Russian Federal Statistics Service for 2011-2016.

STATISTICAL ANALYSIS

We conducted a population-based study. Data analysis was performed using the Statistica 10.0 software package (Statsoft Inc., USA). Correspondence of data to normal distribution was not checked. Categorical variables were compared using the Pearson's test, chi-square test, and Fisher's exact test, if one of the values in the contingency table was < 5 . Spearman's correlation coefficient was calculated to examine the correlation between variables. Differences associated with p values ≤ 0.05 were considered statistically significant.

RESULTS

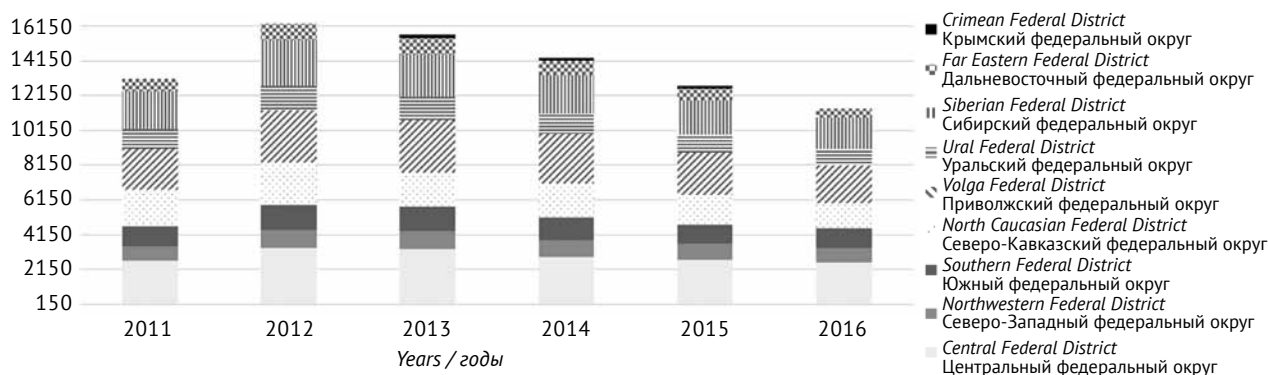
Overall IMR in Russia in 2016 was 6.0 per 1,000 live births; IMR ranged from 4.8 in the Northwestern Federal District to 9.2 in the North Caucasian Federal District (Figure 1). An increase in IM was observed during



Districts	Years					
	2011	2012	2013	2014	2015	2016
Russian Federation	7.3	8.7	8.2	7.4	6.5	6.0
Central Federal District	6.4	7.8	7.6	6.5	6.0	5.6
Northwestern Federal District	5.4	6.2	6.2	5.8	5.3	4.8
Southern Federal District	7.1	8.3	7.9	7.2	6.2	5.6
North Caucasian Federal District	12.9	14.7	12.3	11.9	10.3	9.2
Volga Federal District	6.3	7.7	7.5	7.2	6.1	5.6
Ural Federal District	6.6	7.7	7.4	6.4	5.8	5.5
Siberian Federal District	7.8	9.4	8.5	7.8	7.0	6.6
Far Eastern Federal District	9.2	10.8	11.0	9.1	7.6	6.5
Crimean Federal District	–	–	6.8	6.1	6.0	–

Fig. 1. Infant mortality rate in 2011-2016 and its dynamics in different federal districts

Рис. 1. Коэффициент младенческой смертности за 2011–2016 гг. и его динамика по федеральным округам



Districts	Years					
	2011	2012	2013	2014	2015	2016
Russian Federation	13,136	16,291	15,477	14,322	12,714	11,421
Central Federal District	2649	3401	3343	2889	2732	2566
Northwestern Federal District	847	1022	1033	985	916	827
Southern Federal District	1155	1440	1379	1277	1116	1140
North Caucasian Federal District	2122	2432	2011	1967	1665	1441
Volga Federal District	2335	2997	2977	2836	2427	2164
Ural Federal District	1138	1396	1352	1176	1068	960
Siberian Federal District	2129	2669	2428	2227	1954	1782
Far Eastern Federal District	761	934	954	788	659	541
Crimean Federal District	–	–	191	177	177	–

Fig. 2. Absolute numbers of infant deaths in the Russian Federation during 2011-2016 and its accumulation in different federal districts

Рис. 2. Абсолютный показатель младенческой смертности в Российской Федерации за 2011–2016 гг. и его накопление по федеральным округам

2012 in all federal districts; in 2013 IM continued to increase in the Far Eastern Federal District, whereas it stabilized in the Northwestern Federal District. Since 2013 a steady decline of IM has been recorded. The North Caucasian and Far Eastern Federal Districts demonstrated the highest IM during the period under study (except for 2016, when the Siberian Federal District had higher IM than the Far Eastern Federal District); the lowest IM was observed in the Northwestern Federal District. A total of 11,421 children in the < 1 year age-group died in the Russian Federation during 2016 (Figure 2). The highest number of deaths was registered in the Central and Volga Federal Districts, while the lowest index was registered in the Far Eastern and Northwestern Federal Districts.

