Evaluating the effectiveness of funding for the state health care development program

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Abstract. Currently, assessing the effectiveness of financing government program is a topical issue in theory and practice, since the level of health care development is directly related to the level of socio-economic development of the region. The goal of the research is development of methodological tools for efficiency assessment of the implementation of government program in the health sector, focused on quality improvement of life of the population. The methodological basis of the research is general scientific methods of comparison, analysis, synthesis, tabular representation of data. The methodological toolkit has been tested using official data from the Federal State Statistics Service of the Russian Federation, the Ministry of Finance of the Russian Federation for 2018-2019. The result of the work is development of distribution matrix of Russia's regions for certain segments. The aim of the distribution is ranking regions and makes it possible to identify subjects with a high, medium and low level of effectiveness of program implementation.
Keywords: assessment of financing effectiveness, distribution matrix, efficiency degree, segmentation of regions, normalized indicator

1 Introduction

In order to increase life expectancy, improve health and reduce mortality from the most significant diseases by ensuring access to medical care and improving the effectiveness of medical services, the Government of the Russian Federation has developed the State Program "Development of Healthcare" (implementation period: 2018-2024). The goal of the state program is to improve the quality and accessibility of medical care, drug supply, and guarantee sanitary and epidemiological well-being. The results of the implementation of the State program should be a number of indicators with specific values of statistical indicators distributed over the years, such as: mortality of working-age population, mortality from circulatory system diseases, mortality from neoplasms, including malignant and infant mortality, life expectancy at birth, population satisfaction with the quality of medical care, life expectancy. In Russia the legal foundations for the development and evaluation of state programs are laid within the framework of the strategy for increasing the efficiency of budget expenditures. The President of the Russian Federation called state programs "the key mechanism by which strategic and budgetary planning are linked".

Today, there remains uncertainty about how to assess the final effect of the implementation of programs and their linkage to other planning documents. Aspects of the implementation of state programs have been reflected in a number of scientific studies [1-2, 7-18]. The effectiveness of the application of programs in the Russian Federation is ambiguous.

In this regard, it seems relevant to develop a methodological tool to assess the effectiveness of the State program for the development of health care as the basis of its financing policy.

2 Methods

The first stage of the study includes the selection of significant statistical information that allows us to form a system of indicators, which characterizes the resource provision of the regions (hereinafter – financial and resource provision), as well as the results that allow us to assess the compliance with the target standards of the quality of life (hereinafter – results) (Table 1).

Table 1. System of indicators to evaluate the effectiveness of the state program

Name		**The main indicators characterizing the resource support and results to assess the effectiveness of the state program**	**Characteristics of indicators**
Results		Total fertility rate	maximization of the indices
		Total mortality rate	minimization of the indices
		Mortality in the working age population	minimization of the indices
		Life expectancy at birth	maximization of the indices
		Morbidity per 1,000 people	minimization of the indices
Financial and resource provision	Financial support	Revenues of territorial fund of obligatory medical insurance per capita	maximization of the indices
		The ratio of revenues of the territorial fund for compulsory health insurance to the expenditures of the compulsory health insurance fund	minimization of the indices
		Ratio of consolidated budget revenues to consolidated budget expenditures	minimization of the indices
		Share of consolidated budget revenues in GRP per capita	maximization of the indices
	Human resources	The number of nursing staff per 10,000 people	maximization of the indices
		Number of doctors per 10,000 people	maximization of the indices
	Bed capacity and outpatient capacity	Hospital beds per 10,000 people	maximization of the indicators
		Capacity of outpatient and polyclinic organizations 10,000 people	maximization of the indicators

Source: compiled by the authors based on data from the Ministry of Finance of the Russian Federation and the Federal State Statistics Service

The second stage involves rationing. The calculated indicators can have different dimensionality, importance, or weighting. In this regard, the authors used a method based on the linear transformation of the initial indicators: the values will lie in a given interval from 0 to 1. These transformations will make it possible to get away from dimensionality, while preserving the structure of changes in individual indicators, which allows us to compare them in the future.