The Central, Volga, and Siberian Federal Districts assumed leading positions in terms of the absolute number of deaths during 2011-2016. The lowest number of infant deaths was registered in the Far Eastern and Northwestern Federal Districts. We found an increase in the number of infant deaths by 2012 and a decline by 2016.

The number of districts with IMR of 10-15 per 1,000 live births decreased from 11 (13.3%) in 2011 and 16 (19%) in 2012 to 4 (4.7%) in 2016 (newborns with birth weight < 1,000 g were considered only if they survived > 168 hours). The number of districts with IMR ≤ 5 also increased from 4 (4.8%) in 2012 to 13 (14.9%) in 2015, and 18 (21.2%) in 2016 (*p* = 0,001) (Table 1, Figure 3).

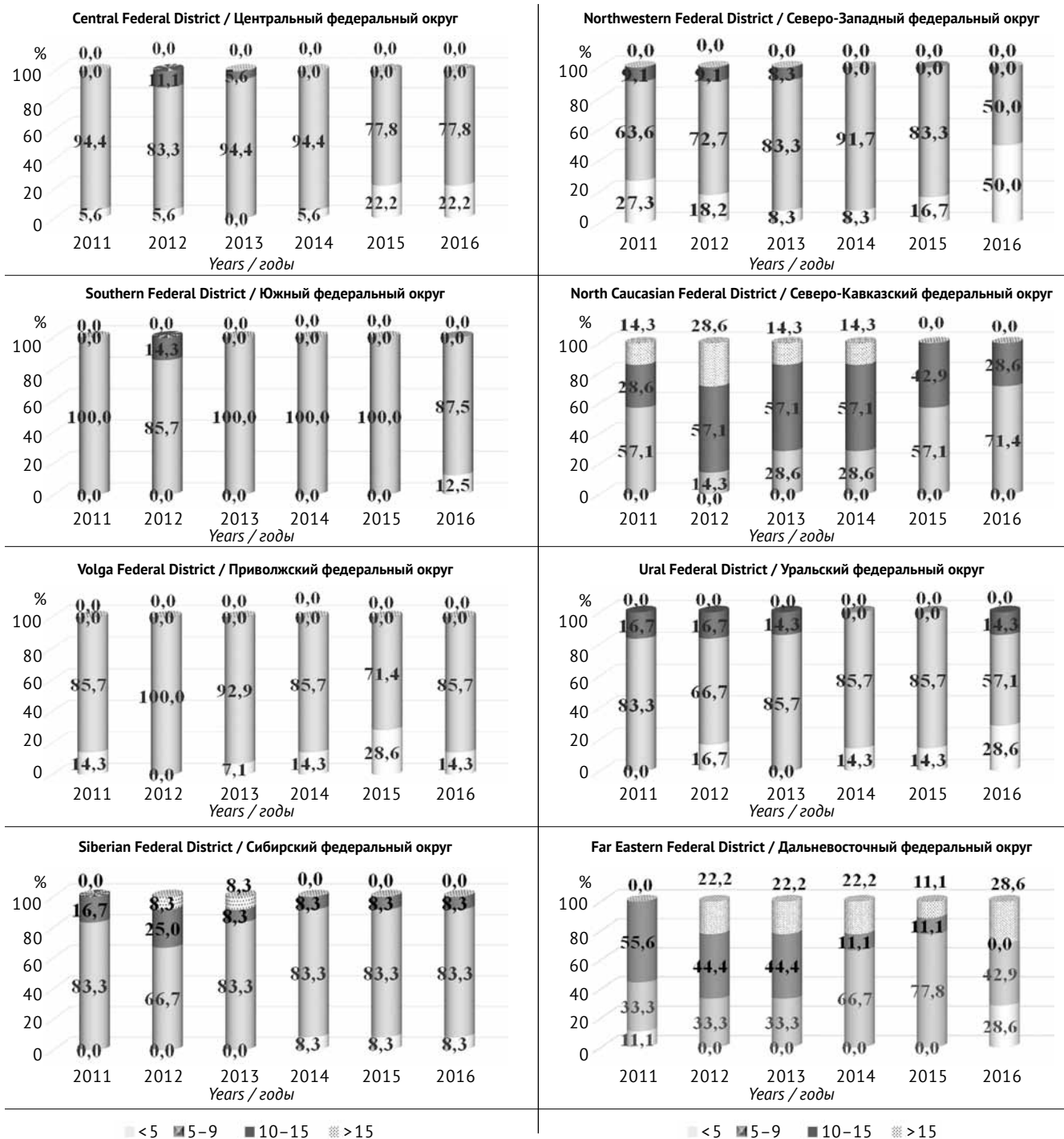


Fig. 3. Distribution of federal districts based on infant mortality rate (per 1,000 live births)
Рис. 3. Распределение субъектов федеральных округов по уровню коэффициента младенческой смертности (на 1000 живорожденных)

A statistically significant correlation was observed between the value of gross regional product and IM: negative correlation between IMR and gross national product and a positive correlation between the absolute number of infant deaths and gross national product (Tables 2 and 3).

In the Russian Federation, patients are primarily transported to the in-patient dpts by ambulance cars. Therefore, we used the density of paved roads as a proxy indicator of inpatient care availability. We found no correlation of IM with inpatient care availability or the size of the region.

Table 1

Distribution of federal districts based on infant mortality rate

Таблица 1

Распределение субъектов Российской Федерации по уровню коэффициента младенческой смертности

IMR (per 1,000)	Number of districts of the Russian Federation												$P_{11,12}$	$P_{12,16}$	$P_{11,16}$
	2011		2012		2013		2014		2015		2016				