In the process of rationing the indicators are classified for the purpose of their further distribution into groups.

1st group – the growth of indicators indicates an increase in the effectiveness of the state program;

2nd group – an increase in indicators characterizes the deterioration of one or another feature of health care.

Formulas for calculating the totals for both groups are presented in Table 2.

Table 2. Normalized indicators for groups formed on the basis of the goals of maximization and minimization of their values

Group number	Desired trend of indicator values	Formula for calculating the totals
1	Minimization of the indicators	$I_{ij}^{*} = \frac{I_{ij} - I_{i\,min}}{I_{i\,max} - I_{i\,min}}$
2	Maximization of the indicators	$I_{ij}^{*} = \frac{I_{i\,max} - I_{ij}}{I_{i\,max} - I_{i\,min}}$

Where I_{ij} is the estimated value of the *i*-th indicator of the system in the *j*-th region, and I_{ij}^{*} is the normalized value of the *i*-th main indicator in the *j*-th region. $K_{i\,max}$ I_{imax} и I_{imin} is the highest and lowest calculated values of the *i*-th indicator.

The third stage involves the calculation of the final normalized index according to the formula (1):

$$I_j^{norm} = \sum_{i=1}^{n} I_{ij}^{*} \text{ККФ}_j^{\text{норм}} = \sum_{i=1}^{n} \text{К}_{ij}. \quad (1)$$

In rationing we come to the final normalized indicators of resource provision for each region.

Then the regions are ranked according to the values of the final normalized indicators I_j^{norm}, whereby the highest level is assigned to the region with the lowest value.

3 Results and discussion

Based on the proposed methodology, empirical calculations were made using the sources [15-18], the results of which are presented in Table 3.

Table 3. Distribution of regions by levels of resource provision and achievement of results for the period of 2018 and 2019

Region	Total normalized resource indicator	Level (FRP 1-FRP 3)	Total normalized result indicator	Level (P1 – P3)
Regions with a high level of resources and high results				
Moscow	3,5587	FRP 1	2,0474	P1
St. Petersburg	3,1005	FRP 1	2,6870	P1
Republic of Sakha (Yakutia)	3,0949	FRP 1	2,6803	P1
Republic of Tuva	3,5128	FRP 1	2,5082	P1
Khanty-Mansi Autonomous Okrug – Yugra	4,0263	FRP 1	2,1903	P1
Regions with a high level of resources and an average level of achievement of results				
The Kamchatka Region	3,4880	FRP 1	3,1751	P2
The Moscow Region	4,0629	FRP 1	2,8172	P2
The Murmansk Region	3,9574	FRP 1	3,2670	P2
…				
Regions with a high level of resources and a low level of achievement of results				
The Arkhangelsk Region	3,8454	FRP 1	3,5280	P3
The Jewish Autonomous Region	3,9821	FRP 1	3,5954	P3
The Irkutsk region	3,9489	FRP 1	3,6041	P3
…				
Regions with an average level of resources and high results				
The Astrakhan Region	4,7797	FRP 2	2,5646	P1
The Republic of Kalmykia	4,6272	FRP 2	2,5120	P1
Republic of North Ossetia – Alania	4,3107	FRP 2	2,1631	P1
…				
Regions with an average level of resources and an average level of achievement of results				
The Volgograd region	4,7556	FRP 2	2,9777	P2
The Republic of Bashkortostan	4,3633	FRP 2	3,1284	P2
The Republic of Crimea	4,7901	FRP 2	2,9903	P2
…				
Regions with an average level of resources and a low level of achievement of results				
The Altai Kray	4,3710	FRP 2	3,7270	P3
The Ivanovo Region	4,9577	FRP 2	3,7828	P3
The Nizhny Novgorod Region	4,3348	FRP 2	3,5133	P3
…				
Regions with a low level of resources and a high level of achievement of results				
The Kabardino-Balkar Republic	5,1145	FRP 3	1,7421	P1
The Republic of Dagestan	5,6755	FRP 3	1,2324	P1
The Chechen Republic	5,6340	FRP 3	0,6035	P1
…				
Regions with a low level of resources and an average level of achievement of results				
Krasnodar Krai	5,2456	FRP 3	2,7759	P2
The Leningrad region	5,5356	FRP 3	3,1639	P2
The Republic of Mari El	5,0733	FRP 3	3,2812	P2
…				
Regions with low levels of resources and low levels of achievement of results				