	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%			
> 15	1	1.2	5	6.0	4	4.6	3	3.4	1	1.1	2	2.4	0.108	0.217	0.509
10–15	11	13.3	16	19.0	12	13.8	6	6.9	5	5.7	4	4.7	0.309	0.003*	0.046*
5–9	64	77.1	59	70.2	69	79.3	72	82.8	68	78.2	61	71.8	0.314	0.827	0.428
< 5	7	8.4	4	4.8	2	2.3	6	6.9	13	14.9	18	21.2	0.261	0.001*	0.020*
Total	83	100.0	84	100.0	87	100.0	87	100.0	87	100.0	85	100.0	–	–	–

Примечание: МС — младенческая смертность; * достоверно различающиеся значения; ^{11,12,16} соответствующие годы 2011, 2012, 2016.
Note: IMR – infant mortality rate; * statistically significant difference; ^{11,12,16} respective years 2011, 2012, 2016

Table 2

Correlation between infant mortality and socio-economic development in federal districts during 2011-2015

Таблица 2

Корреляция между показателями младенческой смертности и отдельными показателями социально-экономического развития федеральных округов за 2011–2015 гг.

Infant mortality	Years														
	2011			2012			2013			2014			2015		
	Gross regional product	Size of the area	Density of paved roads	Gross regional product	Size of the area	Density of paved roads	Gross regional product	Size of the area	Density of paved roads	Gross regional product	Size of the area	Density of paved roads	Gross regional product	Size of the area	Density of paved roads
Absolute number of infant deaths	0.677*	0.175	0.061	0.694*	0.155	0.179	0.718*	0.154	0.184	0.702*	0.111	0.210	0.724*	0.114	0.222*
IMR	-0.262*	0.253*	-0.197	-0.286*	0.119	-0.098	-0.341*	0.132	-0.186	-0.345*	0.061	-0.133	-0.351*	-0.019	-0.051

Примечание: *статистически значимый коэффициент корреляции.
Note: * statistically significant correlation coefficient, IMR—infant mortality rate

Table 3

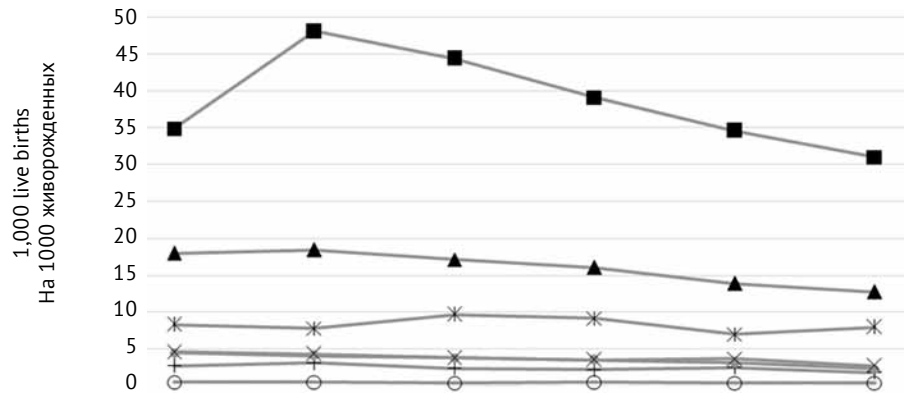
Correlation between infant mortality and socio-economic development in federal districts during 2011-2015

Таблица 3

Корреляция между показателями младенческой смертности и отдельными показателями социально-экономического развития субъектов Российской Федерации за 2011–2015 гг.

Infant mortality	Years														
	2011			2012			2013			2014			2015		
	Gross regional product	Size of the area	Density of paved roads	Gross regional product	Size of the area	Density of paved roads	Gross regional product	Size of the area	Density of paved roads	Gross regional product	Size of the area	Density of paved roads	Gross regional product	Size of the area	Density of paved roads
Absolute number of infant deaths	0.677*	0.175	0.061	0.694*	0.155	0.179	0.718*	0.154	0.184	0.702*	0.111	0.210	0.724*	0.114	0.222*
IMR	-0.262*	0.253*	-0.197	-0.286*	0.119	-0.098	-0.341*	0.132	-0.186	-0.345*	0.061	-0.133	-0.351*	-0.019	-0.051

Примечание: *статистически значимый коэффициент корреляции.
Note: * statistically significant correlation coefficient; IMR, infant mortality rate



Disease	Years	2011	2012	2013	2014	2015	2016 (11 months)
—+— infectious and parasitic diseases including:		2.7	3.1	2.4	2.2	2.5	1.8
—●— respiratory tract diseases		4.5	4.1	3.8	3.5	3.1	2.3
—○— gastrointestinal diseases		0.5	0.5	0.4	0.5	0.4	0.4
—▲— congenital abnormalities		18	18.5	17.2	16.1	13.9	12.8
—■— conditions occurring in the perinatal period		34.9	48.1	44.4	39.1	34.6	31
—×— external causes of death		4.6	4.3	3.8	3.5	3.7	2.7
—*— other diseases		8.3	7.8	9.7	9.2	7	8

Fig. 4. Infant mortality rate in the Russian Federation, disaggregated by the cause of death and its dynamics during 2011-2016
Рис. 4. Коэффициент младенческой смертности по причинам смерти на территории Российской Федерации и его динамика в 2011 г. и 11 месяцев 2016 г.

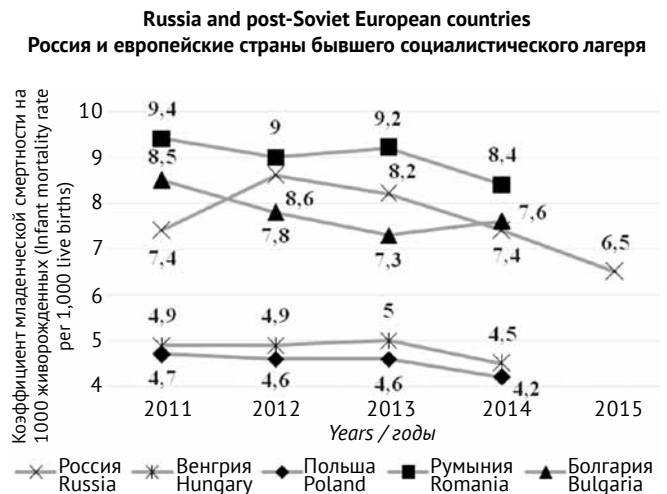
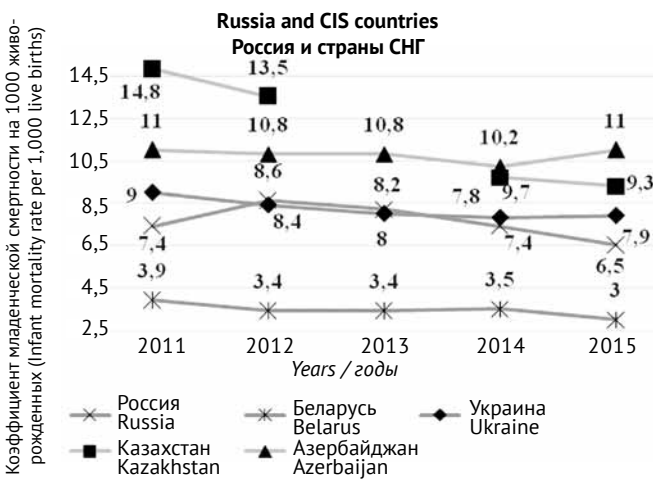