The Amur region	5,2085	FRP 3	3,7885	P3
The Vologda Region	5,2773	FRP 3	3,5751	P3
The Tver Region	5,0406	FRP 3	3,8087	P3

Source: Authors' calculations

FRP 1 is high level of financial and resource provision,

FRP 2 is average level of financial and resource provision,

FRP 3 is low level of financial and resource provision.

P1 is the high level of achievement of the results of the state program,

P2 is the average level of achievement of the results of the state program,

P3 is low level of achievement of the results of the state program.

Further, a matrix of the distribution of the analyzed regions of the Russian Federation by the totality of values of indicators of the level of financial and resource support and the level of achievement of the results of the state program (the abscissa axis indicates levels of financial and resource support, the ordinate axis – levels of achievement of the results) was formed. The matrix is presented in Figure 1.

The proposed methodology allows for the distribution of the regions of the Russian Federation into specific segments.

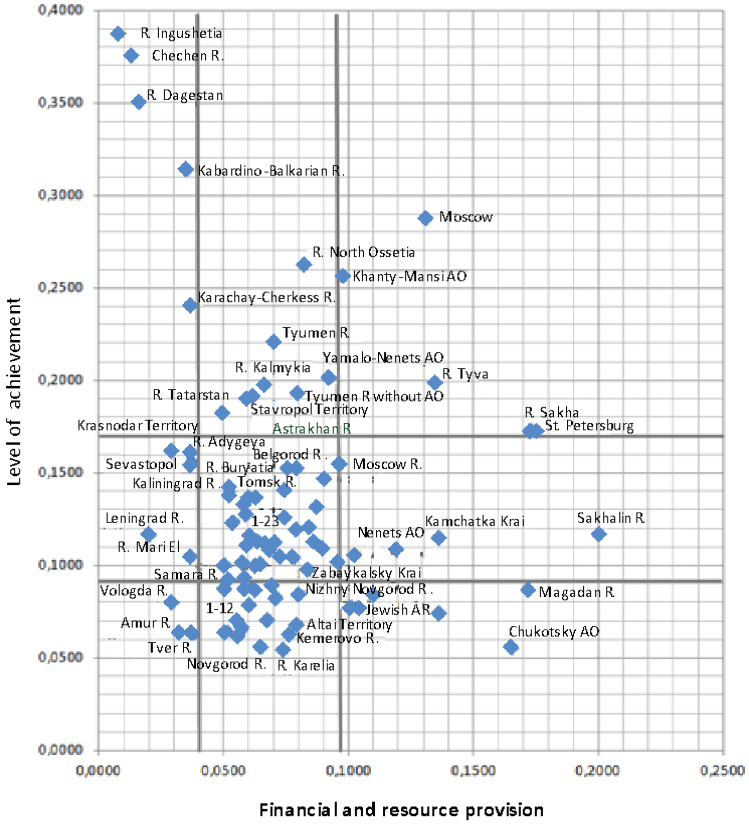

Fig. 1. Matrix of the distribution of the analyzed regions of the Russian Federation by the totality of point estimates of the values of indicators of financial and resource support and results of the state program implementation.

Segment No.1. Regions with a low level of financial resources and a high level of achievement of results. The segment includes: the Kabardino-Balkar Republic, the Karachay-Cherkess Republic, the Republic of Dagestan, the Republic of Ingushetia and the Chechen Republic. In the segment there is an imbalance between regional revenues and expenditures, a low concentration of financial resources.

Segment No.2. Regions with an average level of financial resources and a high level of achievement of results.