Fig. 5. Infant mortality rate in the Russian Federation and other countries at different levels of economic development
Рис. 5. Сравнение величин коэффициента младенческой смертности в Российской Федерации и странах различного уровня экономического развития

Congenital and chromosomal abnormalities were the most frequent causes of deaths during the perinatal period (Figure 4). We observed an increase in the number of perinatal deaths in 2012 and a decline by 2016. The speed of changes in IM associated with congenital and chromosomal abnormalities was significantly higher compared to changes in IM owing to other reasons.

Among the countries of the Commonwealth of Independent States (CIS), the lowest IMR in 2015 was observed in Belarus, 3 per 1,000 live births. Other CIS countries had implemented the system of birth registration recommended by WHO prior to 2012. IM in Russia was higher than that in other post-Soviet states: >1.5-fold higher than that in Poland and Hungary, 2.2-fold higher than that in Finland (for 2014), 1.5-fold higher than that in Germany and Austria, and 22% higher than that in the USA.

The sufficiency of medical care was estimated by the number of doctors and hospital bed for 1 person. None of the countries used for comparative analysis reported a correlation between the IM and the sufficiency of medical care (with the exception of USA due to lack of data). In Finland (which has the lowest IMR), the provision with physicians during 2011-2013 varied between 331 and 335, whereas in Russia during 2011-2015 their number varied between 195 and 218; the provision with hospital beds varied from 181-221 and 106-120 per person in Finland and Russia respectively. In Kazakhstan and Azerbaijan the number of physicians in 2011-2015 was 253-266 and 290-295 respectively; the provision with hospital beds was 142-172 and 204-215, i. e., these parameters were similar to those in Russia, while the IMR was significantly higher in these countries. These data seem to suggest that the availability of medical personnel and hospital beds does not affect the level of IM in the country.

DISCUSSION

The increase in IM observed in the Russian Federation in 2012 is associated with the implementation of a new birth registration system comparable to the international one, which was a significant breakthrough for the national health care [3].

We identified a negative correlation (from mild to moderate) between IMR and the value of the gross regional product, which may indicate relatively small impact of the economic level on IM. However, from 2011 to 2015, the correlation coefficient showed a gradual increase from $|0.262|$ to $|0.351|$, which suggests a growing impact of economic factors on the IMR. The moderate positive correlation between the absolute number of infant deaths and the gross re-

gional product observed in the study is likely attributable to the larger number of young people who tend to reside in the economically prosperous regions, and therefore, to a larger amount of births eventually. High frequency of deaths indicates relatively “low quality” of the product of conception. Thus, IM is considered a medico-social, rather than just a medical problem [5, 6, 10].

“The decrease in IM is associated with improved availability of medical equipment in obstetric hospitals, development of neonatologic services, implementation of internationally-accepted treatment protocols, and the establishment of regional perinatal networks. However, the rate of reduction in postneonatal mortality is slower; during 2011-2016 the perinatal mortality associated with congenital and chromosomal abnormalities demonstrated the most rapid decrease, whereas the mortality associated with respiratory system disorders and infections in children over 1 month of age showed a significantly slower decline. Such dissonance is probably attributable to existing differences in the pace of development of neonatal and pediatric services, which contributes to delayed mortality, when critically ill newborns undergo prolonged, costly treatment in neonatal units and eventually die in pediatric facilities due to improper emergency medical care. In 2014, this problem encouraged the authorities of the Rostov region to start a project entitled ‘Audit of children’s hospitals’ coordinated by the Ministry of Health of the Russian Federation and administrative bodies of Rostov region with the involvement of experts from WHO, Scientific Center of Children’s Health (Moscow), medical institutions of the region, and specialists from the Rostov State Medical University. The project had the following objectives: assessment of the existing status of children’s emergency care and readiness of medical facilities; analysis of pediatricians’ adherence to Federal Clinical Guidelines (treatment protocols); identification of the main ‘hot points’ and planning for immediate and long-term actions to address these. Off-site analysis of patient medical records, quarterly on-site monitoring of changes in the quality of diagnosis made and treatment, improving the skills of doctors and nurses by providing regular one-day trainings using mannequin simulators and subsequent monitoring of performance were some of the key activities undertaken as part of the project.

In addition to this project, the regional government implemented various measures to improve pediatric intensive care, including compulsory rapid (within 2 hours) reporting of all hospitalized children aged 1 month-18 years to the specialists of the Intensive

Care and Advisory Centre (ICAC), joint decision-making on the management of such patients and organization of an ICAC specialists visit to a hospital when necessary. As a result the proportion of children who died in primary healthcare units showed a significant decrease: from 52.9% (37 out of 70) in the first half of 2015 to 33.8% (22 out of 65; $p = 0.026$) in the first half of 2016. The rate of postneonatal mortality reduced from 3.6 per 1,000 live births in 2013 to 3.3 in 2014, 2.3 in 2015, and 3.0 in 2016. A decline in the postneonatal mortality contributed to the decrease in IM: from 9.6 per 1,000 live births in 2013 to 7.9 in 2014 and 6.6 in 2015, 2016.

It is essential that the results were achieved using only the internal resources of healthcare institutions and with no significant additional expenditures. These internal resources were saved by optimizing the system of drug administration, discouraging the use of expensive medications with unproven efficacy and unnecessary investigations (tests with low diagnostic value), ensuring comprehensive control of children in reanimation units, and provision of timely intensive/emergency care with the involvement of specialized healthcare facilities [8, 12, 13, 15]. Establishment of an effective intensive/emergency care is a powerful tool to reduce the number of deaths in children [1, 2, 16, 17].

REFERENCES

1. Александрович Ю.С., Пшениснов К.В., Паршин Е.В., и др. Роль реанимационно-консультативных центров в снижении младенческой смертности // *Анестезиология и реаниматология*. – 2009. – № 1. – С. 48–51. [Aleksandrovich YuS, Pshenisnov KV, Parshin EV, et al. Rol' reanimatsionno-konsul'tativnykh tsentrov v snizhenii mladencheskoy smertnosti. *Anesteziologiya i reanimatologiya*. 2009;(1):48-51. (In Russ.)]
2. Александрович Ю.С., Пшениснов К.В. Сердечно-легочная реанимация в педиатрической практике: основы и изменения 2015 года // *Педиатр*. – 2016. – Т. 7. – № 1. – С. 5–15. [Aleksandrovich YuS, Pshenisnov KV. Resuscitation in Pediatric Practice: Leading Changes of 2015. *Pediatr*. 2016;7(1):5-15. (In Russ.)]
3. Альбицкий В.Ю., Терлецкая Р.Н. Младенческая смертность в Российской Федерации в условиях новых требований к регистрации рождения. – М.: ПедиатрЪ, 2016. – 88 с. [Al'bitskiy VYu, Terletskaia RN. Infant Mortality in Russian Federation in the Conditions of the New Requirements to Registration of Birth. Moscow: *Pediatr*; 2016: 88 p. (In Russ.)]
4. Боброва И.Н., Перепелкина Н.Ю. Анализ показателей младенческой смертности в субъекте Российской Федерации (десятилетнее наблюдение) // *Медицинский альманах*. – 2010. – № 4. – С. 40–42. [Bobrova IN, Perepelkina NYu. Analiz pokazateley mladencheskoy smertnosti v sub'ekte Rossiyskoy Federatsii (desyatiletnee nablyudenie). *Meditsinskiy al'manakh*. 2010;(4):40-42 (In Russ.)]
5. Веселов Н.Г. Социальная педиатрия. Актуальные проблемы. – Уфа: РИО, 1992. – 192 с. [Veselov NG. Sotsial'naya pediatriya. Aktual'nye problemy. Ufa: RIO; 1992. 192 p. (In Russ.)]
6. Иванов Д.О., Орёл В.И. Современные особенности здоровья детей мегаполиса // *Медицина и организация здравоохранения*. – 2016. – Т. 1. – № 1. – С. 6–11. [Ivanov DO, Orel VI. Contemporary Features of Health of Megapolis' Children. *Meditsina i organizatsiya zdravookhraneniya*. 2016;1(1):6-11. (In Russ.)]
7. Ильин А.Г., Романова Т.А., Акиншин В.И., и др. Анализ младенческой смертности в Белгородской области за 2005–2007 гг. // *Вопросы современной педиатрии*. – 2008. – Т. 7. – № 3. – С. 125. [Il'in AG, Romanova TA, Akin'shin VI, et al. Analiz mladencheskoy smertnosti v Belgorodskoy oblasti za 2005-2007 gg. *Voprosy sovremennoy pediatrii*. 2008;7(3):125. (In Russ.)]
8. Куличенко Т.В., Байбарина Е.Н., Баранов А.А., и др. Оценка качества стационарной помощи детям в регионах Российской Федерации // *Вестник Российской академии медицинских наук*. – 2016. – Т. 71. – № 3. – С. 214–223. [Kulichenko TV, Baybarina EN, Baranov AA, et al. Assessment of In-hospital Care to Children in Russian Federation' Regions. *Vestnik Rossiyskoy akademii meditsinskikh nauk*. 2016;71(3):214-223. (In Russ.)]
9. Мавропуло Т.К., Иванов Д.О., Сурков Д.Н., Фот А.Ю. Особенности оказания неотложной и реанимационной помощи новорожденным, родившимся в 22–27 недель гестации // *Детская медицина Северо-Запада*. – 2012. – Т. 3. – № 2. – С. 4–13. [Mavropulo TK, Ivanov DO, Surkov DN, Fot AY. Osobennosti okazaniya neotlozhnoy i reanimatsionnoy pomoshchi povorozhdennym, rodivshimsya v 22-27 nedel' gestatsii. *Detskaya meditsina Severo-Zapada*. 2012;3(2):4-13. (In Russ.)]
10. Орёл В.И., Ким А.В., Серeda В.М., и др. Служба охраны здоровья матери и ребенка Санкт-Петербурга в 2015 году. – СПб.: СПбГПМУ, 2016. [Orel VI, Kim AV, Sereda VM, et al. The Service of Maternal and Children Care of St. Petersburg in 2015. Saint Petersburg: SPbGPMU; 2016. (In Russ.)]
11. Орёл В.И., Чолоян С.Б., Серeda В.М., и др. Клинико-экономические особенности профилактической работы с детьми до трех лет // *Вестник Росздравнадзора*. – 2016. – № 3. – С. 55–61. [Orel VI, Choloyan SB, Sereda VM, et al. Clinical and Epidemiological