The regions are characterized by a rational formation of budgets in terms of socio-economic development of territories. Demographic statistics indicators allow us to conclude that the situation in the regions is favorable. The segment includes: the Astrakhan Region, the Republic of Kalmykia, the Republic of North Ossetia – Alania, the Republic of Tatarstan, Stavropol Krai, the Tyumen Oblast, the Yamalo-Nenets Autonomous Okrug.

Segment No.3. Regions with high levels of financial and resource support and achievement of results. They include: Moscow, St. Petersburg, the Republic of Sakha (Yakutia), the Republic of Tuva and Khanty-Mansi Autonomous Okrug – Yugra. The regions are distinguished by the balance between state guarantees in the provision of medical care and financial opportunities, the financial flows are balanced.

Segment No.4. Regions with a low level of financial and resource support and an average level of achievement of results. The regions are characterized by the imbalance of state guarantees in the provision of medical care and financial capabilities.

The regions have the opportunity to rectify this situation by improving the efficiency of spending on medical care, on the availability and quality of medical care for the population. The segment includes: the city of Sevastopol, Krasnodar Krai, the Leningrad region, the Republic of Adygeya, the Republic of Mari El.

Segment No.5. Regions with average levels of financial and resource support and achievement of results. The regions of the segment are economically developed, the territories have high tax potential. With average levels of resource provision and results, there are reserves for improving the effectiveness of the implementation of the state program. The segment includes 30 regions: the Belgorod region, the Volgograd region, the Voronezh Region, the Kaliningrad Region, the Ulyanovsk Region, the Chuvash Republic, and other regions (Fig.1, 1-23 and having captions).

Segment No. 6. Regions with a high level of financial resources and an average level of achievement of results. We can note the balance between budget revenues and expenditures, a high degree of concentration of financial, human and material resources in the regions. The demographic situation is satisfactory. The regions belong to the segment: The Kamchatka Region, The Moscow Region, The Murmansk region, Nenets Autonomous Okrug, Sakhalin Oblast, Khabarovsk Krai.

Segment No.7. Regions with low levels of financial and resource support and achievement of results. The segment is characterized by a low level of competitiveness of the economy, an imbalance in the expenditure of budgetary funds is determined. The creation of conditions for improving the quality and accessibility of medical care to citizens of the subjects of the Russian Federation, taking into account the demographic situation in the regions, is a priority of state policy in the field of health care. The segment includes: the Amur region, the Vologda Region, the Tver Region.

Segment No.8. Regions with an average level of financial and resource support and a low level of achievement of results. The regions of the segment are characterized by the rational formation and execution of budgets in terms of health care. However, public authorities need to find reserves to improve the efficiency of the functioning of the regional health care system. The segment includes 18 regions: the Vladimir region, the Kemerovo

region, the Nizhny Novgorod region, the Perm region, the Republic of Karelia, the Yaroslavl region and others.

Segment No.9. Regions with a high level of financial and resource support and a low level of achievement of results. The segment includes 6 regions: the Arkhangelsk Region, the Jewish Autonomous Region, the Irkutsk region, the Magadan Region, the Komi Republic, the Chukotka Autonomous Okrug. Regional governments have the ability to fund the health care system over a long period of time. Taking into account the lack of capacity for health care development and the demographic situation in the regions, the direction of state policy in the field of health care should become a priority.

4 Conclusion

As part of the work were assessed and grouped entities of the Russian Federation in accordance with the levels of financial and resource support and the achievement of the results of the state program in the regions. As a result of the evaluation by selected indicators, the authors concluded that the location of a region in a particular segment allows to give the strategy of public funding through the State Program of Health Development a certain vector of development, identifying its weaknesses and strengths.

In conclusion, it should be noted that the considered methodology takes into account the difference in budget capabilities and the regions' ability to meet the established target indicators of health care assessment. In the future, on the basis of the obtained data, it is supposed to build a health care financing strategy in the subjects of the Russian Federation, allowing to increase the efficiency of the use of state program funds.

Acknowledgments

The study was carried out within the framework of the realization of the Strategic Academic Leadership Program "Priority 2030", project H-426-99_2022-2023 "Socio-economic models and technologies for the creative human capital development in the innovative society

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