- Features of Prophylactic Work in Children. *Vestnik Roszdravnadzora*. 2016;(3):55-61. (In Russ.)
12. Пискунова С.Г., Шаршов Ф.Г., Приходько Н.Н., Прометной Д.В. Областная детская клиническая больница в системе оказания реанимационно-консультативной помощи детям на территории Ростовской области. Материалы конференции к 50-летию РДКБ Республики Адыгея, Майкоп, 2016. – С. 81–85. [Piskunova SG, Sharshov FG, Prikhod'ko NN, Prometnoy DV. Regional Pediatric Teaching Hospital in the System of Intensive Therapy Consultative Care to Children in the Territory of Rostov Oblast. (conference proceedings) Майкоп; 2016. P. 81-85. (In Russ.)]
 13. Пискунова С.Г., Шаршов Ф.Г., Прометной Д.В., и др. Анализ эффективности оптимизированной системы реанимационно-консультативного обеспечения оказания экстренной медицинской помощи детям на территории Ростовской области // Педиатр. – 2017. – № 1. – С. 74–81. [Piskunova SG, Sharshov FG, Prometnoy DV, et al. Analiz effektivnosti optimizirovannoy sistemy reanimatsionno-konsul'tativnogo obespecheniya okazaniya ekstrennoy meditsinskoй pomoshchi detyam na territorii Rostovskoy oblasti. *Pediatr.* 2017(1):74-81. (In Russ.)]
 14. Прометной Д.В., Спиридонова Е.А., Румянцев С.А., и др. Смертность детского населения в Ростовской области // Эпидемиология и инфекционные болезни. Актуальные вопросы. – 2014. – № 6. – С. 63–68. [Prometnoy DV, Spiridonova EA, Rumyantsev SA, et al. Smertnost' detskogo naseleniya v Rostovskoy oblasti. *Epidemiologiya i infektsionnye bolezni. Aktual'nye voprosy*. 2014(6):63-68. (In Russ.)]
 15. Чернозубенко А.В., Прометной Д.В., Шаршов Ф.Г., Прометная Г.А. Качество экстренной стационарной медицинской помощи детям с тяжелой механической травмой в стационарах педиатрического и непедиатрического профиля: результаты ретроспективного когортного исследования // Вопросы современной педиатрии. – 2016. – Т. 15. – № 4. – С. 379–384. [Chernozubenko AV, Prometnoy DV, Sharshov FG, Prometnaya GA. Quality of Urgent In-hospital Medical Care to Children with Severe Mechanical Trauma in Pediatric and Non-Pediatric Hospitals: Results of retrospective Cohort Study. *Voprosy sovremennoy pediatrii*. 2016;15(4):379-384. (In Russ.)]
 16. Шаршов Ф.Г., Спиридонова Е.А., Румянцев С.А., и др. Оказание реанимационно-консультативной помощи детям на территории Ростовской области // Российский вестник детской хирургии, анестезиологии и реаниматологии. – 2011. – № 3. – С. 19–26. [Sharshov FG, Spiridonova EA, Rumyantsev SA, et al. Okazanie reanimatsionno-konsul'tativnoy pomoshchi detyam na territorii Rostovskoy oblasti. *Rossiyskiy vestnik detskoy khirurgii, anesteziologii i reanimatologii*. 2011(3):19-26. (In Russ.)]
 17. Юнусов Д.И., Пшениснов К.В., Миронов П.И., Александрович Ю.С. Роль реанимационно-консультативных центров при оказании помощи детям с тяжелой травмой // Скорая медицинская помощь. – 2016. – Т. 17. – № 1. – С. 15–19. [Yunusov DI, Pshenisnov KV, Mironov PI, Aleksandrovich YuS. Role of Intensive Care Consultative Centers in Medical Care to Children with Severe Trauma. *Skoraya meditsinskaya pomoshch'*. 2016;17(1):15-19. (In Russ.)]
 18. Rajaratnam JK, Marcus JR, Flaxman AD, et al. Neonatal, postneonatal, childhood, and under-5 mortality for 187 countries, 1970-2010: A systematic analysis of progress towards Millennium Development Goal 4. *Lancet*. 2008;375.

◆ Information about the authors

Dmitry O. Ivanov – MD, PhD, Dr Med Sci, Professor, Rector, Chief Neonatologist, Ministry of Healthcare of the Russian Federation. St Petersburg State Pediatric Medical University, Ministry of Healthcare of the Russian Federation, Saint Petersburg, Russia. E-mail: doivanov@yandex.ru.

Vasily I. Oryol – MD, PhD, Dr Med Sci Professor, Head. Department of Social Pediatrics and Public Health Organisation and AF and DPO. St Petersburg State Pediatric Medical University, Ministry of Healthcare of the Russian Federation, Saint Petersburg, Russia. E-mail: viorel56@list.ru.

◆ Информация об авторах

Дмитрий Олегович Иванов – д-р мед. наук, профессор, и. о. ректора ФГБОУ ВО «СПбГПМУ» Минздрава России, главный неонатолог МЗ РФ. ФГБОУ ВО «Санкт-Петербургский государственный педиатрический медицинский университет» Минздрава России, Санкт-Петербург. E-mail: doivanov@yandex.ru.

Василий Иванович Орёл – д-р мед. наук, профессор, заведующий, кафедра социальной педиатрии и организации здравоохранения ФП и ДПО. ФГБОУ ВО «Санкт-Петербургский государственный педиатрический медицинский университет» Минздрава России, Санкт-Петербург. E-mail: viorel56@list.ru.

◆ Information about the authors

Yuri S. Alexandrovich – MD, PhD, Dr Med Sci, Professor, Head. Department of Anesthesiology and Intensive Care and Emergency Pediatrics Faculty of Postgraduate Education. St Petersburg State Pediatric Medical University, Ministry of Healthcare of the Russian Federation, Saint Petersburg, Russia. E-mail: Jalex1963@mail.ru.

Dmitriy Vladimirovich Prometnoy – MD, PhD, Associate Professor. Department of Anesthesiology and Intensive Care and Emergency Pediatrics. St Petersburg State Pediatric Medical University, Ministry of Healthcare of the Russian Federation, Saint Petersburg, Russia. E-mail: Jalex1963@mail.ru.

◆ Информация об авторах

Юрий Станиславович Александрович – д-р мед. наук, профессор, заведующий кафедрой анестезиологии-реаниматологии и неотложной педиатрии ФП и ДПО. ФГБОУ ВО «Санкт-Петербургский государственный педиатрический медицинский университет» Минздрава России, Санкт-Петербург. E-mail: Jalex1963@mail.ru.

Дмитрий Владимирович Прометной – канд. мед. наук, доцент кафедры анестезиологии и реаниматологии. ФГБОУ ВО «Санкт-Петербургский государственный педиатрический медицинский университет» Минздрава России, Санкт-Петербург. E-mail: Jalex1963@mail.ru.